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AUG 27 1984

50-352/353

Dr. Thomas E. Murley, Director
United States Nuclear Regulatory Commission
Office of Inspection and Enforcement, Region I
631 Park Avenue
King of Prussia, PA 19406

SUBJECT: Significant Deficiency Report #152
Final Report on Loose Bolts on BBC Circuit
Breaker Charging Motors
Limerick Generating Station, Units 1 and 2
NRC Construction Permits Nos. 106 & 107

FILE: QUAL 2-10-2 (SDR #152)

Dear Dr. Murley:

In compliance with 10CFR50.55 (e), enclosed is the final report on the subject deficiency.

Sincerely,

John S. Kemper

Copy to: Director of Inspection and Enforcement
United States Nuclear Regulatory Commission
Washington, DC 20555

S. K. Chaudhary, Resident NRC Inspector (Limerick)
J. Wiggins, Resident NRC Inspector (Limerick)

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Enclosure

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Limerick Generating Station Units 1 & 2
Significant Deficiency Report #152
Loose Bolts Supporting Charging Motors
On BBC Brown Boveri, Inc. Circuit Breakers

Final Report

1.0 Introduction

This is the final report regarding a significant performance deficiency involving loose support bolts for the charging motors on Class 1E circuit breakers. The two 5HK BBC circuit breakers found with loose bolts are located in the Limerick Unit 1 Class 1E system. A failure of the supporting bolts for the charging motor occurred during a diesel generator preoperational test.

The Limerick project uses 5HK and 15HK BBC breakers with similarly supported charging motors for both Class 1E and non-Class 1E systems.

2.0 Description of Problem

During preoperational testing of a 5HK breaker, the charging motor did not perform its spring charging function. Three of the four horizontal supporting bolts had loosened sufficiently to allow the motor to rotate on the remaining bolt, thus becoming non functional. Another 5HK safeguard breaker with loose bolts was found during a subsequent inspection.

3.0 Analysis of Deficiency

The charging motor is horizontally supported by four Allen head bolts that secure directly into the breaker frame. There are no nuts and washers involved. These bolts are not torqued to a specific value during factory assembly. A typical value of torque on the bolts found at Limerick is 3 to 4 foot-pounds.

The supplier's instruction book recommends that periodic maintenance and adjustment, including checks of accessible bolts, nuts and screws be made after 1000 operations. This failure occurred after only several hundred operations.

It appears that the factory did not provide sufficient torque on these bolts.

4.0 Safety Implication

Loose charging motor supporting bolts can result in failure of the breaker to open and close as required. The loss of one of the four safeguard systems provided for each Limerick generating unit is acceptable. Coincident failures on several safeguard buses is not acceptable for safe shutdown of the reactor.

5.0 Corrective Actions

All BBC circuit breakers in the 2.3kV, 4kV and 13kV systems, both Class 1E and non-Class 1E, will have the charging motor supporting bolts inspected. The bolts will be removed, cleaned, coated with Locktite and torqued to 12 foot-pounds.

Inspection and retorquing of the Class 1E circuit breakers has been completed for Unit 1. A procedure is in place to perform this work on the Unit 2 Class 1E breakers at a later time. The 2.3kV and 13kV systems, which are non-Class 1E. will be inspected and retorqued as the breakers become available.

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