



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 121 TO PROVISIONAL OPERATING LICENSE NO. DPR-13

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 1

DOCKET NO. 50-206

1.0 INTRODUCTION

By letter dated November 11, 1988, as supplemented February 14, 1989, Southern California Edison Company (SCE or the licensee) requested a change to the Technical Specifications appended to Provisional Operating License No. DPR-13 for operation of San Onofre Nuclear Generating Station, Unit No. 1 in San Diego County, California.

2.0 DISCUSSION

As a result of a single failure analysis for the reactor protection system, the licensee, in its letter dated March 11, 1987, stated that additional deficiencies in the steam/feedwater flow mismatch trip (mismatch trip) design had been identified. The steam and feedwater flow analog amplifier system, in addition to the PT-459 instrument loop, was found to contain potential common cause failures of all three steam/feedwater flow mismatch trip channels due to the channel-common signal path and power supply configuration. Further, the design of the mismatch trip would not provide a trip signal for a main feedwater line break downstream of the feed flow element in which the affected loop would indicate high feedwater flow. Since the mismatch trip logic requires feed flow to be less than steam flow by 25% of the full power value, a reactor trip signal would not be generated for this loop. If a single failure were to prevent a trip signal in one of the two unaffected loops, the two out of three loop trip logic would not be achieved and no reactor trip would be generated by the mismatch logic. Without the reactor trip provided by the mismatch logic, acceptable transient results for this feedwater line break would not be achieved. However, the high pressurizer level trip with reduced setpoint would provide adequate protection for the postulated main feedwater line break accident during interim plant operation.

The licensee subsequently provided design descriptions for the modification of the mismatch trip to resolve the single failure susceptibilities by letters dated November 20, 1987, April 5, June 21, August 31 and November 11, 1988. Also, in its letter dated November 11, 1988, the licensee proposes changes to Technical Specification 2.1, Table 2.1 and Table 3.5.1-1 to incorporate the modified mismatch trip.

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### 3.0 EVALUATION

The licensee provided design descriptions for the modification of the mismatch trip in its above stated letters to NRC. These modifications are as follows:

- (1) The mismatch trip logic would be revised to provide a trip signal to the reactor trip circuit, two out of three reactor trip logic, for a high feedwater flow mismatch as well as the original low feedwater flow mismatch. The mismatch would then generate a reactor trip for a main feedwater line break downstream of the flow element. The affected loop would generate a trip signal on high feedwater flow mismatch and the two unaffected loops would generate a trip signal on low feedwater mismatch under the main feedwater line break conditions.
- (2) The high pressurizer level trip would be retained at the 50% setpoint and a P-8 permissive would be added to the revised mismatch trip. This permissive will disarm the mismatch trip below 50% power. These features are provided to accommodate acceptable feedwater transients during low power operation and avoid the possibility of spurious reactor trips. The high pressurizer level with 50% setpoint or the high pressurizer pressure reactor trips would provide protection when the mismatch is bypassed.
- (3) A minimum flow value will be provided for the main steam header signal in each of the channelized steam flow calculator modules. This feature will eliminate the potential for loss or spurious initiation of the mismatch trip due to a downscale failure of the common pressure transmitter PT-459.
- (4) The power supplies and signal paths for each mismatch instrument loop will be channelized. Also, isolation will be provided between the PT-459 instrument loop and each mismatch channel and its associated feedwater control loop. These features will prevent loss of more than one channel of the mismatch trip due to a single failure of power supplies, signal path, PT-459 instrument loop or non-qualified control loop.

The licensee, in a letter dated February 14, 1989, provided the basis for the high and low steam/feedwater flow mismatch trip setpoints in response to the staff request. The licensee stated that the high mismatch trip setpoint is determined by the limiting value of either the increase in the main feedwater flow through the ruptured line required to decrease the flow in the remaining intact lines to the low feed flow mismatch trip setpoint or the feedwater flow instrument range limit. The setpoint is conservatively determined by the feedwater flow instrument range limit. The safety limit for the low feedwater mismatch setpoint is determined by

the largest partial loss of normal feedwater which does not require a mismatch trip. Based on these criteria, the licensee has conservatively selected the high feedwater mismatch trip when the feedwater flow exceeds the steam flow by 25% and the low feedwater mismatch trip when the feedwater flow falls below the steam flow by 25%.

The licensee has performed safety analysis of the design basis complete loss of normal feedwater transient and feedwater line break accident at 100% power assuming a steam/feedwater flow mismatch trip occurs at 5 and 10 minutes following the event initiation respectively. The results of the analysis show that the acceptance criteria for each transient are met. During these transients, the mismatch trip will actually be reached within one or two seconds. Therefore, the staff considers that the licensee proposed technical specification values for the high and low feedwater flow mismatch trip setpoints are conservative.

The pressurizer high level trip setpoint at 50% narrow range level is retained in the proposed technical specification, since it is credited in the licensee's analysis at less than 50% power with bypassed mismatch trip for loss of normal feedwater and feedwater line break, and partial loss of normal feedwater at 100% power. The results of the licensee's analysis of these events assuming a reactor trip on high pressurizer level show that the acceptance criteria of each transient are met.

Based on the above, the staff concludes that the proposed modifications to the steam/feedwater flow mismatch trip logic and its setpoints are acceptable. Also, the proposed technical specifications incorporating these changes are acceptable.

#### 4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact have been prepared and published in the Federal Register on February 9, 1989 (54 FR 6344). Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of human environment.

#### 5.0 CONCLUSION

We have concluded, based on the considerations discussed above, that:

- (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner,
- (2) such activities will be conducted in compliance with the Commission's regulations and
- (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: April 4, 1989