

SAFETY EVALUATION REPORT
THREE MILE ISLAND NUCLEAR STATION, UNIT 1
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.

GPU Nuclear Corporation, the licensee for Three Mile Island Nuclear Station Unit 1 (TMI-1) submitted responses to the Generic Letter on November 8, 1983, and June 24, 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-50299EI*, 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, and NRC IE Information Notice No. 85-58. The NRC Staff, Equipment Qualification Branch, 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;

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 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 intends to maintain a 6 month maintenance interval until sufficient information is available to assess the breaker performance. That may change to a 12 month maintenance interval if performance found acceptable. The licensee confirmed that his periodic maintenance program includes the 12 items mentioned in paragraph 2.1 of this report. The staff finds the licensee position of Item 4.2.1 acceptable, provided the licensee confirms that the UVT device roller rivet-armature clearance is measured with the UVT armature down in the energized position, as recommended in IE Notice No. 85-58.

3.2 Evaluation of the Licensee's Position on Item 4.2.2

The licensee is a participant in the B&W Owners Group Reliability Monitoring Program. The licensee provides B&W with trending data of undervoltage device trip response time, trip shaft operating torque, undervoltage device pickup voltage, and undervoltage device dropout voltage. B&W will compile the licensee's data as well as the other member utilities and perform a trend analysis. The analyzed data will be reviewed by the GPUN on a six month basis to determine if action is warranted. The staff finds the licensee position on Item 4.2.2 acceptable.

4. CONCLUSIONS

Based on a review of the licensee response, the staff finds the licensee positions on Items 4.2.1 and 4.2.2 of Generic letter 83-28 to be acceptable, provided the licensee confirms that the UVT device roller

rivet-armature clearance is measured with the UVT armature down in the energized position, as recommended in IE Notice No. 85-58.

37806