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

July 6, 1989

NRC INFORMATION NOTICE NO. 89-45, SUPPLEMENT 1: METALCLAD, LOW-VOLTAGE POWER CIRCUIT BREAKERS REFURBISHED WITH SUBSTANDARD PARTS

Addressees:

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

Purpose:

This information notice supplement is being provided to present additional information regarding the supply of surplus or refurbished circuit breakers and related electrical equipment to nuclear power plants as discussed in NRC Information Notice No. 89-45. 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

NRC Information Notice No. 89-45 discussed a General Electric (GE) type AKF-2-25 metalclad, low-voltage power circuit breaker (field discharge configuration) from the Quad Cities nuclear power plant found to be refurbished with nonstandard and substandard parts.

In conducting followup inspections at Utilities that have procured circuit breakers of this type and other related electrical equipment from Satin American Corporation, the NRC has learned of the existence of other equipment from Satin American, refurbished with nonstandard and possibly substandard parts and fabrication methods, some of which may contain latent defects resulting from the introduction of nonstandard materials and components. These defects may not be readily detectable by means of normal inspection and testing, and the nature of the defects is such that they could render the equipment inoperable without warning.

Discussion:

Recent information, received in the course of the NRC's review and inspections of refurbished electrical equipment, indicates that GE EC-type, series overcurrent trip devices (particularly EC-1 and EC-2A) commonly used in GE

AK-type, low-voltage power circuit breakers, and supplied by a vendor other than the original manufacturer, may have been represented as new or original equipment. Documentation such as "certificates of certification" stated that the trip devices were "duplicates" of "identical" equipment originally supplied, when in fact, they were refurbished. Many were fitted with irregular nameplates and nonstandard and substandard parts. The trip devices were supplied primarily during the period 1983 through 1987. These electromechanical devices are presently used in Class 1E DC electrical systems because the newer solid-state devices use current transformers as sensors which do not operate on DC. They are also used in safety-related AC electrical systems that may be exposed to the harsh radiation environments of design-basis accidents. Solid-state trip devices have limited capability to withstand the effects of accident radiation doses greater than 10,000 rads or to function properly under the conditions of high accident radiation dose rates.

Of particular concern is the fact that, in addition to irregular nameplates and refurbishments not in accordance with the manufacturer's specifications, some of the units could be considered potentially defective as a result of the use of nonstandard parts and questionable refurbishing methods. Specifically, disassembly and detailed examination of trip units supplied to Nine Mile Point, Unit 1, by Satin American revealed that some trip units were modified, apparently to alter their trip characteristics, by (1) substituting series coils with nonstandard numbers of turns, (2) changing instantaneous trip springs and/or varying the number of active spring turns and/or adjusting tension to compensate, and (3) altering longtime trip characteristics by such practices as using nonstandard longtime trip calibration springs, apparently enlarging the bleed orifices in the dashpot pistons and/or substituting pistons (the markings of some of which were found to be incorrect for the nameplate longtime trip characteristic and current rating) or using other than the original dashpots to obtain different time delays. Additionally, in some trip units examined, the samples of oil taken from the dashpots exhibited some variance from their expected color and odor, indicating that the mechanical modifications may have been complemented by the use of nonstandard dashpot oils (of yet undetermined composition, viscosity, and compatibility) to aid in obtaining the desired longtime trip characteristics.

Aside from the issue of representation of refurbished equipment as original, such modifications constitute the introduction of potential latent defects into equipment, already of indeterminate quality, that would not be readily detected by normal field testing and inspection and which could result in degraded trip unit performance, inability to be adjusted properly, or failure to operate entirely.

Attachment 1 identifies differences that have been observed between several characteristics of construction of refurbished series overcurrent trip devices as supplied by Satin American and original ones from GE. Some of these attributes, identified by an asterisk (*), can often be observed without removing an installed trip unit from its circuit breaker (although the breaker may have to be racked out) and the rest may be observed by removing only the trip unit cover. These attributes may be used to identify refurbished units, although they, in themselves, may not all represent defects.

Attachment 2 tabulates differences between various attributes of irregular nameplates found on some refurbished series overcurrent trip devices supplied by Satin American and authentic ones from GE. These differences may also be used to identify refurbished units.

Addressees are cautioned that although the differences described in Attachments 1 and 2 may be used to identify refurbished units from one vendor, each characteristic should be considered, since not all refurbished units will exhibit all of the differences that have been identified. Therefore, the lack of some of the differences described, or variations on them, should not be considered sufficient evidence to conclude that a given trip unit has not been refurbished.

The NRC is particularly interested in obtaining information on circuit breakers and related electrical equipment supplied by Satin American or others in which differences or deficiencies have been found that are similar to those described in IN 89-45 and this supplement. Of special interest is information on recent procurements. Documentation, in as much detail as practicable, of any such differences or deficiencies discovered, especially in cases in which a piece of equipment may have been improperly serviced or refurbished, is important. Licensees may communicate information of this type by telephone to one of the technical contacts listed below.

No specific action or written response is required by this information notice supplement. If you have any questions about this matter, please contact one of the technical contacts 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 Contacts: S. D. Alexander, NRR
(301) 492-0995

U. Potapovs, NRR
(301) 492-0984

Attachments:
1. Observed Differences in Original and Refurbished Trip Device Construction
2. Observed Differences in Authentic and Irregular Trip Device Nameplates
3. List of Recently Issued NRC Information Notices

OBSERVED DIFFERENCES IN ORIGINAL AND REFURBISHED TRIP DEVICE CONSTRUCTION

This attachment identifies differences that have been observed between several characteristics of construction of refurbished series overcurrent trip devices as supplied by Satin American and original ones from GE. Some of these attributes, identified by an asterisk (*), can often be observed without removing an installed trip unit from its circuit breaker (although the breaker may have to be racked out) and the rest may be observed by removing only the trip unit cover. These attributes may be used to identify refurbished units.

	COMPONENT	ORIGINAL GE	REFURBISHED
*1.	Magnetic structure pole-piece laminations	Fastened with rivets	Fastened with split pins (also called roll-pins)
*2.	EC-2A dashpot fasteners	Riveted to frame	Bolted to frame with nuts and machine screws
3.	Longtime calibration spring (EC-2A)	Half near adjusting thumbwheel is painted; color corresponds to rating range.	Slightly larger diameter and not painted
4.	EC-2A instantaneous trip adjusting spring	Usually 8 active turns and 1 inactive turn, unpainted[1]	> 9 active turns, painted including screw adjusting nut or < 8 active turns
*5.	Paint on magnetic structure and/or frame	Flat black, even and smooth	Glossy, drips, may be applied over rust
6.	Dashpot lever arm shaft rubber oil seal boots	Secured with two wraps of copper wire, ends twisted since 1984	May still use old style pinch/spring type "hose" clamps
7.	Longtime trip dashpots	Cast aluminum alloy body - unfinished	Body may have been sandblasted
*8.	Square, flat cardboard series coil insulators	Usually bears handwritten instantaneous trip setting marking and the tester's rubberstamp	Often shows no marking or is a used insulator, inverted so original marks are hidden
*9.	EC-1 trip setting or calibration plates	Factory set for longtime and short-time characteristics, bright aluminum, coarse stamped characters	Replacement plates stamped to work on refurbished unit, matte finish, finer stamped characters
*10.	Series coil: condition, number of turns, lug type, and position	Uniform amber "varnish" insulation, number of turns correct for current rating[1]	Discolored/darkened; may appear recoated, overheated; may have wrong lug pattern or number of turns

Note 1: Consult technical documentation and/or the manufacturer for specific functional and construction specifications if in doubt.

OBSERVED DIFFERENCES IN AUTHENTIC AND IRREGULAR TRIP DEVICE NAMEPLATES

This attachment tabulates differences between various attributes of irregular nameplates found on some refurbished series overcurrent trip devices supplied by Satin American and authentic ones from GE. These attributes can usually be observed without removing an installed trip unit from its circuit breaker (although the breaker may have to be racked out). These differences may be used in conjunction with Attachment 1 to identify refurbished units.

	ATTRIBUTE	AUTHENTIC GE	IRREGULAR NAMEPLATE
1.	Finish on EC-1 nameplates	Bright brushed aluminum	White anodized/matte-finished aluminum
2.	Finish on EC-2A nameplates	White anodized finish often lacquered	Similar finish, but not lacquered
3.	"INSPECTED" block stamps (made at GE Plainville, CT factory prior to about 1984)	Unique, single-line closed figure/shape[1] (not used on new units made after 1984 at GE Atlanta, GA factory)	Blank or stamp figure made by reorienting and/or superimposing one standard stamped character on another
4.	Shop or work order number (only on trip units made in GE Atlanta factory, 1984 on)	Letters "ATL-" followed by unique five-digit number usually stamped in upper left corner[1]	Not seen on refurbished trip units with irregular nameplates
5.	Date code (should not appear on plates with shop order number)[1]	Stamped, 2-ltr code on top line between catalog "NO." and type designation, year ltr different weight from month letter.	Present on most EC-2As, missing on many EC-1s examined, year and month letters same weight
6.	"NO." block (catalog part or drawing number)	0549D0497G-1 printed on EC-2As of this design	May be stamped onto irregular nameplates
7.	"NO." block	"NO." corresponds to type and unique "NP" (nameplate) number for each design[1]	Numbers may not correspond correctly or be valid at all
8.	"NO." block	"8"s in "NO." block on EC-1s appear as: "8" e.g., 238D685G-1	Plain figure "8"s
9.	Frequency symbol "CY"	Printed on EC-1s	Stamped
10.	Stamped characters	Darkened with paint	Darkened with grease
11.	EC-1 trip setting calibration plates	Coarse stamped numbers	Finer numbers, graduations closer spaced
12.	EC-2A type designation	"EC-2A" printed	"A" suffix stamped

Note 1: Consult manufacturer for identification of valid date codes, catalog numbers (and corresponding nameplate numbers), inspection stamps, and shop order numbers.

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-55	Degradation of Containment Isolation Capability by a High-Energy Line Break	6/30/89	All holders of OLs or CPs for nuclear power reactors.
89-54	Potential Overpressurization of the Component Cooling Water System	6/23/89	All holders of OLs or CPs for nuclear power reactors.
89-53	Rupture of Extraction Steam Line on High Pressure Turbine	6/13/89	All holders of OLs or CPs for nuclear power reactors.
88-46, Supp. 3	Licensee Report of Defective Refurbished Circuit Breakers	6/8/89	All holders of OLs or CPs for nuclear power reactors.
89-52	Potential Fire Damper Operational Problems	6/8/89	All holders of OLs or CPs for nuclear power reactors.
89-51	Potential Loss of Required Shutdown Margin During Refueling Operations	5/31/89	All holders of OLs or CPs for nuclear power reactors.
88-88, Supp. 1	Degradation of Westinghouse ARD Relays	5/31/89	All holders of OLs or CPs for nuclear power reactors.
89-50	Inadequate Emergency Diesel Generator Fuel Supply	5/30/89	All holders of OLs or CPs for nuclear power reactors.
89-49	Failure to Close Service Water Cross-Connect Isolation Valves	5/22/89	All holders of OLs or CPs for nuclear power reactors.
89-48	Design Deficiency in the Turbine-Driven Auxiliary Feedwater Pump Cooling Water System	5/22/89	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

Attachment 2 tabulates differences between various attributes of irregular nameplates found on some refurbished series overcurrent trip devices supplied by Satin American and authentic ones from GE. These differences may also be used to identify refurbished units.

Addressees are cautioned that although the differences described in Attachments 1 and 2 may be used to identify refurbished units from one vendor, each characteristic should be considered, since not all refurbished units will exhibit all of the differences that have been identified. Therefore, the lack of some of the differences described, or variations on them, should not be considered sufficient evidence to conclude that a given trip unit has not been refurbished.

The NRC is particularly interested in obtaining information on circuit breakers and related electrical equipment supplied by Satin American or others in which differences or deficiencies have been found that are similar to those described in IN 89-45 and this supplement. Of special interest is information on recent procurements. Documentation, in as much detail as practicable, of any such differences or deficiencies discovered, especially in cases in which a piece of equipment may have been improperly serviced or refurbished, is important. Licensees may communicate information of this type by telephone to one of the technical contacts listed below.

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**CONCURRED BY TELECON

	D/DOEA:NRR	*C/OGCB:DOEA:NRR	*RPB:ARM	**OGC
	CERossi	CHBerlinger	TechEd	JGoldberg
	07/6/89	07/05/89	07/03/89	07/03/89
*VIB:DRIS:NRR	*SC/VIB:DRIS:NRR	**C/VIB:DRIS:NRR	*D/DRIS:NRR	**OI:BC
SAlexander	UPotapovs	EWBrach	BKGrimes	GPawlik
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