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CONTROL NO: 1294

FILE: INCIDENT FILE

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|---|---------|-----------|-----------------------|----------------------|------------|--------------------------------|-----|-------|
| FROM: Carolina Power & Light Co. Raleigh, N.C. E.E. Utley | | | DATE OF DOC 2-2-76 | DATE REC'D 209-76 | LTR XXX | TWX | RPT | OTHER |
| TO: N.C. Moseley | | | ORIG None | CC 40 | OTHER | SENT NRC PDR SENT LOCAL PDF | | |
| CLASS | UNCLASS | PROP INFO | INPUT | NO CYS REC'D 40 | | DOCKET NO: 50-261 | | |
| | XXX | | | | | | | |

DESCRIPTION:
Letter trans the following.....

q

PLANT NAME: H.B. Robinson # 2

ENCLOSURES:

Abnormal Occurrence # 76-2, on 1-21-&1-22-76,
Concerning Failure of one and delayed operation
of two reactor trip relays.....

(40 Cys. Received)

**DO NOT REMOVE
ACKNOWLEDGED**

FOR ACTION/INFORMATION

SAB 2-10-76

BRANCH CHIEF Reid W/3

LIC. ASST. Ingram W/16 cys ACRS

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REC FILE

NRC PDR

I&E (2)

MPC (3)

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VOLLMER/BUNCH

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NOTE: IF PERSONEL EXPOSURE IS INVOLVED
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EXTERNAL DISTRIBUTION

LOCAL PDR Hartville, S.C.

TIC

NSIC

DISTRIBUTION REVISED 1-19-76 by D. CRUTCHFIELD, TECH REVIEW COORDINATOR

Chas and Lower Light Company

February 2, 1976

File: NG-3513 (R)

50-261

Mr. Norman C. Moseley, Director
U. S. Nuclear Regulatory Commission
Region II, Suite 818
230 Peachtree Street, N.W.
Atlanta, Georgia 30303

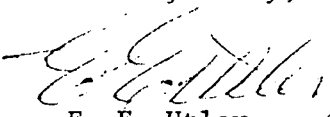
Dear Mr. Moseley:

H. B. ROBINSON UNIT NO. 2
LICENSE NO. DPR-23

FAILURE OF ONE AND DELAYED OPERATION OF TWO REACTOR TRIP RELAYS

In accordance with 6.6.2.a of the Technical Specifications for H. B. Robinson Unit No. 2, the attached Abnormal Occurrence Report is submitted for your information. This report fulfills the requirement for a written report within ten days of an Abnormal Occurrence and is in accordance with the format set forth in Regulatory Guideline 1.16, Revision 1.

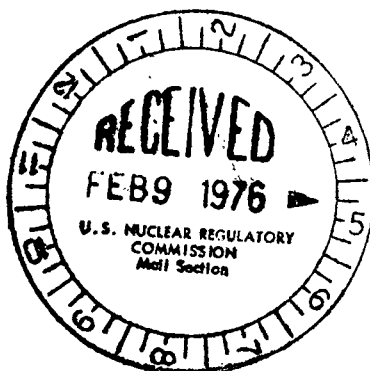
Yours very truly,



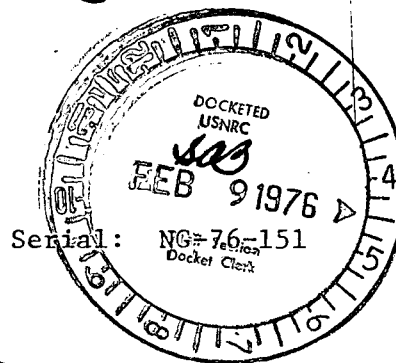
E. E. Utley
Vice-President
Bulk Power Supply

DBW:mvp
Attachment

cc: Mr. D. C. Knuth
Mr. W. G. McDonald



1294



Regulatory

File Cy.

ABNORMAL OCCURRENCE REPORT

1. Report No. 50-261/76-2
- 2a. Report Date: January 29, 1976
- 2b. Occurrence Date: January 21, 1976, January 22, 1976
3. Facility: H. B. Robinson Unit No. 2
Hartsville, South Carolina 29550

4. Identification of Occurrence

Failure of one and delayed operation of two reactor trip relays which constitutes an abnormal occurrence as defined by Plant Technical Specification 1.8.d.

5. Conditions Prior to Occurrence

The plant was operating at 100% of rated power with normal full power plant parameters during the period involved. A monthly periodic test CP&L- PT-19 A/B, which verifies proper operation of reactor protection logic components, was in progress on train "A" of the Reactor Protection System. An equalizing charge had just been completed on Unit No. 2 "A" station battery (90 minutes prior to first malfunction) and an extended equalizer was in progress on "B" battery. The extended equalizer was terminated on January 22, 1976, approximately 135 minutes prior to the identification of the third malfunction.

6. Description of Occurrence

At approximately 1400 hours, on January 21, 1976, reactor trip relay RT-3 was observed as sluggish to open. As in other logic circuits two relays in parallel are required to open in order to generate the reactor trip condition. Relay RT-3 was exercised and found to open on delays of up to 20 seconds. "A" Reactor Trip Breaker was tested in conjunction with RT-3 (train "A") and its opening resulted in similar delays. The relay was replaced with a new unit from stock at 1615 hours on January 21, 1976.

At approximately 0845 hours, on January 22, 1976, reactor trip relay RT-4 on train "B" of the Reactor Protection System was found to be failed. The discovery was made as a result of a visual inspection prior to the performance of part "B" of periodic test PT-19 A/B. The failed relay was replaced with a new component and the circuit was returned to normal service at 0920 hours on January 22, 1976.

On January 22, 1976, at approximately 1045 hours, reactor trip relay RT-8 on train "B" was observed to operate in a sluggish manner. The extended equalizing charge (48 hours) had been completed on Unit No. 2 "B" station battery at approximately 0830 that day. The questionable relay was replaced with a new component from stock at 1140 hours on

January 22, 1976.

7. Designation of Apparent Cause of Occurrence

The cause of the relay failure (RT-4, train "B") was identified as an open coil winding. The coil holds the relay trip contacts in the closed position, therefore, failure of the coil causes the relay contacts to open with spring tension resulting in a fail-safe disposition. The cause of the delay malfunction has not been determined to date. However, suspicion is directed to high voltage conditions which exist during the monthly station battery charge.

Disassembly of the relays revealed discolored and brittle nylon sleeves which are used as coil liners in which the operating plungers travel. It is believed that this deterioration, noted on all three relays in question, is a thermal effect which resulted from increased voltage during a battery charge. The relays are rated for continuous service at 125/130 volts dc. During an equalizing charge on a battery, that train of relays is subjected to 140 volts dc. In addition, the frequency of charging "B" station battery had been increased in the past four months in order to reduce a sulfate buildup. This increased voltage is suspected to be the cause of the apparent thermal degradation. Subsequent fragmenting or deformation of the sleeve could have created a restriction to free movement of the plunger and resulted in the delayed actuating times. The open coil (RT-4), although not a direct result of high temperature, cannot be discounted as an ultimate result of this condition. Inspection, in all cases, revealed only the thermal effects described above. No definitive cause of the sluggish results has yet been found.

8. Analysis of Occurrence

Relay RT-4 train "B", a normally energized device failed such that it resulted in one of the two deenergized relays necessary to initiate a reactor trip. This particular malfunction, therefore, resulted in a fail-safe condition.

Immediately upon identification of the delaying of RT-3 train "A" and RT-8 train "B", each defective relay was expeditiously replaced. The delayed reaction times were in excess of assumptions made in safety analyses reports. However, the delays only affected one parallel circuit in one logic train of the particular protective systems. Therefore, adequate redundancy was available. RT-3 and RT-4 are in logic trains actuated by Overtemperature and Overpower ΔT and Low Low Steam Generator Level. RT-8 serves Safety Injection Actuation and Pressurizer High Pressure. As a result of the occurrence plant safety was not jeopardized, nor were any limiting conditions of operation violated.

9. Corrective Action

Immediate corrective action was replacement of the three defective relays. Design specifications require that the subject relay's drop out time be within 12 to 25 milliseconds. Obvious concern and considerable attention has been directed towards positively identifying the cause of these malfunctions, since the delayed behavior directly affects reactor trip time. An investigation is in progress by both utility and vendor to identify this cause.

As an evaluation of the performance of the remaining reactor trip relays, each was tested to verify it's "drop-out" time as compared to design specifications. With the exception of one, all relays tested were found to be within the prescribed limits with the average drop-out time to be approximately 17 milliseconds. The one relay not conforming to vendor's design was found to have a drop-out time of approximately 28 milliseconds. This relay has been replaced and will be inspected as part of the continuing investigation.

To mitigate the potential for thermal degradation, the decision has been made to replace all d.c. relays of the type and application involved in the occurrence. The replacement relays will be rated for the higher voltages encountered during a battery charge. Until some time that these relays are replaced, battery charges will be practiced only at the frequency required by Technical Specifications.

10. Failure Data

No previous relay failure of this nature has occurred.

Name plate data (relay):

Westinghouse
Cat. No. BFD-31
Style 46E7352
Coil - 125/130 volt d.c.