BEFORE THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY and SAN DIEGO GAS & ELECTRIC COMPANY for a Class 104(b) License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 1 of the San Onofre Nuclear Generating Station	)	DOCKET NO. 50-206 Amendment Application NO. 196

SOUTHERN CALIFORNIA EDISON COMPANY and SAN DIEGO GAS & ELECTRIC COMPANY, pursuant to 10 CFR 50.59, hereby submit Amendment Application No. 196.

This amendment consists of Proposed Change No. 245 to Provisional Operating License No. DPR-13. Proposed Change No. 245 modifies the Technical Specifications incorporated in Provisional Operating License No. DPR-13 as Appendix A to reflect more restrictive limits on core axial offset than those specified in the current Technical Specifications. The proposed change will revise Technical Specifications Section 3.5.2, "Control Rod Insertion Limits," and Section 3.11, "Continuous Power Distribution Monitoring."

More restrictive limits on core axial offset are intended to reflect the addition of analytical margin necessary to compensate for effects of differences between Reactor Coolant System volume used in design basis accident analyses of record and that calculated in the NOTRUMP code.

Based on the significant hazards analysis provided in the Description and Significant Hazards Consideration Analysis of Proposed Change No. 245, it is concluded that (1) the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92, and (2) there is reasonable

assurance that the health and safety of the public will not be endangered by the proposed change.

Subscribed on this 18TH day of JUNE, 1991.

Respectfully Submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: Harold B. Ray
Harold B. Ray
Senior Vice President

Subscribed and sworn to before me this 18TH day of JUNE, 1991.

OFFICIAL SEAL
BARBARA A. MC CARTHY
Notary Public-California
ORANGE COUNTY
My Commission Expires
March 31, 1995

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James A. Beoletto
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DESCRIPTION AND SIGNIFICANT HAZARD CONSIDERATION ANALYSIS OF
PROPOSED CHANGE NO. 245
TO PROVISIONAL OPERATING LICENSE NO. DPR-13

This is a request to revise Section 3.5.2, "Control Rod Insertion Limits," and Section 3.11, "Continuous Power Distribution Monitoring" of the Technical Specifications for San Onofre Nuclear Generating Station, Unit 1 (SONGS 1). The purpose of this proposed change is to implement more restrictive limits on axial offset than those currently included in the Technical Specifications. The proposed change is necessary to provide analytical margin to compensate for identified differences between volume used in design basis accident analyses and that calculated in recently completed NOTRUMP analyses.

Existing Technical Specifications

See Attachment 1.

Proposed Technical Specifications

See Attachment 2.

Description of Change

Implementation of more restrictive limits on axial offset than those currently included in the Technical Specifications provides margin in PCT. This margin will be used to offset penalties due to differences between Reactor Coolant System (RCS) volumes used in design basis accident analyses and those calculated in recently completed NOTRUMP analyses. The purpose of this proposed change to the Technical Specifications is to implement the new limits on the axial offset. The proposed change will revise Technical Specification section 3.5.2, "Control Rod Insertion Limits," and section 3.11, "Continuous Power Distribution Monitoring" as follows.

Item 1 of the Basis for Technical Specification Section 3.5.2 provides initial design maximum values for specific power and Heat Flux Hot Channel Factor (HCF). This section also discusses application of more restrictive limit on the design values for operation. These statements will be deleted from Section 3.5.2 since they pertain to Cycle 1 only, and are no longer valid. The current values for specific power and HCF are given in this section as 13.2 kw/ft and 2.78 respectively. Reducing axial offset limits results in an overall HCF of 2.38. The linear heat rate will also be reduced to 11.3 kw/ft. The proposed change will revise the existing values for specific power and HCF to reflect the new values.

Item 2 of the Basis for Technical Specification Section 3.5.2 provides minimum shutdown capability requirements. A typographical error in the unit symbols for reactivity will be corrected.

The Cycle 10 Reload Safety Evaluation is currently referenced (Reference 8) in the Basis for Technical Specification Section 3.5.2 as the source for the values of specific power and HCF. Since these values are revised by this proposed change, reference to Cycle 10 Reload Safety Evaluation no longer applies. Therefore, this document will be deleted from Section 3.5.2 as a reference. Consequently, the current Reference 9 in this section will be changed to Reference 8.

Technical Specification Section 3.11, "Continuous Power Distribution Monitoring", provides functional relationships for the incore axial offset maximum limits. The proposed change will revise the term 2.78/P in this equation to 2.595/P. This will conservatively limit the incore axial offsets such that the linear heat rate assumed in the LOCA analysis, and hence the new HCF limit of 2.38, is not violated at any allowable core power level. This change will result in an allowable incore axial offset of +/- 12% at 100% power, a reduction of approximately 5% from the current Technical Specification limits.

Action A in the current Technical Specification Section 3.11 requires that in the event the incore axial offsets exceed the specified limits, the thermal power should be reduced until they are within the limits. This Action will be revised to provide operators an opportunity to restore the incore axial offsets within the specified limits prior to reducing the power. This will eliminate unnecessary plant transient conditions without causing any adverse impact on operations.

The Basis for Technical Specification Section 3.11 references Cycle 10 Reload Safety Evaluation (Reference 1) as the source for values in the equation for Incore Axial Offset limits. Since the term 2.78/P in this equation is being changed to 2.595/P by this proposed change as discussed above, the current reference to Cycle 10 Reload Safety Evaluation is not appropriate. Therefore, this document will be replaced as the reference by a Westinghouse letter which contains the new values. This letter is included here as Attachment 3. Other changes to the Basis for Section 3.11 will reflect general improvements and clarifications to the text.

Discussion

BACKGROUND

During recent engineering design work related to Cycle 12 modification, SCE noted an inconsistency in the values used by Westinghouse for the reactor vessel refill volume (consisting of reactor vessel lower plenum and downcomer volumes) in the small break LOCA (SBLOCA) and the large break LOCA (LBLOCA) analyses. The difference in the volumes was reviewed by Westinghouse and it was confirmed that the LBLOCA refill volume had been underestimated by 182 cubic feet. Administrative controls were implemented immediately to limit reactor power to less than 75%. By letter to the NRC dated March 29, 1991, SCE described the impact of the underestimated LBLOCA refill volume, and the planned administrative controls to return the plant to full power operation. NRC concurrence on these controls and approval to return the plant to full

power were obtained prior to plant operation above the 75% power level.

SCE's subsequent efforts to verify the quantities for other volumes used in Westinghouse analyses identified additional differences that affect the LBLOCA/Peak Clad Temperature (PCT), LBLOCA containment mass and energy, and non-LOCA analyses. The impact of the additional volume differences on these analyses was evaluated by conservatively treating the differences as non-conservative errors. This evaluation concluded that sufficient margin is available to compensate for all of the identified volume differences and to assure that the plant continues to be operated within its design basis. The necessary margin is provided by the following:

- restriction to the incore axial offset (as proposed by this change and as currently implemented by administrative controls);
- plant operation with a reduced RCS average coolant temperature (as currently implemented by administrative controls); and
- a more realistic analysis assumption for safety injection miniflow.

The evaluation results were discussed in detail in SCE's letters to the NRC dated May 10 and May 17, 1991.

IMPACT OF VOLUME DIFFERENCES

The underestimated refill volume results in a larger calculated value for the time to refill the reactor vessel lower plenum to the bottom of the active fuel region after the LBLOCA. This in turn results in an increase in calculated PCT. The underestimate of the refill volume by 182 cubic feet was calculated to result in a predicted increase in PCT of 210 degrees F. The calculated PCT based on the LBLOCA analyses of record is 2278.5 degrees F. This provides 21.5 degrees F margin to the SONGS 1 PCT limit of 2300 degrees F. Reducing the refill penalty in PCT of 210 degrees by this 21.5 degree margin results in a net penalty of 188.5 degrees F.

The overall difference between the RCS volume used in LBLOCA PCT analyses and the volume from recently verified calculations is approximately 550 cubic feet. This difference consists of the 182 cubic feet discrepancy in the refill volume, 150 cubic feet in the core baffle region, and 168 cubic feet of small volume differences in other areas of the system. Using conservative assumptions, the penalty due to the volume difference during the blowdown and reflood phases of LOCA was calculated to be 21 and 36.3 degrees F respectively. Therefore, the volume difference of 550 cubic feet results in a total conservatively assessed penalty of 57.3 degrees F.

The total RCS volume used in the LBLOCA containment mass and energy design basis analyses was determined to be approximately 300 cubic feet less than the volume used in the recent NOTRUMP analysis. This difference consists of the 182 cubic feet in refill volume and other differences in various areas of the RCS. Assuming that these differences represent non-conservative errors, they result in an underestimate of the RCS mass and energy released during the LBLOCA. This adversely affects the calculated peak containment pressure and temperature after a LBLOCA. The increased energy released into the containment during a LBLOCA resulting from the identified 300 cubic feet

volume difference was calculated to be 8 MBTU.

A comparison of volumetric inputs to LOFTRAN (the non-LOCA event analysis code) with the Westinghouse plant component data base (that was used to calculate the RCS volumes for the recent NOTRUMP SBLOCA analysis) uncovered a volume difference of 366 cubic feet. This difference is associated with the dead volume in the reactor vessel head, the total upper core plenum volume, and with differences in calculational approach in computing various volume inputs. The volume difference due to differences in calculational approach has been confirmed not to be a discrepancy. Evaluation of the non-LOCA analyses performed with the LOFTRAN code and the boron dilution accident analysis performed by SCE show that these analyses of record are either conservative or are not significantly impacted by the identified volume differences associated with the vessel head dead volume and the total upper core plenum volume.

AVAILABLE PCT MARGINS

The following operating conditions and analysis assumptions are sources that could provide margin to offset penalties due to volume differences discussed above. Each of these is discussed below.

- reduced axial offset limits
- increased SI flow rate
- reduced RCS average coolant temperature
- reduced operating power

Evaluation of compensatory measures to offset the PCT penalty due to the underestimated refill volume concluded that the necessary PCT margin is gained by reducing the axial offset limits. Previous SONGS 1 analysis was based on a linear heat rate of 13.2 kw/ft which results in a total Heat Flux Hot Channel Factor (HCF) of 2.78. Reanalysis of the current cycle has demonstrated that reducing axial offset limits results in a linear heat rate of 11.3 kw/ft, which in turn results in an overall HCF of 2.38. The PCT benefit due to this reduction is 237.5 degrees F. Details of this evaluation is contained in a Westinghouse letter dated April 24, 1991, included here as Attachment 3.

Previous LBLOCA analysis conservatively assumed a Safety Injection system miniflow rate higher than the rate appropriate for an LBLOCA. A more realistic (but nevertheless conservative) miniflow rate will increase the safety injection delivery rate by 27 lbm/sec., and will result in a more rapid reactor vessel reflood. This has a net effect of reducing PCT by approximately 46 degrees F.

SONGS 1 is currently operating at a reduced RCS average coolant temperature, Tavg., implemented by administrative controls. However, Cycle 11 design basis LBLOCA mass and energy analyses have not credited plant operation at the reduced Tavg. Operating with a lower Tavg reduces the energy available to be released to the containment by approximately 11 MBTU. This margin is more than sufficient to offset the 8 MBTU penalty associated with the volume difference in the existing LBLOCA mass and energy analyses discussed earlier.

The current accident analyses are based on plant operation at 102% rated thermal power. However, the plant is limited to operation upto 95% power level due to operation at reduced Tavg. Assuming a PCT benefit of 8 degrees F for a 1% decrease in power level (based on power sensitivities with the IAC evaluation model), operation at reduced power level provides a margin of 56 degrees F. This margin represents conservatism built into the existing LBLOCA analyses, and no credit is taken for this to offset penalty due to volume differences.

As discussed above, the reduced incore axial offsets and the more realistic assumptions for Safety Injection miniflow result in a combined PCT margin of 283.5 degrees F (i.e., 237.5 + 46.0). This margin is sufficient to offset the 245.8 degrees F PCT penalty due to the total RCS volume difference in the LBLOCA/PCT analysis (i.e., 188.5 due to underestimated refill volume plus 57.3 due to differences in volume of core baffle region and other areas of RCS). The margin provided by operation at the reduced Tavg (11 MBTU) is sufficient to offset the penalty (8 MBTU) in LBLOCA mass and energy release to the containment due to the volume difference in the LBLOCA mass and energy analysis. The available margins are therefore sufficient to compensate for all of the identified volume discrepancies and differences, and to ensure that the plant continues to be operated within its design basis.

MODIFICATION TO AXIAL OFFSET LIMITS

Functional relationships for the incore axial offset maximum limits are provided in Technical Specification Section 3.11. The proposed change will revise the term 2.78/P in the equation to 2.595/P. Incorporating this change, the revised axial offset limits will be as follows:

$$\text{For Positive Offsets: } IAO = \frac{2.595/P - 2.10}{0.033} - FCC$$

$$\text{For Negative Offsets: } IAO = \frac{2.595/P - 2.10}{-0.033} + FCC$$

The change in the term 2.78/P to 2.595/P is intended to conservatively limit the incore axial offsets such that the linear heat rate assumed in the LOCA analysis, and hence the new Hot Channel Factor limit of 2.38 (as being proposed by changes to Technical Specifications section 3.5.2), is not violated at any allowable core power level (See Attachment 3). The constants +/- 0.033 and 2.10 in the above equations are used to establish the relationship between the incore axial offset and power. The incore/excore correlation uncertainty (FCC) represents the difference between the periodic correlation verification and the monthly correlation check of incore versus excore power distribution data. The allowable incore axial offset limits are reduced by this amount to maintain plant operation within existing safety analysis assumptions.

The current Technical Specifications allow an incore axial offset limit of +/- 20.6% based on a Hot Channel Factor of 2.78 and 100% Rated Thermal Power

(RTP), if the incore/excore correlation uncertainty is not included. This limit is reduced to approximately +/- 17% when the incore/excore correlation uncertainty is taken into consideration.

The revised incore axial offset equations result in an allowable axial offset of +/- 15% at 100% RTP. This represents a 5.6% reduction on both sides of the window from the current Technical Specification limits. Accounting for the expected incore/excore correlation uncertainty, the new allowable axial offset will be approximately +/- 12% at 100% power.

Data points representing potential axial offset values have been calculated for Cycle 11 that include maneuvers typically performed at SONGS 1 and variants on these maneuvers done at a number of control rod insertions, times, and burnups. These data points demonstrate that with the proposed axial offset of +/- 15% at RTP, no violations of the proposed linear heat rate of 11.3 kw/ft or the Hot Channel Factor of 2.38 will occur.

Significant Hazards Consideration Analysis

In accordance with 10CFR50.91(a)(1), the following analysis is provided to demonstrate that the proposed changes do not represent a significant hazards consideration. According to 10CFR50.92(c), the proposed changes discussed above are deemed to involve a significant hazards consideration if there is a positive finding in any one of the following areas:

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of any accident previously evaluated?

   Response: No

   The proposed change will reflect restrictions on axial offset necessary to assure that the Hot Channel Factor and the linear heat rate do not exceed their analysis values. This will provide the necessary margin in peak clad temperature calculations to assure that current acceptance criteria are met. The proposed change to axial offset will place more restrictive limits on the displacement of power from the core center toward the ends of the core by further limiting the axial offset operating band. This has no impact on the probability of any accident previously evaluated. The consequences of accidents previously evaluated will not be affected since the proposed change will provide margin to compensate for the volume differences described above. The consequences will remain bounded by previous safety analyses modified to reflect the new volumes. Therefore, the proposed change will not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The core axial offset limits are means to control the offset window for the core axial power distribution. They are specified as the result of analyses of the limiting design basis accidents. Restrictions on axial offset assure that the analyzed accidents remain bounding. Therefore, operation of the facility in accordance with this proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?

Response: No

The decrease in the Hot Channel Factor and the more restrictive limits to the offset do not represent reduced conservatism from existing analyses. The reduction in the axial offset places a more severe restriction on acceptable power configurations that are assumed in the accident analyses. The margins in the analyses are not affected. The Interim Acceptance Criteria (IAC) PCT limit for SONGS 1 continues to be met by placing more restrictive limits on axial offset. With the proposed change and other analysis and operating conditions discussed earlier, penalties due to the volume differences will be offset, and the predicted peak clad temperature will remain below the IAC PCT limit. The proposed change will not introduce any changes to the plant design, plant configuration, or the method of plant operation, which will remain bounded by the existing safety analysis. Therefore, operation of the facility n accordance with this proposed change will not involve a significant reduction in a margin of safety.

Safety and Significant Hazards Determination

Based on the above Safety Analysis, it is concluded that: (1) the proposed change does not constitute a significant hazards consideration as defined by 10CFR50.92; (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

ATTACHMENT 1