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February 25, 1993

FILE: B09-13520 10CFR21
SERIAL: BSEP-93-0030

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT UNITS 1 AND 2
DOCKET NO. 50-325 AND 50-324
LICENSE NO. DPR-71 AND DPR-62
INITIAL NOTIFICATION OF A 10CFR21 REPORTABLE OCCURRENCE

This fax is being sent to support the initial notification of a 10CFR21 reportable occurrence discovered December 30, 1992. Attached is an evaluation of possible manufacturing defects associated with Westinghouse Type HMCP150 and Type HFD breakers. These manufacturing problems result in the breaker contacts potentially not opening during trip conditions. These defects could seriously compromise the ability of the electrical distribution system to isolate component faults. Contact Robert Godley, Manager Regulatory Programs, at 1-919-457-2412 if additional information is required.

Very truly yours,

J M Brown

J. M. Brown, Plant Manager Unit 2

cc: Mr. S. D. Ebneter
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Westinghouse Type HFD breakers

On December 20, 1992, the HFD3070 breaker for the Diesel Jacket Water Heater tripped and could not be reset. The breaker was found to be defective and replaced (WR/JO 92-BIJB1). On December 26, 1992, the installed circuit breaker experienced an overcurrent condition generated by a cable insulation breakdown at the conduit entrance. The replacement breaker failed to trip open all breaker poles adequately, but opened sufficiently to de-energize the control power feeding the breaker compartment contactor. A total of 79 Type HFD breakers, including Technical Specification System applications exists at Brunswick.

Failure of these two Westinghouse Type HFD breakers can be grouped into two categories:

(1) Inadequate fabrication and tolerances

(2) Inadequate lubrication at critical hinges

Failures have occurred due to inadequate lubrication and poor manufacturing tolerances of the trip mechanism. Lack of lubrication in critical friction areas prevent the circuit breaker from fully opening. Lubrication and hard-facing on the hinge surfaces are critical to avoid partial-opening of the circuit breaker. They are critical because there is a null point in the trip mechanism actuation where the spring force becomes zero and inertia must carry the mechanism to the fully tripped position. Any excessive friction will prevent the breaker from fully opening.

Hinge bearing misalignment, cam plate misalignment and the lack of lubrication in critical areas contribute to the failures. The failure mechanism involves poor tolerance in critical bearing areas and poor manufacturing controls in the assembly, specifically the application of adequate lubrication.

SAFETY SIGNIFICANCE

A failure of a single motor control center circuit breaker to open under a fault condition will result in the loss of the entire motor control center and all of its safety related loads.

Evaluation of appropriate action is currently underway.

ATTACHMENT 1

Westinghouse Type HMCP breakers

In December of 1992, instantaneous trip testing per Preventive Maintenance Procedure OPM-BKR008 found four failures. The Westinghouse HMCP150 breaker failures included not completely opening when subjected to instantaneous currents in excess of NEMA AB4-1991 "Tolerances of Marked Adjustable Trip Circuit Breakers" +40% of expected trip value. While the four breakers in question were for Reactor Building supply or exhaust fans, other plant usage (Total 139 breakers) includes Technical Specification Systems.

Evaluation of the breaker failures revealed two issues:

1) Inadequate fabrication and tolerances

2) Inadequate lubrication at critical hinges

A defect in the fabrication of the magnetic trip coil plungers used to trip the circuit breaker open exists. Tripping the breaker is accomplished by the downward pulling action of three plungers. As phase current increases the plungers are pulled into the coils by the increasing magnetic field until they hit their stops and pull down the trip bar. This rotates the trip cam and trips the breaker. The plungers have springs to hold the plunger up against the magnetic field of the current sensing coils. The springs are held on the plungers with a metal disc cap which is highly susceptible to fracturing due to the composition/fabrication of the cap. Once the cap has fractured the springs become lodged in bearing areas causing wear and friction. The caps are cast of a 90% zinc and 10% aluminum composite, which resulted in void pockets in the center of the discs.

Westinghouse has indicated that the original design of the plungers utilized a steel cap but this was later changed to zinc. Performance problems identified to Westinghouse by the commercial industry resulted in changing the design back to the original steel plunger cap. Breakers manufactured between October 1986 and October 1987 are susceptible to this manufacturing defect.

In addition to the defect in the fabrication of the plunger assembly, failures have occurred due to inadequate lubrication and poor manufacturing tolerances in the trip mechanism. Lack of lubrication in critical friction areas prevent the circuit breaker from fully opening. Lubrication and hard-facing on the hinge surfaces are critical to avoid partial-opening of the circuit breaker. They are critical because there is a null point in the trip mechanism actuation where the spring force becomes zero and inertia must carry the mechanism to the fully tripped position. Any excessive friction will prevent the breaker from fully opening.