Holding Letter

82-749-000

W. Laudan

Brown Boveri Electric, Inc.

Manufacturer of I-T-E Electrical Power Equipment

December 10, 1982

Mr. Victor Stello, Jr., Director
Office of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Stello:

This report is to identify a potential problem with Brown Boveri Electric (formerly ITE) low voltage circuit breakers equipped with solid state trip devices only. This potential problem may also be reported by Southern California Edison Company, San Onofre Units 2 and 3.

Four (4) solid state trip units were received from San Onofre Nuclear Units 2 and 3 on November 11, 1982.

As received, the trip units would not perform a trip function. Careful inspection and test of all units determined that capacitor C205, which is a filter capacitor in the power supply circuit, was non-functioning. This Sprague type 40D, 20 mf capacitor was replaced with a new type capacitor and each unit then functioned perfectly in all respects.

An inspection and analysis of the type 40D capacitors showed that in every case the capacitor was made ineffective from long term degradation. Three of these capacitors were sent to our supplier, Sprague Electric for inspection. Their analysis showed the capacitors damaged by internal corrosion of the internal aluminum elements indicating attack by a halogenated compound such as those used in commercial solvents. It was stated that these solvents, under certain conditions, can penetrate the elastomer seal (non-hermetic) at the end of the capacitor and attack the aluminum.

A study of our records shows that the use of the type 40D capacitor was discontinued on August 17, 1976 when a change was made to a higher temperature unit, Sprague type 137D, (22 mf). The design change was made because of electrical damage to the type 40D capacitor experienced in several applications in chemical plants. The circuits in the chemical plants on which those units were damaged, were feeders to loads consisting of heavy current SCR drives. These were determined to cause the primary load current to be very distorted (non-sinusoidal). The non-sinusoidal primary current placed an undue stress on these capacitors due to excessive AC ripple in the power supply circuit. At that time the type 137D (higher temperature rated) capacitor unit had just been placed on the market and was adopted as standard in all of our solid state trip units. The type 137D capacitor is hermetically sealed, which precludes the recurrence of the contamination problem experienced with the four (4) Southern California Edison units.

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Solid state trip units with a serial number below 28300 are suspect. Serial numbers above 28300 have the 137D capacitor installed. The serial number is shown on a tag on the side of the trip unit.

For trip units packaged in a gray case the capacitor is designated C205. For trip units packaged in a red case the capacitor is designated as C4.

The ultimate failure condition of the capacitor is an open circuit. At this point the trip unit will not respond to an overcurrent condition (i.e. will not trip the breaker). During the initial stages of degradation it may be possible to get nuisance operations for load currents below the pick up settings.

This failure condition should be uncovered by routine testing of the trip unit with the ITE type 504 test set, however, test sets with serial numbers below 260 may not be able to detect the condition. Users with test sets below serial number 260 should check with the manufacturer to determine if the test set needs modification.

This condition is possible on Brown Boveri Electric (formerly ITE) low voltage power circuit breaker with solid state (static) trip devices only. Records indicate that these are located at the following Nuclear Stations.

Detroit Edison Company	Fermi 341
Long Island Lighting Company	Shoreham 322
Duke Power Company	McGuire 369, 370, 353
Philadelphia Electric Company	Limerick 352
Indiana & Michigan	Cook 315, 316
Cincinnati Gas & Electric	Zimmer 358
Pennsylvania Power & Light	Susquehanna 387, 388
Southern California Edison	San Onofre Units 2 & 3 361, 362
Mississippi Power & Light	Grand Gulf Unit #1 only 416

RECOMMENDATION

It is recommended that suspect trip units be tested to determine that they are operating properly. If the test is to be made with the ITE type 504 test set, the user should verify that their test set has the capability to detect this condition.

D. D. DUVALL
Vice President, Operations

EWR/jm

✓ cc: Wolfgang Lauden