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

July 28, 1988

NRC INFORMATION NOTICE NO. 88-54: FAILURE OF CIRCUIT BREAKER FOLLOWING INSTALLATION OF AMPTECTOR DIRECT TRIP ATTACHMENT

Addressees:

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

Purpose:

This information notice is being provided to alert addressees to potential problems resulting from the installation of Amptector direct trip attachments on Westinghouse Electric Corporation (W) and General Electric Company (GE) circuit breakers. 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On December 21, 1987, the "B" train residual heat removal (RHR) pump at the R.E. Ginna Nuclear Power Plant failed to start during a required surveillance test. The cause of the failure was attributed to a power supply circuit breaker that failed to remain closed on a valid close signal. The spurious opening of this circuit breaker interrupted power to the RHR pump because the circuit breaker Amptector direct trip attachment (DTA) was improperly installed. Inadequate clearance existed between the circuit breaker trip bar and the DTA's actuating arm. Therefore, the mechanical vibration that generally accompanies the closing of a circuit breaker was sufficient to cause the DTA's actuating arm to actuate the circuit breaker trip bar and resulted in the reopening of the breaker.

During the failure, a battery equalizing charge was in progress, which the licensee feels also contributed to the opening of the breaker. The higher than normal operating voltage of 140V dc (as opposed to the normal 130V dc) applied to the breaker likely increased the vibration generated during the closing of the breaker.

Discussion:

As a result of the RHR pump breaker failure, the licensee conducted operational tests on all Class 1E circuit breakers that had undergone the Amptector modification. The "B" train safety injection pump breaker failed on the seventh

actuation. Additional checks of the RHR pump circuit breaker did not result in a failure until the 14th actuation. No other failures were observed and the problem was determined to be intermittent.

The licensee, in consultation with W representatives determined that there was a direct correlation between the circuit breaker failure and the procedure used by the licensee in mounting the Amptector DTA. The procedures supplied by W for installing the trip attachment did not specifically indicate a minimum clearance that was to be maintained between the DTA's actuating arm and the circuit breaker trip bar. W representatives orally informed the licensee that the clearance should measure between 1/32 and 1/16 of an inch which is the gap used by W in establishing the seismic adequacy of the DTA on W circuit breakers.

W representatives stated that this minimum clearance is recommended to ensure that there is no contact between the actuating arm and the trip bar during pre-trip steady-state operating conditions to reduce the possibility of inadvertent actuation. It is our understanding that W will be issuing a technical bulletin addressing the DTA.

The circuit breakers for which this modification is designed are the W Model DB series and the GE Model AK 2A series. The Amptector DTA is manufactured and supplied by W. The operating plants that are known to have the attachments in place are H. B. Robinson, Indian Point 2, Connecticut Yankee, Three Mile Island 1, Cooper, Fitzpatrick, Monticello and San Onofre, but this list may not be complete.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: N. Fields, NRR
(301) 492-1173

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-53	Licensee Violations of NRC Regulations, Which Led to Medical Diagnostic Misadministrations	7/28/88	All manufacturers and distributors of radiopharmaceuticals for human use, nuclear pharmacies, and medical licensees.
88-52	Failure of Intrauterine Tandem of Fletcher Applicator Brachytherapy Devices During Patient Treatment	7/27/88	Medical licensees.
88-46, Supplement 1	Licensee Report of Defective Refurbished Circuit Breakers	7/26/88	All holders of OLs or CPs for nuclear power reactors.
88-51	Failures of Main Steam Isolation Valves	7/21/88	All holders of OLs or CPs for nuclear power reactors.
88-50	Effect of Circuit Breaker Capacitance on Availability of Emergency Power	7/18/88	All holders of OLs or CPs for nuclear power reactors.
88-49	Marking, Handling, Control, Storage and Destruction of Safeguards Information	7/18/88	All holders of OLs or CPs for nuclear power reactors and all other licensed activities involving a formula quantity of special nuclear material.
88-48	Licensee Report of Defective Refurbished Valves	7/12/88	All holders of OLs or CPs for nuclear power reactors.
88-47	Slower-Than-Expected Rod-Drop Times	7/14/88	All holders of OLs or CPs for PWRs.

OL = Operating License
CP = Construction Permit

actuation. Additional checks of the RHR pump circuit breaker did not result in a failure until the 14th actuation. No other failures were observed and the problem was determined to be intermittent.

The licensee, in consultation with W representatives determined that there was a direct correlation between the circuit breaker failure and the procedure used by the licensee in mounting the Amptector DTA. The procedures supplied by W for installing the trip attachment did not specifically indicate a minimum clearance that was to be maintained between the DTA's actuating arm and the circuit breaker trip bar. W representatives orally informed the licensee that the clearance should measure between 1/32 and 1/16 of an inch which is the gap used by W in establishing the seismic adequacy of the DTA on W circuit breakers.

W representatives stated that this minimum clearance is recommended to ensure that there is no contact between the actuating arm and the trip bar during pre-trip steady-state operating conditions to reduce the possibility of inadvertent actuation. It is our understanding that W will be issuing a technical bulletin addressing the DTA.

The circuit breakers for which this modification is designed are the W Model DB series and the GE Model AK 2A series. The Amptector DTA is manufactured and supplied by W. The operating plants that are known to have the attachments in place are H. B. Robinson, Indian Point 2, Connecticut Yankee, Three Mile Island 1, Cooper, Fitzpatrick, Monticello and San Onofre, but this list may not be complete.

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*see previous concurrence

EAB:NRR	EAB:NRR	TECH:ED	C:EAB:NRR	D:DEST:NRR	DRIS:VIB
NFields:db*	RLobel	*	WLanning*	LShao*	WBrach*
5/4/88	5/6/88	5/12/88	5/18/88	7/14/88	7/18/88

DD:DRIS	C:GCB:NRR	~~D:DOEA:NRR~~
BGrimes*	CHBerlinger*	CERossi
7/20/88	7/21/88	7/27/88

Discussion

As a result of the RHR pump breaker failure, the licensee conducted operational tests on all Class 1E circuit breakers that had undergone the "Amptector" modification. The "B" train safety injection pump breaker failed on the seventh actuation. Additional checks of the RHR pump circuit breaker did not result in a failure until the 14th actuation. No other failures were observed and the problem was determined to be intermittent.

The licensee, in consultation with W representatives determined that there was a direct correlation between the circuit breaker failure and the procedure used by the licensee in mounting the "Amptector" DTA. The procedures supplied by W for installing the trip attachment did not specifically indicate a minimum clearance that was to be maintained between the DTA's actuating arm and the circuit breaker trip bar. W representatives orally informed the licensee that the clearance should measure between 1/32 and 1/16 of an inch and, indeed, this gap was used by W in establishing the seismic adequacy of the DTA on W circuit breakers.

W representatives stated that this clearance is recommended only to ensure that there is no contact between the actuating arm and the trip bar during pre-trip steady-state operating conditions. This reduces the possibility of inadvertent actuation. The Ginna licensee has verified that all Class 1E circuit breakers with the Amptector modification are operable. Any needed adjustments were made by bending the actuating arm to obtain the proper clearance.

The circuit breakers for which this modification is designed are W Model DB, and GE Model AK 2A. The operating plants that are known to have the attachments in place are H. B. Robinson, Indian Point 2, Connecticut Yankee, Three Mile Island 1, Cooper, Fitzpatrick, Monticello and San Onofre.

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NFields:db*	RLobel	*	WLanning*	LShao	~~JStone~~
/ /88	/ /88	/ /88	/ /88	7/14/88	7/8/88

D:DRIS	C:GCB:NRR	D:DOEA:NRR
BGrimes	CHBerlinger	CERossi
7/8/88	7/12/88	/ /88

Discussion

As a result of the RHR pump breaker failure, the licensee conducted operational tests on all Class 1E circuit breakers that had undergone the Amptector modification. The "B" train safety injection pump breaker failed on the seventh actuation. Additional checks of the RHR pump circuit breaker did not result in a failure until the 14th actuation. No other failures were observed, ~~and the problem was determined to be intermittent.~~

The licensee, in consultation with W representatives determined that there was a direct correlation between the circuit breaker failure and the procedure used by the licensee in mounting the Amptector ~~OTA~~. The procedures supplied by W for installing the trip attachment did not specifically indicate a minimum clearance that was to be maintained between the ~~OTA~~'s actuating arm and the circuit breaker trip bar. W representatives orally informed the licensee that the clearance should measure 1/32 inch and, indeed, this gap was used by W in establishing the seismic adequacy of the ~~OTA~~ on W circuit breakers.

W representatives stated that this clearance is recommended only to ensure that there is no contact between the actuating arm and the trip bar during pre-trip steady-state operating conditions. This reduces the possibility of inadvertent actuation. The Ginna licensee has verified that all Class 1E circuit breakers with the Amptector modification are operable. Any needed adjustments were made by bending the actuating arm to obtain the proper clearance.

The circuit breakers for which this modification is designed are W Model DB, ~~Types 25, 50, and 75~~, and GE Model AK 2A, ~~Types 25, 50, and 75~~. The operating plants that are known to have the attachments in place are H. B. Robinson, Indian Point 2, Connecticut Yankee, Three Mile Island 1, Cooper, Fitzpatrick, ~~Rancho Seco~~, San Onofre and Monticello.

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NFields:db *	RLobel*	*	WLanning*	CHBerlinger	CERossi
/ /88	/ /88	/ /88	5/16/88	/ /88	/ /88

Discussion

As a result of the RHR pump breaker failure, the licensee conducted operational tests on all class IE circuit breakers which had undergone the "Amptector" modification. The "B" train safety injection pump breaker failed on the 7th actuation. Additional checks of the RHR pump circuit breaker did not produce a failure until the 14th actuation. No other failures were observed and the problem was determined to be intermittent.

The licensee, in consultation with W representatives determined that there was a direct correlation between the circuit breaker failure and the procedure employed by the licensee in mounting the "Amptector" OTA. The W supplied procedures for installing the trip attachment did not specifically indicate a minimum clearance to be maintained between the OTA's actuating arm and the circuit breaker trip bar. W representatives verbally informed the licensee that the clearance should measure 1/32 inch and, indeed, this gap was used by W in establishing the seismic adequacy of the OTA on W circuit breakers.

W stated that this clearance is recommended only to assure that there is no contact between the actuating arm and the trip bar during pre-trip steady state operating conditions. This reduces the possibility of inadvertent actuation. The Ginna licensee has verified that all Class IE circuit breakers with the "Amptector" modification are operable. Any needed adjustments were made by bending the actuating arm to obtain proper clearance.

The circuit breakers for which this modification is designed are W Model DB, Type 25, 50 and 75, and GE Model AK 2A Type 25, 50 and 75. The operating plants which are known to currently have the attachments in place are H.B. Robinson, Indian Point 2, Connecticut Yankee, Three Mile Island 1 , Cooper, Fitzpatrick, Rancho Seco and Monticello.

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NAME	:NFields:db	:RLobel	: M Meyer	:WLanning	:CERossi	:	:
DATE	:5/12/88	:5/16/88	:5/12/88	: / /88	: / /88	:	:

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