



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

SAFETY EVALUATION

AMENDMENT NO. 30 TO NPF-10

AMENDMENT NO. 19 TO NPF-15

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 & 3

DOCKET NOS. 50-361 AND 50-362

1. INTRODUCTION

Southern California Edison Company (SCE), on behalf of itself and the other licensees, San Diego Gas and Electric Company, the City of Riverside, California, and The City of Anaheim, California has submitted an application for license amendments for San Onofre Nuclear Generating Station, Units 2 and 3 (SONGS 2 and 3).

By letter dated April 10, August 1, and August 7, 1984, Southern California Edison Company requested changes (proposed change 138, or PCN-138) to the technical specifications for San Onofre Units 2 and 3. Additional, clarifying information was provided by SCE in letters dated October 2 and 24, 1984. The purpose of these technical specification changes is to accommodate the proposed modifications to the SONGS 2 and 3 core protection calculators (CPCs) and control element assembly calculators (CEACs) to reduce their sensitivity to electronic noise. Instances have occurred where control element assembly (CEA) position sensor noise has been interpreted in the CEAC logic as a significant inward CEA deviation. In this case, overly conservative penalty factors (PFs) are used by the CPC to calculate the departure from nucleate boiling ratio (DNBR) and local power density (LPD). This has resulted in unnecessary reactor scrams. In order to avoid the unnecessary scrams, SCE proposed to reduce the inward CEA deviation PFs to 1.0 (the outward CEA deviation PFs remain unchanged) and, at the same time, change the technical specifications to impose more restrictions on the movable control assemblies. Therefore, the NRC staff's review of the proposed technical specification changes must be linked to the proposed reduction of the inward CEA deviation PFs to ensure that the safety of plant operation is not adversely affected. Our evaluation of the proposed changes follows.

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2. STAFF EVALUATION

(1) Technical Specification Changes

The proposed technical specification changes are related to the limiting conditions for operation (LCO) for the movable control element assemblies as follows:

- (a) Technical Specification 3.1.3.1, LCO for CEA position, is revised to include a new restriction that requires a core power reduction within 15 minutes after the detection of a CEA deviation;
- (b) Technical Specification 3.1.3.6, LCO for regulating CEA insertion limit, is revised to include a restriction that limits the regulating CEA group to the short term steady state insertion limit when the core operating limit supervisory system (COLSS) is out of service; and
- (c) Technical Specification 3.1.3.7, LCO for part length CEA insertion limit, is revised to impose a new insertion limit for the part length CEA group as shown in an added Figure 3.1-3.

Although all of these changes involve imposing new restrictions on CEA Positions, these changes are necessary in order to maintain safe reactor operation with the proposed reduction of the inward CEA deviation PFs used by the CPC. The objective of the PF reduction is to avoid an unnecessary reactor scram for those events where CEA sensor noise is interpreted by the CEAC as a significant inward CEA deviation. However, the PF reduction in the CPC must not result in failure to provide the necessary reactor trip when conditions dictate. To accommodate the margin degradation for an inward CEA deviation event such as a full length CEA drop, a power reduction and CEA maneuvering restrictions are imposed in the proposed technical specification changes.

In a plant with an analog protection system rather than a CPC, the single full length CEA drop is a design basis event which does not require a reactor trip. Rather, the required overpower margin (ROPM) is provided in the determination of limiting conditions for operation (LCO) to prevent the single CEA drop transient from violating the specified acceptable fuel design limits (SAFDL) of minimum DNBR and fuel melting. For a plant with CPCs, the CEA deviation PFs are applied to the CPC DNBR and LPD calculations to determine if the SAFDLs will be violated and, therefore, if a reactor trip is necessary to prevent the violation. The PFs consist of two components: a static component whose magnitude is dependent upon the CEA deviation configuration and magnitude, and a dynamic xenon component which is a linear function of time after CEA drop to account for the xenon redistribution effect. SCE has determined that the thermal margin maintained using COLSS operating limits is sufficient to accommodate the PF that is needed immediately after the CEA deviation. For some specific combinations of the initial CEA configuration and dropped CEA where the required PF exceeds the minimum ROM maintained via COLSS, a power reduction is necessary to accommodate the residual PF. The magnitude of the power reduction as a function of time after CEA drop is specified in the new Figure 3.1-1A added to Technical Specification 3.1.3.1. This figure was determined from the worst PF (combination of the static and xenon components) that can occur for any specified CEA deviation from any initial CEA bank configuration to assure that the worst deviation while operating within the LCO space monitored by the COLSS will not cause a violation of the SAFDL. Since a power reduction in accordance with Figure 3.1-1A provides assurance that the SAFDLs are not exceeded subsequent to a CEA drop event, we conclude that the proposed change to Technical Specification 3.1.3.1 is acceptable.

The existing Technical Specification 3.1.3.6 specifies that the regulating CEA groups shall be limited to the withdrawal sequence and insertion limits shown on Figure 3.1-2, with the CEA insertion between the long term steady state insertion limits and the transient insertion limits (TIL) restricted to a specified duration within a specified time interval. This specification

does not vary the CEA insertion limits whether the COLSS is in service or out of service. The proposed technical specification change will restrict the regulating CEA groups to the short term steady state insertion limit (STSSIL) when the COLSS is out of service. In other words, when the COLSS is out of service, CEA locations in the region between the STSSIL and TIL in Figure 3.1-2 are not permissible. Since the COLSS thermal margin includes a power dependent power operating limit (POL) bias to accommodate CEA drop and deviation from lower power CEA configurations, this POL bias must be compensated for when the COLSS is out of service. However, the limiting condition for operation of Technical Specifications 3.2.4 specifies the DNBR margin operating limit based on CPC calculation for COLSS out of service. This DNBR operating limit preserves the ROPM when COLSS is out of service. The proposed technical specification change imposes an additional power dependent insertion limit (PDIL) by restricting CEA motion to the short term insertion limit. SCE provided an analysis to show that the operating limit imposed in Technical Specification 3.2.4 and the proposed PDIL provide sufficient margin to compensate for the POL bias term and CEA deviation PFs when COLSS is out of service. On this basis we conclude that the addition of this restriction provides assurance that no SAFDL will be violated when COLSS is out of service and therefore we find this change to be acceptable.

The proposed change to Technical Specification 3.1.3.7 will restrict the part length CEA insertion to less than 25 percent for power levels greater than 50 percent of rated power as specified in the PDIL shown in the new Figure 3.1-3. The part length rods (PLR) are unique among the CEAs in that a PLR drop can cause a reactivity increase under the wrong set of circumstances. This reactivity increase will cause a temporary power excursion until the feedback mechanisms return the core to approximately its initial power. SCE has determined that the proposed restriction of PLR to less than 25 percent insertion will prevent a PLR drop from inserting positive reactivity for power levels above 50 percent of the rated power. For power levels below 50 percent, the long term insertion limit of 25 percent will still prevent a positive reactivity insertion on a PLR drop. However, operation between the long term and the transient insertion limits shown in Figure 3.1-3 could result in a

positive reactivity insertion on a PLR drop. The licensee provided an analysis to show that the ROPM available at those power levels is sufficient to accommodate a power increase from a PLR drop with positive reactivity insertion. We therefore conclude that the proposed change to Technical Specification 3.1.3.7 is acceptable.

SCE provided an evaluation of the overall impact of the proposed technical specification changes and the reduction of the inward CEA deviation PFs on a CEA drop event. A safety analysis of a CEA drop event is provided in SCE's Cycle 2 reload report, dated September 28, 1984. This analysis is performed with the inward CEA deviation PF equal to 1.0 and the operating limits in accordance with the proposed technical specification changes. The result shows that no reactor trip is necessary and that the minimum DNBR during the transient is greater than the DNBR limit. Although the Cycle 2 analysis is performed with the method of statistical combination of uncertainties, which results in a higher DNBR limit and calculated DNBR than those resulting from the deterministic treatment of uncertainties used in Cycle 1, the Cycle 2 safety analysis provides a typical system response for a CEA drop event. Based on the above considerations, we conclude that there is reasonable assurance that the SAFDLs for DNB and fuel melt will not be exceeded for a CEA drop event, and therefore we find proposed changes in technical specifications and inward CEA deviation PFs to be acceptable.

(2) CPC/CEAC Software Modification

The implementation of the reduction of the inward CEA deviation PF requires no changes in the CPC software in either its calculational algorithm or data base constants. The only modification is the change in the values of those data base constants related to the inward CEA deviation PF. SCE in its letter of August 1, 1984 submitted the San Onofre - Unit 2 Cycle 1 CPC and CEAC data base, and CPC/CEAC phase I and phase II test results. The staff has reviewed the values of the data base constants of the arrays designated XE, XEC, LPDCON and DNBCON for the entries related to the inward CEA deviation PFs and has confirmed

that they have the correct value of 1.0. In addition, SCE has also confirmed that the CPC/CEAC modifications were done in accordance with the approved procedure described in CEN-39(A), Revision 2, "CPC Protection Algorithm Software Change Procedure". The software verification tests as described in the phases I and II test result reports have determined that no error is detected in the implementation of the data base modifications, and that the operation of the integrated system is consistent with the performance predicted by design analysis. The staff, therefore, concludes that the CPC/CEAC software modification for Cycle 1 Revision 2 is acceptable.

3. SUMMARY OF EVALUATION

The staff has reviewed the changes proposed by SCE to San Onofre Units 2 and 3 Technical Specifications 3.1.3.1, 3.1.3.6 and 3.1.3.7 to accommodate the CPC/CEAC change in which the inward CEA deviation PFs are reduced to 1.0. We conclude that the proposed technical specification changes and the CPC/CEAC change will not result in the SAFDL limits being violated for a CEA drop event. Therefore, the proposed changes are acceptable. We have also reviewed the SONGS-2 Cycle 1 CPC/CEAC data base and phases I and II test reports and conclude that the CPC/CEAC modification and implementation are acceptable.

4. CONTACT WITH STATE OFFICIAL

The NRC staff has advised the Chief of the Radiological Health Branch, State Department of Health Services, State of California, of the proposed determinations of no significant hazards consideration. No comments were received.

5. ENVIRONMENTAL CONSIDERATION

These amendments involve changes in the installation or use of facility components located within the restricted area. The staff has determined that the amendments involve no significant increase in the amounts of any effluents

that may be released offsite and that there is no significant increase in individual or cumulative occupation radiation exposure. The Commission has previously issued proposed findings that the amendments involve no significant hazards consideration, and there has been no public comment on such findings. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR Sec. 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

6. CONCLUSION

Based upon our evaluation of the proposed changes to the San Onofre Units 2 and 3 Technical Specifications, we have concluded that: there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public. We, therefore, conclude that the proposed changes are acceptable.

Dated: January 9, 1985

ISSUANCE OF AMENDMENT NO. 30 TO FACILITY OPERATING LICENSE NPF-10
AND AMENDMENT NO. 19 TO FACILITY OPERATING LICENSE NPF-15
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

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