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

March 22, 1995

NRC INFORMATION NOTICE 95-19: FAILURE OF REACTOR TRIP BREAKER TO OPEN BECAUSE OF CUTOFF SWITCH MATERIAL LODGED IN THE TRIP LATCH MECHANISM

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 the possible failure of a circuit breaker to open because of obstruction by material from a subcomponent switch. It is expected that recipients will review this 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 July 14, 1994, during the monthly testing of the logic matrix of the reactor protection system at St. Lucie, Unit 2, a General Electric (GE) Model AK 2-25 circuit breaker failed to open after operating correctly on three previous steps of the surveillance procedure. This circuit breaker is one of eight reactor trip circuit breakers in a one-out-of-two taken twice reactor trip coincidence logic. Several unsuccessful attempts were made to open the breaker both electrically and mechanically before the licensee isolated the breaker as required by the Technical Specifications and shut down the Unit 2 reactor.

The investigation of the problem revealed that a 6-mm-square [1/4-inch-square] piece of phenolic material had jammed the circuit breaker trip latch mechanism, preventing its operation. This piece of phenolic material had broken off from the breaker cutoff switch (p/n 622 C 505 G1), which is part of the breaker antipump circuitry. The cutoff switch is mounted in the breaker assembly above the trip latch mechanism (Figure 1). A screw holding the cutoff switch had come loose, allowing two halves of the switch to separate, become misaligned, and break during the previous circuit breaker operation.

The licensee inspected the remaining Unit 2 trip circuit breakers as well as the similar motor generator set output breakers. No additional loose screws were found on the cutoff switch mountings. The licensee has incorporated the inspection of the cutoff switch phenolic block and screw into the maintenance procedures for Units 1 and 2.

Discussion

On April 6, 1989, GE Switchgear Operation issued service advisory letter (SAL) 303.0, which dealt with the possibility that the cutoff switch actuator could crack and break and lead to breaker coil burnout. The text of SAL 303.0 is shown in Attachment 2. Although these cutoff switches had a different failure mode and were installed on different breaker models (Models AKR(U) 30s and AK(U) 25-1), the cutoff switch in question was the same part (p/n 622 C 505 G1) as the one that caused the AK2-25 breaker failure at St. Lucie, Unit 2.

The majority of the reactor trip breaker failures at power reactors have been caused by problems with relatively small electrical subcomponents in the breaker assembly, rather that the malfunction of the main breaker mechanism itself. The failure of the cutoff switch in the trip breaker at St Lucie is another example of a subcomponent failure resulting in the failure of a trip breaker. The frequency of reactor trip breaker failures could be reduced if these small component problems were made less likely by appropriate inspection and maintenance.

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.

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

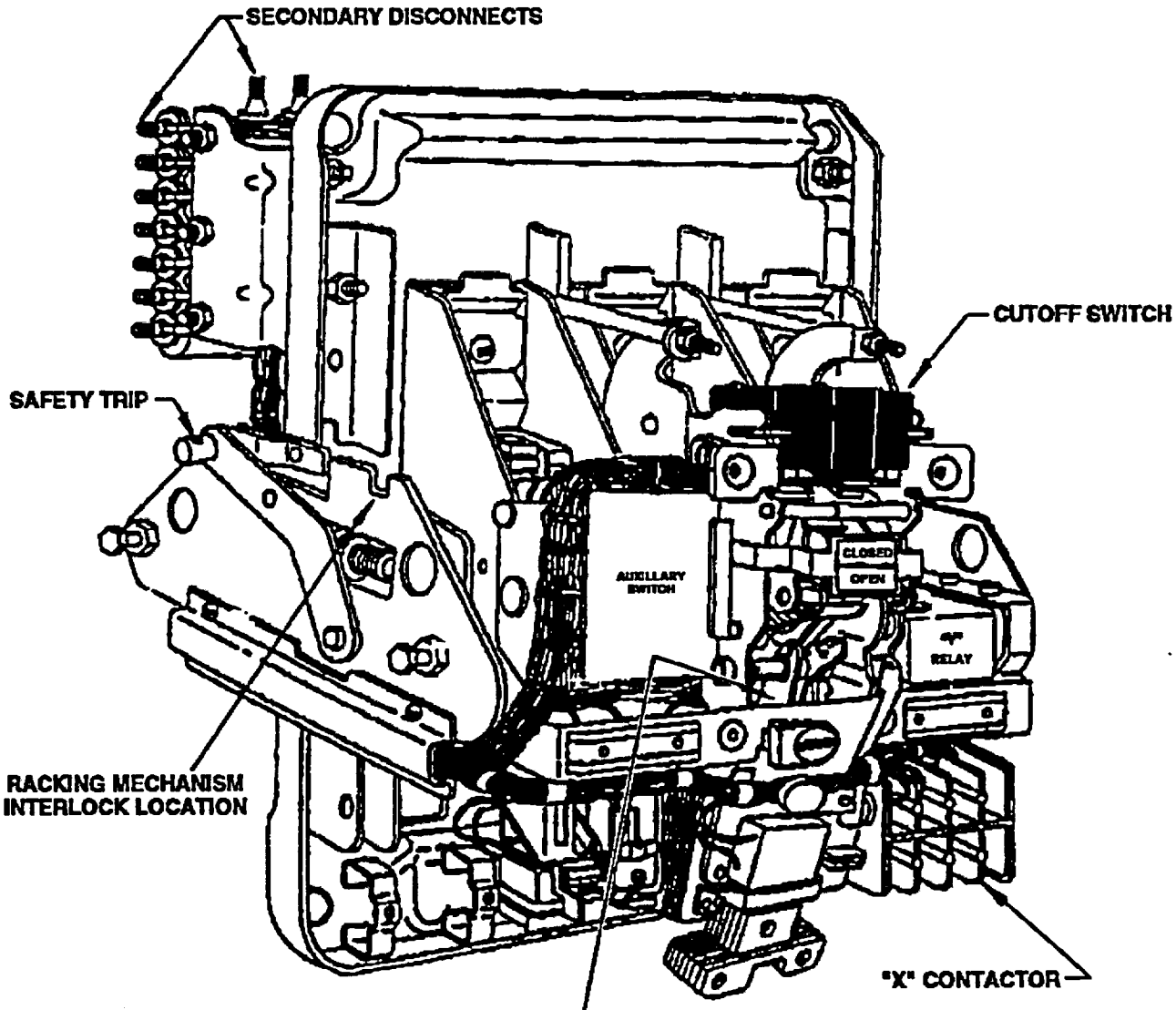
Technical contacts: S. Rudisail, Region II
(404) 331-5582

S. K. Mitra, NRR
(301) 415-2783

M. B. Shymlock, Region II
(404) 331-5596

Attachments:
1. Figure 1
2. GE SAL 303.0
3. List of Recently Issued NRC Information Notices

FIGURE 1
AK-2 BREAKER FRONT VIEW



(CUTOFF SWITCH P/N 622 C 505 G1)

SWITCHGEAR OPERATION SERVICE ADVICE	SUBJECT	ELECTRICALLY OPERATED AKR 30S AND AKRU 30S BREAKERS AK 25-1 AND AKU 25-1 BREAKERS CUT OF SWITCH BREAKAGE	
	TAB	073B SWGR OPER	SA NO. 303.0

Background

The function of the Cut Off Switch is to interrupt the closing coil when the breaker is closed.

Problem

On electrically operated AKR(U) 30S and AK(U) 25-1 breakers manufactured between July 1986 and November 1987 there is a possibility that the cut off switch actuator may crack and break. If this occurs, the closing coil may be overheated and burn up when the breaker is closed.

Recommended Action

GE recommends that the cut off switch actuator on all affected breakers be visually checked for cracks at the next regular breaker maintenance / inspection. This includes all AKR(U) 30S breakers with a Breaker Code Date less than P747+ and all AK(U) 25-1 breakers with a Breaker Date Code P548+ through P747+. The Breaker Code Date is on the control voltage nameplate located to the right of the escutcheon on the breaker frame.

Corrective Action

If a broken or cracked cut off switch is found, contact Customer Service for a no-charge replacement cut off switch [Part No. 622C505G1] at:

Mary Hockett
Customer Service
General Electric
PO Box 488
Burlington, IA 52601

Phone: (319) 753-8475
8*673-6475
Telecopier: (319) 753-5479
8*673-6479

Please have Breaker Serial Numbers and Date Codes when you contact us.

PREPARED BY	ISSUED BY	DATE	SUPERSEDES ISSUE DATED	PAGE 1 OF 1
GARY SCHULE	DON LESNET	4-06-89	(NEW)	

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
95-18	Potential Pressure-Locking of Safety-Related Power-Operated Gate Valves	03/15/95	All holders of OLs or CPs for nuclear power reactors.
95-17	Reactor Vessel Top Guide and Core Plate Cracking	03/10/95	All holders of OLs or CPs
95-16	Vibration Caused by Increased Recirculation Flow in a Boiling Water Reactor	03/09/95	All holders of OLs or CPs for boiling water reactors.
95-15	Inadequate Logic Testing of Safety-Related Circuits	03/07/95	All holders of OLs or CPs for nuclear power reactors.
95-14	Susceptibility of Containment Sump Recirculation Gate Valves to Pressure Locking	02/28/95	All holders of OLs or CPs for nuclear power reactors.
95-13	Potential for Data Collection Equipment to Affect Protection System Performance	02/24/95	All holders of OLs or CPs for nuclear power reactors.
95-12	Potentially Nonconforming Fasteners Supplied by A&G Engineering II, Inc.	02/21/95	All holders of OLs or CPs for nuclear power reactors.
95-11	Failure of Condensate Piping Because of Erosion/ Corrosion at a Flow-Straightening Device	02/24/95	All holders of OLs or CPs for nuclear power reactors.
95-10 Supp. 1	Potential for Loss of Automatic Engineered Safety Features Actuation	02/10/95	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

Discussion

On April 6, 1989, GE Switchgear Operation issued service advisory letter (SAL) 303.0, which dealt with the possibility that the cutoff switch actuator could crack and break and lead to breaker coil burnout. The text of SAL 303.0 is shown in Attachment 2. Although these cutoff switches had a different failure mode and were installed on different breaker models (Models AKR(U) 30s and AK(U) 25-1), the cutoff switch in question was the same part (p/n 622 C 505 G1) as the one that caused the AK2-25 breaker failure at St. Lucie, Unit 2.

The majority of the reactor trip breaker failures at power reactors have been caused by problems with relatively small electrical subcomponents in the breaker assembly, rather that the malfunction of the main breaker mechanism itself. The failure of the cutoff switch in the trip breaker at St Lucie is another example of a subcomponent failure resulting in the failure of a trip breaker. The frequency of reactor trip breaker failures could be reduced if these small component problems were made less likely by appropriate inspection and maintenance.

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Original signed by Brian K. Grimes

Brian K. Grimes, Director
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Office of Nuclear Reactor Regulation

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(301) 415-2783

M. B. Shymlock, Region II
(404) 331-5596

Attachments:
1. Figure 1
2. GE SAL 303.0
3. List of Recently Issued NRC Information Notices

DOCUMENT NAME: S:\DOPS SEC\95-19.IN *See previous concurrence

OECB:DOPS:NRR*	RPB:ADM	EELB:DE	C/EELB:DE
DCKirkpatrick	BCalure, Tech Ed*	SKMitra*	CEBerlinger*
12/22/94	12/28/94	01/23/95	01/23/95
RII (via e-mail)	RII (via e-mail)	SC/OECB:DOPS:NRR	OECB:DOPS:NRR
SRudisail*	MBShymlok*	EFGoodwin*	RJKiessel*
01/25/95	01/25/95	01/26/95	02/01/95
C/OECB:DOPS:NRR	D/DOPS:NRR		
AEChaffee*	BKGrimes		
03/11/95	03/17/95		

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With Noted correction on pg 1

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RJKiessel	AEChaffee	BKGrimes	
01/ /95	01/ /95	01/ /95	

* See previous concurrences

From: Donald C. Kirkpatrick (DCK1)
To: SBR
Date: Wednesday, January 25, 1995 10:43 am
Subject: CONCURNCE W IN:FAILURE OF RX TRIP BREAKR

Steve:

The attached file contains your proposed IN on the failure of the reactor trip breaker due to foreign material in the latch. Brian Grimes decided that it should be issued after all. We added some history on previous problems with the cutoff switch that was the source of the jamming material.

Please review it, concur if possible and pass it on to Shymlock. Pleace call me at (301) 504-1849 if you need anything else on this.

Thanks,

Don Kirkpatrick, OECB

Files: G:\DON\BREAKER

From: Steven B. Rudisail (SBR)
To: AT1:HMS1:HMS2:WN4:DCK1
Date: Wednesday, January 25, 1995 3:03 pm
Subject: CONCURNCE W IN:FAILURE OF RX TRIP BREAKR

Milton Shymlock and I have reviewed the draft notice and we both concur.

CC: MBS

1. Contents of GE Service Advisory Letter 303.0

2. List of Recently Issued NRC Information Notices

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DCKirkpatrick DCK	B. Calvo, Tech Ed	SKMitra	CEBerlinger
12/22/94	12/28/94	01/ 95	

REG II	REG II		SC/OECB:DOPS:NRR
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01/ /95	01/ /95		01/ /95

OECB:DOPS:NRR	C/OECB:DOPS:NRR	D/DOPS:NRR	
RJKiessel	AEChaffee	BKGrimes	
01/ /95	01/ /95	01/ /95	