



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
MAINE YANKEE ATOMIC POWER COMPANY
MAINE YANKEE ATOMIC POWER STATION
DOCKET NO. 50-309
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 the 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.

Maine Yankee Atomic Power Company, the licensee for Maine Yankee, submitted responses to the Generic Letter on November 10, 1983, and January 25, 1985. This report presents an evaluation of the adequacy of those responses and of the licensee's preventive maintenance and surveillance programs for RTBs.

2. EVALUATION CRITERIA

2.1 Periodic Maintenance Program

The primary criteria for an acceptable periodic maintenance program are contained in Maintenance Instruction GEI-50299E1*, Power Circuit Breakers, Types AK-2/2A-15, AK-2/3/2A/3A-25, AKU-2/3/2A/3A-25," and Service Advice 175-9.3S and 175-9.20, by General Electric. The NRC staff has reviewed these items and endorsed the maintenance program they describe. The criteria include those items in the General Electric instructions and advisories that relate to the safety function of the breaker, supplemented by those measurements which must be taken to accumulate data for trending. Those items identified for maintenance at six month intervals that should be included in the licensee's RTB maintenance program are:

1. Verification of breaker cleanliness and insulation structure; all foreign materials, such as paint, dust, or oil, should be removed to prevent electrical breakdown between points of different potential;
2. Verification of breaker physical condition, including wiring insulation and termination, all retaining rings, pole bases, arc quencher, stationary and movable contacts, and tightness of nuts and bolts;
3. Verification of proper manual operation of the breaker, including checks for excessive friction, trip bar freedom, latch engagement, operating mechanism alignment and freedom, and undervoltage trip (UVT) device armature freedom;
4. Verification of the optimum freedom of the armature as specified in General Electric Service Advice 175-9.3S, Item #S1;
5. Verification of proper trip latch engagement as specified in Service Advice 175-9.3S, Item #S2.

6. Verification of undervoltage pick-up setting, as specified in Service Advice 175-9.3S, Item #S3, and dropout voltage;
7. Verification that the trip torque required on the trip shaft is less than 1.5 pound-inches, as specified in Service Advice 175-9.3S, Item #S4; "Before" and "After" maintenance torque values should be recorded;
8. Verification of positive tripping by checking the adjustment between the UVT device and trip paddle as specified in Service Advice 175-9.3S, Item #S5;
9. Verification of proper trip response time as specified in Service Advice 175-9.3S, Item #S6;
10. Shunt Trip Attachment (STA) operation verification;
11. Examination and cleaning of breaker enclosure;
12. Functional test of the breaker prior to returning it to service.

2.2 Trending of Parameters

Generic Letter 83-28 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 torque, and breaker response time for undervoltage trip. The staff position is that the above three parameters in addition to the breaker insulation resistance 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 licensee states that his preventative maintenance program for RTB's contains all the elements detailed in Section 2.1 of this SE. The licensee's preventative maintenance is presently performed both quarterly and during refueling. The staff finds the licensee position on Item 4.2.1 to be acceptable.

3.2 Evaluation of the Licensee's Position on Item 4.2.2

The licensee measures trip torque, breaker response time, undervoltage trip pickup and dropout voltage and insulation resistance. While the licensee performs trend analysis on only breaker opening times, he is a participant in the Combustion Engineering (CE) Owners Group Availability Data Program, which is attempting to identify the most effective parameters to forecast breaker degradation or failure. The licensee has identified the organization which will perform trend analysis, how often it will be performed and how the information derived from the analysis will be used to effect periodic maintenance. The staff finds the licensee position on Item 4.2.2 to be acceptable.

While not strictly a part of the parametric trending program at Maine Yankee, the licensee has found a precursor to at least one type of undervoltage coil failure. Observation of undervoltage coil current during actuation shows, in the event of incipient coil failure, a characteristic signature; when that particular waveform is observed during maintenance, the licensee replaces the coil.

4. CONCLUSIONS

Based on a review of the licensee responses, the staff finds the licensee positions on Items 4.2.1 and 4.2.2 of Generic Letter 83-28 to be acceptable.

Date: August 7, 1985

Principal Contributor:

N. Romney

R. Haroldsen, INEL