

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

November 4, 1993

NRC INFORMATION NOTICE 93-87: FUSE PROBLEMS WITH WESTINGHOUSE 7300 PRINTED
CIRCUIT CARDS

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to recent failures of Westinghouse 7300 printed circuit cards related to the use of incorrect fuses. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

On April 29, 1992, at the Catawba Nuclear Station, a capacitor failed in a Westinghouse type NAL printed circuit card. The card was used in the control circuit for the reactor coolant system power operated relief valves (PORVs). The fault resulted in the loss of the PORV automatic operation function on two of the three PORVs (although operation in the manual mode was not affected), and no alarm was initiated to alert the operator to the card failure. The licensee, Duke Power Company, found that the card was protected with a 5.0 ampere (A) fuse, rather than the specified 0.5 A fuse. Had the correct fuse been installed, it would have cleared the fault and generated an alarm.

On April 5, 1993, at the V.C. Summer Nuclear Power Station, a fuse blew in a type NAC card in the component cooling water system. The card was used for annunciation and safety-related automatic action for low surge tank level. The 0.63 A fuse blew with a card load of about 1.0 A, which is within the normal range if all of the card outputs are energized. Thus the blown fuse was the cause of the card failure, rather than a protective response to another fault. The licensee, South Carolina Electric & Gas Company, found that most type NAC cards have a 2.0 A fuse, but the installed card had the 0.63 A fuse specified in an outdated drawing (Revision 6).

Discussion

Type NAL signal comparator cards are used extensively in the Westinghouse 7300 series solid state protection system and process control cabinets. Type NAC signal comparator cards are not used in the solid state protection system, but

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are used in the process control cabinets, particularly where Westinghouse provided balance-of-plant control equipment.

Catawba personnel inspected the 7300 circuit cards in both units and in the warehouse stock (approximately 1000 cards) and found 150 discrepancies in fuse size, compared with the values specified in the instruction book. Most discrepancies were small (e.g., 0.5 A required vs. 1.0 A installed), but 27 of the MA and MB fuses on type NAL cards were found to be 5.0 A fuses, rather than the specified 0.5 A fuses. After the Catawba inspection, Westinghouse prepared a list of correct fuse values for the various 7300 series card types. The list was subsequently issued by Westinghouse to all customers early in 1993 as Infogram IG 93001.

The Westinghouse drawing for a circuit card may contain several groups and typically has undergone several revisions. Westinghouse provides each licensee with an instruction book for each card type, which includes the schematic diagram and bill of material for the drawing revision in effect at that time. (The Catawba manual for the NAL card type, for example, is dated September 1976.) When a licensee returns a failed card for repair, Westinghouse routinely updates the card to the then-current drawing revision. The documentation provided typically identifies that an update was performed, and identifies the new part numbers, but does not otherwise describe the new parts. Thus the licensee is advised that the card was changed, but does not know the values or other details of any new parts. Although such changes are relatively minor, they can affect component values.

The Catawba inspection found nine card types with discrepant fuse values: NAL, NCD, NCH, NCT, NLP, NMA, NRA, NSA, and NSC. The Infogram identified six of these types as experiencing drawing revisions that included fuse changes. The reason for the discrepant 5.0 A fuses on NAL cards at Catawba is not clear, but Catawba sends cards to the vendor rather than repairing onsite.

The type NAC card that failed at Summer used a fuse specified only for an outdated revision of the card. According to Westinghouse, at drawing Revision 5, fuse M121 had a value of 2.0 A and would not protect certain lower-rated components on the card. Accordingly, Revision 6 was generated to change to a 0.6 A fuse that would protect all of the components. At the same time, Revision 7 was initiated to upgrade component ratings and return the fuse value to 2.0 A. These changes took place in late 1973, whereas the Summer cards were not shipped until May 1978. Westinghouse Infogram IG 93001 specifies the "correct" fuse values for the seven revisions. However, it does not warn that in Revision 5 the fuse may not protect board-mounted components, or that the Revision 6 card may experience a blown fuse during normal plant operation.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) Project Manager.

orig /s/'d by BKGrimes

Brian K. Grimes, Director
Division of Operating Reactor Support
Office of Nuclear Reactor Regulation

Technical contacts: George T. MacDonald, RII
(404) 331-5576

Richard C. Wilson, NRR
(301) 504-3220

Attachment:
List of Recently Issued NRC Information Notices

*See previous concurrences

*VIB:DRIL RWilson 09/01/93	*DRS:RII GMacdonald 09/01/93	*VIB:DRIL GCwalina 09/01/93	*VIB:DRIL LNorrholm 09/02/93	*PD2-1:NRR SBajwa 09/13/93	*PD2-3:NRR DMatthews 09/08/93
*DRS:RII AGibson 09/08/93	*DRIL:NRR CRossi 09/20/93	*TechEd 09/07/93	*OGCB:DORS TJKim 09/28/93	*OGCB:DORS GMarcus 10/01/93	DORS NRR BGrimes 10/2/93

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Revision 7 was initiated to upgrade component ratings and return the fuse value to 2.0 A. These changes took place in late 1973, whereas the Summer cards were not shipped until May 1978. Westinghouse Infogram IG 93001 specifies the "correct" fuse values for the seven revisions. It does not warn that in Revision 5 the fuse may not protect board-mounted components, or that the Revision 6 card may experience a blown fuse during normal plant operation.

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<i>by Telecom</i> DRS:RII AGibson 09/08/93	<i>CM</i> DRIL:NRR CROSS 09/20/93	TechEd 09/07/93	OGCB:DORS TJKim <i>TJK</i> 09/28/93	OGCB:DORS GMarcus 09/ /93	DORS:NRR BGrimes 09/ /93

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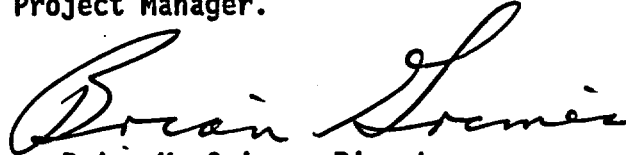
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OFFICE	VIB/DRIL	REGION II	SC/VIB/DRIL	BC/VIB/DRIL	TECHED
NAME	RWILSON <i>RCW</i>	GMACDONALD <i>GM</i>	GCHALINA <i>GC</i>	LNORRHOLM <i>LN</i>	
DATE	9/1/93	9/1/93	9/1/93	9/2/93	9/ /93
COPY	YES	YES	YES	YES NO	NO
OFFICE	D/DRS/RII	D/DRIL/NRR	BC/OGC/DORS	D/DORS	
NAME	AFGIBSON	CEROSI	GMARCUS	BKGRIMES	
DATE	9/ /93	9/ /93	9/ /93	9/ /93	
COPY	YES NO	YES NO	YES NO	YES NO	YES NO

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LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
93-86	Identification of Isotopes in the Production and Shipment of Byproduct Material at Non-power Reactors	10/29/93	All holders of OLs or CPs for test and research reactors.
93-85	Problems with X-Relays in DB- and DHB-Type Circuit Breakers Manufactured by Westinghouse	10/20/93	All holders of OLs or CPs for nuclear power reactors.
93-84	Determination of Westinghouse Reactor Coolant Pump Seal Failure	10/20/93	All holders of OLs or CPs for pressurized water reactors (PWRs).
93-83	Potential Loss of Spent Fuel Pool Cooling Following A Loss of Coolant Accident (LOCA)	10/07/93	All holders of OLs or CPs for boiling water reactors (BWRs).
93-82	Recent Fuel and Core Performance Problems in Operating Reactors	10/12/93	All holders of OLs or CPs for nuclear power reactors and all NRC-approved fuel suppliers.
93-81	Implementation of Engineering Expertise on Shift	10/12/93	All holders of OLs or CPs for nuclear power reactors.
93-80	Implementation of the Revised 10 CFR Part 20	10/08/93	All byproduct, source, and and special nuclear material licensees.
93-79	Core Shroud Cracking at Beltline Region Welds in Boiling-Water Reactors	09/30/93	All holders of operating licenses or construction permits for boiling-water reactors (BWRs).
93-78	Inoperable Safety Systems At A Non-Power Reactor	10/04/93	All holders of OLs or CPs for test and research reactors.

OL - Operating License
CP - Construction Permit

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