DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

85 AUG 26 A8:29

August 21, 1985

Dr. J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Reference: Oconee Nuclear Station
Docket No. 50-269

Dear Dr. Grace:

Please find attached a report concerning the response time failure of a Control Rod Drive (CRD) DC breaker during a Channel C Reactor Protective System (RPS) on-line testing on July 22, 1985. The breaker, which should have opened within 80 milliseconds, took 1.738 seconds to open. This report is submitted per our commitment to inform the NRC of unacceptable performance of CRD breakers.

Very truly yours,

Hal B. Tucker/mac

Hal B. Tucker

MAH:slb

Attachment

cc: American Nuclear Insurers
c/o Dottie Sherman, ANI Library
The Exchange, Suite 245
270 Farmington Avenue
Farmington, CT 06032

Ms. Helen Nicolaras
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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

M&M Nuclear Consultants
1221 Avenue of the Americas
New York, New York 10020

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

Mr. J. C. Bryant
NRC Resident Inspector
Oconee Nuclear Station

IE29

Duke Power Company
Oconee Nuclear Station
Response Time Failure of Control Rod Drive
DC Breaker CB-1

Introduction:

On July 22, 1985 at 1306 hour with Unit 1 operating at 100% Full Power, Control Rod Drive (CRD) DC Breaker CB-1 failed its trip time requirement during a Channel "C" Reactor Protective System (RPS) on-line test. The CB-1 breaker which should have opened within 80 milliseconds (msec) did not open until 1738 msec had elapsed.

The root cause of this incident could not be determined. A suspected cause of the failure was that the undervoltage device's armature was touching the heads of some mounting bracket studs.

The immediate corrective action was to discontinue on-line testing of the CRD breakers and place CB-1 in the tripped position. Other corrective actions consisted of replacing CB-1 with an operable spare CRD breaker and on-line testing all Unit 1 CRD breakers.

The health and safety of the public were not affected.

Background:

The Oconee Nuclear Station Unit 1 Control Rod Drive (CRD) breakers are composed of:

1) Two AC breakers identified as Unit #10 and #11.

2) Four DC breakers identified as CB-1, CB-2, CB-3 and CB-4.

These breakers are connected to the Reactor Protective System (RPS) through the following channels:

1) RPS channel "A" controls Unit #10.

2) RPS channel "B" controls Unit #11.

3) RPS channel "C" controls CB-1 and CB-2.

4) RPS channel "D" controls CB-3 and CB-4.

Together these six breakers supply the power to the safety control rod groups 1-4 and the regulating rod groups 5-8. Being part of the RPS, these breakers are connected such that any single component failure will not prevent the remaining components from operating.

Quarterly preventive maintenance (PM) on the CRD breakers are performed using procedures which establish requirements to control the inspection and maintenance of the General Electric (GE) AK Control Rod Drive Breakers.

Monthly RPS on-line checks (which include the CRD breakers) performed require the CRD breaker to trip within 80 msec delay time assumed for calculations in support of Oconee Nuclear Station FSAR safety analyses. The quarterly PM and the monthly response time tests are performed so that the CRD breakers meet their critical function and early failure can be detected.

Description of Occurrence:

On July 22, 1985 at 1306 hours the CRD DC Breaker DC Breaker CB-1 failed during a monthly Channel "C" Reactor Protective System (RPS) on-line test. The on-line test of the CB-1 breaker showed a response time of 1738 msec which was greater than the 80 msec delay time for CRD breakers assumed in the safety analyses calculation of overall RPS delay times. Therefore, the test procedure was discontinued and the failed breaker was taken out of service and replaced with a spare DC breaker and tested operable. All Unit 1 CRD breakers were tested and verified operable.

Cause of Occurrence:

On July 23, 1985 the failed breaker was inspected for the cause of failure. The breaker was exercised numerous times, however, no failure occurred. Upon detailed inspection of the breaker, a metal burr was discovered on the head of one of the mounting studs for the undervoltage (UV) device. A possible cause of the failure could be that the undervoltage device's armature was touching the stud as it moved toward the trip position. However, the breaker did not fail again after it was removed from the breaker cabinet and tested. Therefore, the "root cause" of this failure could not be determined.

The failed undervoltage device was a new UV device installed on the CRD breakers. In comparison between the old UV devices and the new devices, the new UV device's stud heads has square edges compared to the round headed studs in the old UV devices. Possible reduced clearance between the armature and the heads of the mounting bracket studs could have caused the contact and thus slow breaker trip response time. The stud heads were filed during preventive maintenance of the failed breaker before it was installed in location CB-2 at a later date.

A review of past incident reports indicates that there have been several previous occurrences of CRD breaker failure due to mechanical binding. However, this incident and a previous incident, reported to the NRC by letter dated May 28, 1985, are the only ones that specifically involve the UV devices on the breaker. In both incidents the failed breaker was at location CB-1 with a new UV device. The cause of previous breaker response time was thought to be due to some particles, possibly paint chips or metal shavings, stuck in the pivot point of the undervoltage device. In both incidents the failed breaker had a new UV device installed in place.

The UV device is one of two redundant mechanisms for tripping the CRD breaker. The other mechanism-shunt-trip is capable of tripping the breaker should the UV device fail.

Duke Power Company continues to monitor the CRD breakers through its surveillance program. The surveillance testing program is designed to catch failures, provide expeditious failure reporting, and repair the failure on the CRD breakers.

Analysis of Occurrence:

All the Unit 1 CRD AC and Dc breakers were tested and all tripped with the prescribed time of not greater than 80 msec.

In the event that a reactor trip had occurred and CRD DC Breaker CB-1 delayed in tripping, the remaining CRD DC breakers and the CRD AC breakers would have tripped and all safety rod groups and regulating rod groups 5, 6 and 7 would have dropped immediately into the reactor core as designed. Therefore, the health and safety of the public were not affected by this event.

Corrective Action:

The immediate corrective action was to place the failed CB-1 breaker in tripped position per Technical Specification requirement. Other corrective actions included the replacement of the failed breaker with an operable spare breaker. All Unit 1 CRD AC and DC breakers were on-line tested and verified operable. The failed CB-1 breaker was inspected, preventive maintenance performed on it and tested operable.

The immediate and supplemental corrective actions assured the operability of all Unit 1 CRD breakers. The planned corrective action will monitor each individual CRD breaker for historical data and future trending.