SAFETY EVALUATION

SAN ONOFRE NUCLEAR GENERATING 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.

Southern California Edison Company, the licensee for San Onofre 1, submitted responses to the Generic Letter on November 28, 1983, April 27, 1984, October 1, 1984, and May 14, 1985. This report presents an evaluation of the adequacy of those responses and of the licensee's preventive maintenance and surveillance programs for RTBs.

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2. EVALUATION CRITERIA

2.1 Periodic Maintenance Program

The primary source for periodic maintenance program criteria is Westinghouse Maintenance Program for DB-50 Reactor Trip Switchgear, Rev. 0. This document is the breaker manufacturer's recommended maintenance program for the DB-50 breaker and 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 that should be included in the licensee's RTB maintenance program are:

1. Verification of trip bar freedom
2. Verification of operating mechanism alignment and freedom
3. Retaining ring verification
4. Verification of nut and bolt tightness
5. Verification of pole bases physical condition
6. Verification of arcing and main contacts physical condition
7. Verification of insulating link's physical condition
8. Verification of wiring insulation and termination physical condition
9. Verification of arc chute physical condition
10. Verification of breaker cleanliness
11. Undervoltage Trip Attachment (UVTA) dropout voltage test and lubrication
12. Shunt Trip Attachment (STA) operation verification
13. Verification of operation of auxiliary switches
14. Inspection of positioning lever condition
15. Functional test of the breaker prior to returning it to service.

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

16. Verification of cell interlock operation
17. Examination and cleaning of breaker enclosure
18. Measurement of trip force required
19. Functional test of the breaker prior to returning it to service
20. Breaker response time for undervoltage trip.

All of the items listed above are recommended by the manufacturer except Item 20. This item is the breaker trip response time measurement which is implied by the IEEE Standard 279-1971.

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, 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

Because San Onofre 1 uses DB-25 breakers rather than DB-50s for RTBs, the licensee's preventative maintenance program differs in some details, e.g., clearances and number of retaining rings, from that specified in the

referenced Westinghouse program. The licensee states that his preventative maintenance program for RTBs contains all the elements detailed in Section 2.1 of this SER with the exception of breaker response time testing for undervoltage trip. The licensee states that the Westinghouse Owners Group has concluded that response time testing of DB-50 RTBs is unnecessary, as slow response time has not been identified as a problem with these breakers. The licensee also considers that trip force and breaker response time for undervoltage trip to be predictive parameters that provide the same information on breaker degradation, that measurement of both parameters is redundant, and that measurement of both parameters therefore constitutes excessive testing and wear on the RTBs. The staff does not concur with the licensee conclusion that the two parameters provide redundant information; trip force and undervoltage trip response time provide different measures of margin available to assure that the RTBs will perform their safety mission. The staff finds the licensee omission of undervoltage trip response time unacceptable.

The licensee performs those items of maintenance recommended for six month intervals at refueling intervals. The licensee justifies his variation from the recommended six month interval for the majority of the items in Section 2.1 of this SER on the basis that:

1. San Onofre 1 reactor trip system was not designed to permit on-line testing, and so does not have bypass breakers

2. The RTBs at San Onofre 1 have operated for 15 years without a single failure to function on demand

3. The potential for operator error or safety system malfunction or actuation associated with shutdown and startup may exceed any increase in breaker reliability resulting from semi-annual maintenance.

Item 4.5.2 of Generic Letter 83-28 requires the licensee to provide on-line testing capability or to provide justification for its continued omission. The staff is reviewing the licensee response to Item 4.5.2. Preliminary review has indicated that San Onofre 1 will not be required to provide on-line testing of RTBs; therefore, the maintenance interval is acceptable provided that no more than 200 RTB actuations are expected to occur during the refueling interval.

The licensee's April 27, 1984 submittal conservatively estimated the number of RTB trips to be not more than 25 per year, which would be less than 38 per refueling cycle. Thus, the staff concludes that the licensee's refueling outage maintenance interval is acceptable.

3.2 Evaluation of the Licensee's Position on Item 4.2.2

The licensee has committed to performance of trend analysis of undervoltage trip attachment dropout voltage, trip force and insulation resistance. The licensee's election not to measure undervoltage trip response time precludes trending this parameter. 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 affect periodic maintenance. The staff finds the licensee position on Item 4.2.2 to be acceptable, if the licensee commits to measuring, recording, and trending undervoltage trip response time.

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, subject to the following condition:

> The licensee's maintenance program is acceptable pending inclusion of the undervoltage trip response time measurement and trending of the resulting data.

5. ACKNOWLEDGEMENTS

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