REQUEST FOR ADDITIONAL INFORMATION

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

By application dated January 30, 2009, Southern California Edison (SCE) Company requested changes to the Technical Specifications (ADAMS Accession Number ML090360738) for the San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. The proposed changes would revise TS 5.7.1.5, "Core Operating Limits Report" that will allow SCE to use the CASMO-4/SIMULATE-3 methodology to perform nuclear design calculations. The application also included a request for a temporary exemption from 10 CFR 50.46 and 10 CFR 50, Appendix K, to allow up to sixteen (16) lead fuel assemblies (LFAs) manufactured by AREVA NP to be inserted into the SONGS Unit 2 or Unit 3 reactor cores, beginning with upcoming Unit 2 refueling outage (Cycle 16). The SCE reactor core physics methodology using CASMO-3 and SIMULATE-3 was previously approved by the NRC. The upgrade from CASMO-3 to CASMO-4 is needed to model AREVA LFAs, since they contain Gadolinia burnable absorbers.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the amendment and exemption requests and determined that the following additional information is required in order to complete its review.

RAI 1: Nonlimiting Locations for the LFAs in the core

Enclosure 1 of SCE's request for temporary exemption and TS amendment states (paragraph 3 on page 5 of 7) that, "An underlying assumption of the LFA program is that a 5% radial power peaking penalty will be sufficient to ensure that the LFAs will be nonlimiting in the safety, fuel performance, thermal hydraulic, and ECCS performance analyses…." Also, the licensee states that, "since the LFAs will not be in the highest core power density locations, the placement scheme assures that the behavior of the LFAs is bounded by the safety analyses performed for the co-resident Westinghouse fuel." Provide the following information based on the above statements:

(1) Provide a detailed technical basis for the statement that a 5% radial power peaking penalty will be sufficient to ensure that the LFAs will be nonlimiting in the safety, fuel performance, thermal hydraulic, and ECCS performance analyses.

(2) Provide the details of analyses and methodologies used to identify the locations that are non-limiting locations. Provide the criteria and the key parameters used to determine the non-limiting locations; and

(3) Since LFAs are to be used in the subsequent cycles (Cycles 17 and 18), provide justification for the assumption/prediction that the LFAs will remain in nonlimiting core regions.

RAI 2: AREVA and Westinghouse Design Analyses

AREVA will be performing detailed design analyses for the LFAs, including thermal-hydraulic compatibility, LOCA and non-LOCA criteria, mechanical design, thermal hydraulic and seismic analyses of the AREVA LFAs in the SONGS reactor cores. Westinghouse will perform a compatibility analysis to ensure that the insertion of AREVA LFAs will not cause the remaining Westinghouse fuel to exceed its operating limits and to ensure there is no adverse impact on the fuel performance or mechanical integrity. The staff needs the following additional information regarding these analyses:

(1) Provide the methodology, data used in, and results expected from AREVA design analyses that include thermal-hydraulic compatibility, LOCA and non-LOCA criteria, mechanical design, thermal hydraulic and seismic analyses.

(2) Provide details of the Westinghouse compatibility analysis including methodology and expected results from analysis. Explain how the results will be interpreted to ensure that the insertion of the AREVA LFAs will not cause the remaining Westinghouse fuel to exceed its operating limits and to ensure there is no adverse impact on the fuel performance or mechanical integrity.

RAI 3: Poolside LFA Examinations

Provide details of the poolside LFA examinations to assess key performance measures of the lead fuel assembly. List methods and procedures for each of the examinations, inspections and measurements that are required to be done during the post-irradiation examination to obtain sufficient data to substantiate in-reactor fuel performance behavior such as; oxidation behavior, hydriding behavior, fretting and diameter measurements, assembly and fuel rod growth, assembly and channel bow, and guide tube wear measurements.

RAI 4: Generic Letter 83-11, Supplement 1: Licensee qualification for performing safety analyses, Attachment 1: Guidelines for qualifying licensees to use generically approved analysis methods.

This NRC Generic Letter (GL) was issued to notify licensees and applicants of modifications to the NRR practice regarding licensee qualification for performing their own safety analyses. This includes the analytical areas of reactor physics, core thermal hydraulic analysis, transient analysis (non-LOCA), and COLR parameter generation. The agency encourages utilities to perform their own safety analyses since doing this will significantly improve the licensee's understanding of plant behavior. Attachment 1 of GL 83-11, Section 2.4, "Comparison Calculations," stipulates that licensees should verify their ability to use the methods by comparing their calculated results to an appropriate set of benchmark data, such as physics startup tests, measured flux detector data during an operating cycle, higher order codes, published numerical benchmarks, analyses of record, etc. (emphasis added). These comparisons should be documented in a report which is part of the licensee's quality assurance (QA) records. Significant, unexpected, or unusual deviations in the calculations of safety-related parameters should be justified in the report. All comparisons with startup test data should agree within the acceptance criteria defined in the plant startup test plan.

(1) In accordance with the Generic Letter 83-11 and its Attachment 1, comparisons of calculated results from an adopted code with benchmark data such as experimental data, analysis of record, and/or data from measurements such as plant startup/low power physics tests should be documented. Tables 4.1 through 4.13 list various physics parameters from CASMO-4/SIMULATE-3 and compare them with the

respective measured values. Please revise these Tables with values from CASMO-3/SIMULATE-3 methodology. The revised Tables must include comparisons of both CASMO-4/SIMULATE-3 values with the measured data and comparison of CASMO-3/SIMULATE-3 vales with their respective measured values and calculate the percentage difference between the two sets of data.

(2) Guidelines listed in Attachment 1 of GL-83-11 stipulate that "licensees should verify their ability to use the methods by comparing their calculated results to an appropriate set of benchmark data…" Section 6 of Enclosure 4 of the LAR describes the benchmark results from KRITZ-3, KRITZ-4, and B&W critical experiments for gadolinia burnable absorber.

(i) Describe how SCE has applied the measurements and results from the above mentioned criticals to the proposed SONGS core with gadolinia burnable absorber.

(ii) SCE should provide details of how to benchmark the CASMO-4/SIMULATE-3 methodology against B&W critical data for the use of gadolinia bearing fuel at SONGS with respect to fuel pin power and associated uncertainties for $UO_2$ and gadolinia pin power.

RAI 5: Statistical Analysis: Biases and Uncertainties

Table 1.1 of Enclosure 4 of Reference 1 lists biases and uncertainties in parameters calculated using CASMO-4/SIMULATE-3.

Provide detailed statistical analyses methodology for biases, uncertainty and tolerance values for predicted (calculated) and measured values for parameters listed in Table 1.1 of Enclosure 4 of Reference 1. The parameters include, but are not limited to, reactivity, power coefficients, control rod worths, and various assembly and pin peaking factors.

RAI 6: Mixed Core Fuel Design Analysis

With the proposed introduction of AREVA NP fuel assemblies in to the SONGS Unit 2 or Unit 3 core, the AREVA NP fuel assemblies will be co-resident with Westinghouse fuel in the core, which will be considered a mixed core.

(1) How will the "mixed core" affect the compatibility analysis that will be performed "to ensure that the insertion of the AREVA LFAs will not cause the remaining Westinghouse fuel to exceed its operating limits and to ensure there is no adverse impact on the fuel performance or mechanical integrity?"

(2) How will the non-LOCA transient analyses be impacted by the mixed core, particularly the minimum DNBR calculations?

When a reactor core consists of more than one type of fuel assembly, as in the proposed SONGS Unit 2 or Unit 3 core, the flow redistributions due to pressure drop differences in the fuel assemblies of different types might introduce a DNBR penalty with respect to the reference core consisting of only one fuel type. Discuss the impact, if any, of the mixed core on various thermal margin calculations for the proposed new core.

RAI 7: Statements regarding the use of CASMO-3/SIMULATE-3 Methodology at SCE/SONGS

Clarification is required regarding the date of implementation of CASMO-3/SIMULATE-3 methodology for reactor physics design analyses at SONGS.

SCE obtained NRC approval to use CASMO-3/SIMULATE-3 methodology (SCE-9001-A) for their nuclear design reload analyses for Units 2 and 3 in August 1992.

In June 1999, SCE obtained NRC approval to use ROCS/MC for their nuclear design analysis as part of their reload analysis methodology (SCE-9801-P-A).

San Onofre Updated FSAR (June 2005), Section 4.3.3.5.1 indicates "Specifically, SCE intends to use CASMO-3/SIMULATE-3 programs in licensing applications, including PWR reload physics design, calculating startup predictions, generating physics input for safety analyses, generating core physics data books, and establishing setpoint updates for both reactor protection and monitoring systems."

Current San Onofre Unit-2 and Unit-3 Technical Specification 5.7.1.5 b. CORE OPERATING LIMITS REPORT does not list SCE 9001-P-A as a methodology for analytical methods used to determine the core operating limits. Instead the TS lists only SCE-9801-P-A as “Reload Analysis Methodology for SONGS” which permits SCE to use ROCS/MC methodology.

The LAR for ME0602/3 states (Page 1 of 7 of Enclosure 3) that "The CASMO-3 and SIMULATE-3 methodologies have been used to evaluate reload designs at San Onofre for over fifteen years". I have no way to verify this statement in the light of the above facts.

Please clarify the information regarding the date of implementation and duration of use of CASMO-3/SIMULATE-3 methodology at SONGS. Include the clarification in the final version of appropriate enclosures of the LAR

RAI 8: Correction(s) needed:

On page 18 of SCE-0901, correct the Clad ID of 0.322 inches to 0.332 inches.

RAI 9: Margin of Safety

Page 5 of 7 of Enclosure 3 of Reference 1 states that, “Extensive benchmarking of CASMO-4 has demonstrated that the values of those parameters used in the safety analyses are not significantly changed relative to the values obtained using the CASMO-3 methodology. For any changes in the calculated values that do occur, the application of appropriate biases and uncertainties ensures that the current margin of safety is maintained.” Also, this section states that, “The proposed change does not involve a significant reduction in a margin of safety.”

Provide details of the calculations to support the above statements regarding margin of safety in the physics parameters from CASMO-4/SIMULATE-3, over those calculated from CASMO-3/SIMULATE-3 methodology.

References

1. Letter from Southern California Edison (Michael P. Short) to US Nuclear Regulatory Commission (Document Control Desk), “ Request for Temporary Exemption fro the Provisions of 10 CFR 50.46 and 10 CFR 50 Appendix K for Lead Fuel Assemblies and Proposed Change Number (PCN)-589, Amendment Application Numbers 254 and 240, respectively for Units 2 and 3 Request to Revise TS 5.7.1.5 “ Core Operating Limits Report (COLR)” San Onofre Generating Station, Units 2 and 3”, January 30, 2009 Enclosures 1, 2, 3 and 4.