

SAFETY EVALUATION REPORT
VIRGIL C. SUMMER NUCLEAR STATION
REACTOR TRIP SYSTEM RELIABILITY
ITEMS 4.2.1 AND 4.2.2 OF GENERIC LETTER 83-28

1. INTRODUCTION

On July 8, 1983, the Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 83-28. This letter addressed intermediate-term actions to be taken by licensees and applicants aimed at assuring that a comprehensive program of preventive maintenance and surveillance testing is implemented for the reactor trip breakers (RTBs) in pressurized water reactors. In particular, Item 4.2 of the letter required licensees and applicants to submit a description of their preventive maintenance and surveillance program to ensure reliable reactor trip breaker operation. The description of the submitted program was to include the following:

- GL, Item 4.2.1 A planned program of periodic maintenance, including lubrication, housekeeping, and other items recommended by the equipment supplier.
- GL, Item 4.2.2 Trending of parameters affecting operation and measured during testing to forecast degradation of operation.

South Carolina Electric and Gas Company, the licensee for Virgil C. Summer Nuclear Station submitted a response to the Generic Letter on November 4, 1983. In this response, the licensee referred to his letter from G. W. Dixon, Jr., to H. R. Denton, NRC, dated June 8, 1983, which describes his preventive maintenance and surveillance program for the Reactor Trip Breakers. This June 1983 letter shows that the licensee took the initiative by developing his maintenance program prior to the publication of both Generic Letter 83-28 and Revision 0 of the Westinghouse Maintenance Manual for the DS-416 RTBs. This report presents an evaluation of the adequacy of the licensee's responses and of his preventive maintenance and surveillance programs for RTBs.

2. EVALUATION CRITERIA

2.1 Periodic Maintenance Program

The primary source for periodic maintenance program criteria is Westinghouse Maintenance Program Manual for DS-416 Reactor Trip Circuit Breakers, Rev. 0. This document was prepared for the Westinghouse Owners Group and is the breaker manufacturer's recommended maintenance program for the DS-416 breaker. It provides specific direction with regard to schedule, inspection and testing, cleaning, lubrication, corrective maintenance and record keeping. The document was reviewed to identify those items that contribute to breaker trip reliability consistent with the generic letter. Those items identified for maintenance at six month intervals (or when 500 breaker operations have been counted, whichever comes first) that should be included in the licensee's RTB maintenance program are:

1. General inspection to include checking of breaker's cleanliness, all bolts and nuts, pole bases, arc chutes, insulating link, wiring and auxiliary switches;
2. Retaining rings inspection, including those on the undervoltage trip attachment (UVTA);
3. Arcing and main contacts inspection as specified by the Westinghouse Maintenance Manual;
4. UVTA check as specified by the Westinghouse Maintenance Manual, including replacement of UVTA if dropout voltage is greater than 60% or less than 30% of rated UVTA coil voltage;
5. Shunt Trip Attachment (STA) check as specified by the Westinghouse Maintenance Manual;

6. Lubrication as specified by the Westinghouse Maintenance Manual;
7. Functional check of the breaker's operation prior to returning it to service.

The licensee's RTB periodic maintenance should also include, on a refueling interval basis:

1. Pre-cleaning insulation resistance measurement and recording;
2. RTB dusting and cleaning;
3. Post-cleaning insulation resistance measurement and recording, as specified by the Westinghouse Maintenance Manual;
4. Inspection of main and secondary disconnecting contacts, bolt tightness, secondary wiring, mechanical parts, cell switches, instruments, relays and other panel mounted devices;
5. UVTA trip force and breaker load check as specified by the Westinghouse Maintenance Manual;
6. Measurement and recording of RTB response time for the undervoltage trip;
7. Functional test of the breaker prior to returning to service as specified by the Westinghouse Maintenance Manual.

2.2 Trending of Parameters

Generic Letter Item 4.2.2 specifies that the licensee's preventative maintenance and surveillance program is to include trending of parameters affecting operation and measured during testing to forecast degradation of operation. The parameters measured during the maintenance program described above which are applicable for trending are undervoltage trip

attachment dropout voltage, trip force, response time for undervoltage trip and breaker insulation resistance. The staff position is that the above parameters are acceptable and recommended trending parameters to forecast breaker operation degradation or failure. If subsequent experience indicates that any of these parameters is not useful as a tool to anticipate failures or degradation, the licensee may, with justification and NRC approval, elect to remove that parameter from those to be tracked.

3. EVALUATION

3.1 Evaluation of the Licensee Position on Item 4.2.1

The NRC staff prepared a Safety Evaluation Report (SER) that was transmitted from T. M. Novak to O. W. Dixon, Jr., of South Carolina Electric and Gas Company, on May 15, 1984; that SER indicated that the NRC staff finds the licensee maintenance procedures acceptable except for proposed changes discussed therein. The same SER includes an evaluation of the licensee maintenance and surveillance program. However, it does not include evaluation of the licensee responses and his action taken as a result of Generic Letter 83-28. The following is a supplement to the May 15th, 1984, SER to evaluate the licensee program with reference to Items 4.2.1 and 4.2.2 of GL 83-28.

The licensee's June 8th, 1983, letter precedes the publication of both GL 83-28 and Revision 0 of the Westinghouse Maintenance Manual for the DS-416. The licensee indicated in this letter that he has reached an agreement with the NRC on several items concerning issuance of the SER for the RTBs. The licensee committed to revise his current RTB maintenance procedures to include the following surveillance items:

- (a) Response time on undervoltage (UV) trip.
- (b) Trip shaft force measurements

- (c) UV output force measurements
- (d) Check of dimensional tolerance of pre- and post-travel of the trip tab
- (e) Inspection of the lubricant and cleanliness of the roller bearing on the UV device.

These additions and the previously reviewed maintenance program are acceptable to the staff. The staff finds the licensee program in conformance with the latest manufacturer's recommendations and the evaluation criteria, except for the undervoltage dropout voltage check and insulation resistance measurement. The licensee maintenance and surveillance program is acceptable to the staff except for omission of the undervoltage dropout voltage check. The licensee should add this item to his maintenance program and replace the UVTA if the dropout voltage is greater than 60% or less than 30% of rated UVTA coil voltage as per the manufacturer's recommendation.

3.2 Evaluation of the Licensee's Position on Item 4.2.2

The licensee has committed to measure and record the response time, the trip shaft force, the UV output force and to check the dimensional tolerance of pre- and post-travel of the trip tab.

The staff finds the licensee positions on item 4.2.2 adequate, if trending of the UVTA dropout voltage will be added. The licensee should add this item to his trending program or provide an acceptable justification.

4. CONCLUSIONS

Based on a review of the licensee response, the staff finds the licensee position on Item 4.2.1 acceptable except for checking the dropout voltage for the undervoltage coil. The UVTA should be replaced if the dropout voltage is greater than 60% or less than 30% of rated UVTA coil voltage.

The licensee should add the UVTA dropout voltage to his trending program or provide an acceptable justification.