UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 15, 2009

Mr. Ross T. Ridenoure
Senior Vice President and Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENTS REVISING TECHNICAL SPECIFICATION 5.7.1.5, "CORE OPERATING LIMITS REPORT (COLR)" (TAC NOS. ME0604 AND ME0605)

Dear Mr. Ridenoure:

The Commission has issued the enclosed Amendment No. 222 to Facility Operating License No. NPF-10 and Amendment No. 215 to Facility Operating License No. NPF-15 for San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated January 30, 2009, as supplemented by letters dated March 16 and September 29, 2009.

The amendments revise the list of Nuclear Regulatory Commission-approved reports in TS 5.7.1.5, "Core Operating Limits Report (COLR)," to allow the licensee to use the CASMO-4 methodology to perform nuclear design calculations for SONGS, Units 2 and 3.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

James R. Hall

James R. Hall, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosures:
1. Amendment No. 222 to NPF-10
2. Amendment No. 215 to NPF-15
3. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

DOCKET NO. 50-361

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 222
License No. NPF-10

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee), dated January 30, 2009, as supplemented by letters dated March 16 and September 29, 2009, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C(2) of Facility Operating License No. NPF-10 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 222, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility
Operating License No. NPF-10
and Technical Specifications

Date of Issuance: December 15, 2009

ATTACHMENT TO LICENSE AMENDMENT NO. 222

FACILITY OPERATING LICENSE NO. NPF-10

DOCKET NO. 50-361

Replace the following pages of the Facility Operating License No. NPF-10 and Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Facility Operating License

REMOVE	INSERT
3	3

Technical Specifications

REMOVE	INSERT
5.0-27	5.0-27

(3) SCE, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of San Onofre Nuclear Generating Station, Units 1 and 2 and by the decommissioning of San Onofre Nuclear Generating Station Unit 1.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

Southern California Edison Company (SCE) is authorized to operate the facility at reactor core power levels not in excess of full power (3438 megawatts thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 222, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

5.7 Reporting Requirements (continued)

5.7.1.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

1. CENPD-132P, "Calculative Methods for the C-E Large Break LOCA Evaluation Model"

2. CENPD-137P, "Calculative Methods for the C-E Small Break LOCA Evaluation Model"

3. CEN-356(V)-P-A, "Modified Statistical Combination of Uncertainties"

4. SCE-9801-P-A, "Reload Analysis Methodology for the San Onofre Nuclear Generating Station Units 2 and 3"

5. CEN-635(S), "Identification of NRC Safety Evaluation Report Limitations and/or Constraints on Reload Analysis Methodology"

6. Letter, dated May 16, 1986, G. W. Knighton (NRC) to K. P. Baskin (SCE), "Issuance of Amendment No. 47 to Facility Operating License NPF-10 and Amendment No. 36 to Facility Operating License NPF-15," San Onofre Nuclear Generating Station Units 2 and 3 (Cycle 3 SER)

7. Letter, dated January 9, 1985, G. W. Knighton (NRC) to K. P. Baskin, "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 (Cycle 2 SER)

8. "Implementation of ZIRLO™ Cladding Material in CE Nuclear Power Fuel Assembly Designs," CENPD-404-P-A

9. SCE-0901, "PWR Reactor Physics Methodology Using Studsvik Design Codes"

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal hydraulic limits, Emergency Core Cooling System ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any mid-cycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.7.1.6 REACTOR COOLANT SYSTEM (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

a. RCS pressure and temperature limits for heatup, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

(continued)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

DOCKET NO. 50-362

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 215
License No. NPF-15

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee), dated January 30, 2009, as supplemented by letters dated March 16 and September 29, 2009, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C(2) of Facility Operating License No. NPF-15 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 215, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility
Operating License No. NPF-15
and Technical Specifications

Date of Issuance: December 15, 2009

ATTACHMENT TO LICENSE AMENDMENT NO. 215

FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NO. 50-362

Replace the following pages of the Facility Operating License No. NPF-15 and Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Facility Operating License

REMOVE	INSERT
3	3

Technical Specifications

REMOVE	INSERT
5.0-27	5.0-27

(3) SCE, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

(4) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source and special nuclear materials as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70 to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) SCE, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of San Onofre Nuclear Generating Station, Units 1 and 3 and by the decommissioning of San Onofre Nuclear Generating Station Unit 1.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

Southern California Edison Company (SCE) is authorized to operate the facility at reactor core power levels not in excess of full power (3438 megawatts thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 215, are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

5.7 Reporting Requirements (continued)

5.7.1.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

1. CENPD-132P, "Calculative Methods for the C-E Large Break LOCA Evaluation Model"

2. CENPD-137P, "Calculative Methods for the C-E Small Break LOCA Evaluation Model"

3. CEN-356(V)-P-A, "Modified Statistical Combination of Uncertainties"

4. SCE-9801-P-A, "Reload Analysis Methodology for the San Onofre Nuclear Generating Station Units 2 and 3"

5. CEN-635(S), "Identification of NRC Safety Evaluation Report Limitations and/or Constraints on Reload Analysis Methodology"

6. Letter, dated May 16, 1986, G. W. Knighton (NRC) to K. P. Baskin (SCE), "Issuance of Amendment No. 47 to Facility Operating License NPF-10 and Amendment No. 36 to Facility Operating License NPF-15," San Onofre Nuclear Generating Station Units 2 and 3 (Cycle 3 SER)

7. Letter, dated January 9, 1985, G. W. Knighton (NRC) to K. P. Baskin, "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 (Cycle 2 SER)

8. "Implementation of ZIRLO™ Cladding Material in CE Nuclear Power Fuel Assembly Designs," CENPD-404-P-A

9. SCE-0901, "PWR Reactor Physics Methodology Using Studsvik Design Codes"

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal hydraulic limits, Emergency Core Cooling System ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any mid-cycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.7.1.6 REACTOR COOLANT SYSTEM (RCS) PRESSURE AND TEMPERATURE LIMITS REPORT (PTLR)

a. RCS pressure and temperature limits for heatup, cooldown, low temperature operation, criticality, and hydrostatic testing as well as heatup and cooldown rates shall be established and documented in the PTLR for the following:

(continued)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 222 TO FACILITY OPERATING LICENSE NO. NPF-10

AND AMENDMENT NO. 215 TO FACILITY OPERATING LICENSE NO. NPF-15

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letter dated January 30, 2009, as supplemented by letters dated March 16 and September 29, 2009 (References 1, 2, and 3, respectively), Southern California Edison Company (SCE, or the licensee), submitted a license amendment request for changes to the Technical Specifications (TS) for the San Onofre Nuclear Generating Station, Units 2 and 3 (SONGS 2 and 3). The proposed changes would revise TS 5.7.1.5, "Core Operating Limits Report (COLR)," to allow the licensee to use the CASMO-4 methodology to perform nuclear design calculations for SONGS 2 and 3. Specifically, report number SCE-0901, "PWR [Pressurized-Water Reactor] Reactor Physics Methodology Using Studsvik Design Codes" (Reference 4), which provides the basis for the use of CASMO-4 for SONGS 2 and 3, will be added to the list of references in TS 5.7.1.5.

SCE is developing a lead fuel assemblies (LFAs) program with AREVA NP. Under this program, the licensee is requesting Nuclear Regulatory Commission (NRC) approval to insert up to 16 LFAs manufactured by AREVA NP into the SONGS 2 core or the SONGS 3 core, to be used for up to three operating cycles. Currently, SCE plans to load eight AREVA LFAs in the SONGS 2 core for Cycle 16 operation. Unlike the current fuel assemblies used in SONGS 2 and 3, the AREVA LFAs will contain M5 alloy cladding material and Gadolinia (gadolinium oxide) burnable absorbers. The CASMO-4 methodology will enable the licensee to model the behavior of the Gadolinia burnable neutron absorber material in the LFAs. Although TS 4.2.1, "Fuel Assemblies," authorizes the licensee to use assemblies with gadolinium oxide burnable absorbers, an NRC-approved method for their analysis is needed.

In the same January 30, 2009, letter submitting the license amendment request, SCE also requested a temporary exemption to authorize the use of up to 16 AREVA LFAs with M5 alloy cladding in SONGS 2 or 3. The use of a zirconium-based alloy different from zircaloy or ZIRLO™ cladding requires an exemption from the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors," and 10 CFR Part 50, Appendix K, "ECCS [Emergency Core Cooling System] Evaluation Models." That exemption request will be addressed as a separate, concurrent licensing action by the NRC staff.

The supplemental letters dated March 16 and September 29, 2009, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination, as published in the *Federal Register* on September 22, 2009 (74 FR 48320). The September 29, 2009, supplemental letter provided the licensee's response to the NRC staff's request for additional information (RAI), transmitted via e-mail on August 26, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092380531).

The NRC staff has reviewed the licensee's regulatory and technical analyses in support of the proposed license amendment, which are described in the licensee's January 30, 2009, application and its supplements. This staff safety evaluation supports the conclusion 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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

2.0 REGULATORY EVALUATION

The NRC staff considered the following regulatory requirements and guidance in its review of the licensee's application.

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems for light water nuclear power reactors"

10 CFR Part 50, Appendix K, "ECCS [Emergency Core Cooling System] Evaluation Models"

10 CFR 50, Appendix A, "General Design Criteria [GDC] for Nuclear Power Plants," as follows:

> GDC 10, "Reactor design, which states: "The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences."
>
> GDC 11, Reactor inherent protection," which states: "The reactor core and associated coolant systems shall be designed so that in the power operating range the net effect of the prompt inherent nuclear feedback characteristics tends to compensate for a rapid increase in reactivity."

GDC 12, "Suppression of reactor power oscillations," which states: "The reactor core and associated coolant, control, and protection systems shall be designed to assure that power oscillations which can result in conditions exceeding specified acceptable fuel design limits are not possible or can be reliably and readily detected and suppressed."

The NRC staff also considered the guidance in NUREG-0800, "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 4.2, "Fuel System Design," in its review of the application.

3.0 TECHNICAL EVALUATION

The proposed amendment would add the CASMO-4 methodology to the SCE core physics analysis methodologies approved by the NRC for nuclear design analysis for SONGS 2 and 3. SCE has been using the CASMO-3/SIMULATE-3 methodologies to evaluate reload designs at SONGS 2 and 3 for many years. TS 5.7.1.5.b. requires that the analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC. As such, the SCE core reload methodology document that describes the applicability of the CASMO-4 methodology, SCE-0901, "PWR Reactor Physics Methodology Using Studsvik Design Codes" (Reference 4), was submitted to the NRC for approval. SCE is requesting that this CASMO-4 methodology document be added to the approved references in TS 5.7.1.5.b. Use of the CASMO-4 computer program for SONGS 2 and 3 core physics analyses would streamline the process of generating cross-sections and allow modeling of the Gadolinia absorber material in the AREVA LFAs.

3.1 Fuel Design

The SONGS 2 and 3 reactor cores each consist of 217 fuel assemblies. Each fuel assembly consists of 236 fuel rods. The fuel rods are arranged in a square 16x16 array. For the Westinghouse-designed fuel assemblies currently in use, the fuel rods consist of slightly enriched uranium oxide cylindrical pellets, encapsulated within a cylindrical zircaloy or ZIRLO™ tube. Unlike the currently resident fuel assemblies, the AREVA NP LFAs use M5 alloy cladding material, and spacer grids of the high thermal performance (HTP) design and one alloy 718 spacer grid of the high mechanical performance (HMP) design. The lower end fitting is the FUELGUARD design, and the upper end fitting is a reconstitutable AREVA NP design based on Combustion Engineering (CE) fuel. The HTP spacer grid was generically reviewed and accepted by NRC (Reference 5). The FUELGUARD lower-end fitting design has also been used in CE, Westinghouse, and General Electric (GE) reactors. The reconstitutable upper-end fitting design has been used in reload design for CE plants with 14x14 fuel pin lattices. Each fuel bundle contains four outer guide tubes, one center guide/instrument tube, and 236 fuel rods. The LFA fuel rods have the same pellet stack height and overall dimension as the Westinghouse fuel assemblies currently used in the SONGS 2 and 3 cores (identified as "co-resident" fuel). The primary differences between the current SONGS co-resident Westinghouse fuel design and the AREVA design are: (1) the use of different zirconium-based alloys for fuel cladding, guide tubes, and spacer grids; (2) the use of HTP grids; and (3) the use of a different burnable absorber, Gd_2O_3 (Gadolinia).

SCE is required to verify the performance of the LFAs with respect to the safety analyses in accordance with the regulatory commitments identified in the application and listed in

Section 4.0 of this safety evaluation. The analyses include thermal hydraulic compatibility, loss-of-coolant accident (LOCA) and non-LOCA criteria, mechanical design, seismic design, and core physics.

Currently, SCE's NRC-approved core physics reload analysis methodology uses CASMO-3 for cross-section and SIMULATE-3 for core simulation and depletion calculations (References 6 and 7). SCE proposes to use CASMO-4, in conjunction with SIMULATE-3, to support core design analysis, by streamlining the process of generating cross-sections. CASMO-4 treats Gadolinia depletion and other absorber depletions automatically within the code, without the need for auxiliary codes.

3.2 Computer Programs and Models

CASMO-4 is a multi-group, two-dimensional neutron transport theory lattice physics code capable of depletion calculations and generation of cross-sections and discontinuity factors for boiling-water reactors and PWR core analyses. The cross-section generation process in CASMO-4 is automated such that all the nuclear data required for the SIMULATE-3 code are generated in one execution. This automated feature of CASMO-4 results in reduced human error that might arise from the manual construction of the case matrix as was required for CASMO-3.

SONGS-specific zonal enrichment of fuel rods, burnable absorbers, guide tubes, and spacer grids are explicitly modeled in CASMO-4. Each assembly was depleted up to 60 gigawatt days per metric ton assembly average burnup using the CASMO-4 default depletion steps. Gadolinia is modeled directly in CASMO-4. Reflector calculations were performed in 25 energy groups to accurately capture the effects of high energy leakage.

CMSLINK is a data processing program that links CASMO-4 with SIMULATE-3. CMSLINK reads CASMO-4 ASCII card image files and functionalizes key neutronic variables and produces a binary master cross-section library for use with SIMULATE-3. CMSLINK processes two-group macroscopic cross-sections, assembly discontinuity factors, fission product data, detector data, pin power reconstruction data, kinetics data, and decay heat data.

INTERPIN-3 is used to calculate fuel pin temperature as a function of burnup. The output from this program provides a single burnup independent fuel rod temperature for use in CASMO-4, and a power and burnup dependent fuel rod temperature for use in SIMULATE-3.

SIMULATE-3 is a two-group, three-dimensional (3-D), coarse mesh nodal diffusion theory reactor simulator code that employs both thermal hydraulic and Doppler feedback. SIMULATE-3 explicitly models the baffle/reflector region. Homogenized cross-sections and discontinuity factors are applied to the model to solve the two-group diffusion equation. The nodal thermal hydraulic properties are calculated based on the inlet temperature, reactor coolant system (RCS) pressure, RCS mass flow rate, and the heat addition along the channel. SIMULATE-3 calculates the 2-D or 3-D pin power distribution from the inter- and intra-assembly information from the coarse mesh solution and the pin-wise assembly power distribution from CASMO-4. SIMULATE-3 performs a macroscopic depletion of fission products to allow modeling of typical reactor transients.

SCE modeled the active fuel region into 20 axial nodes and 4 radial nodes per fuel assembly. Axially, the fuel assembly is divided into a single bottom reflector node, 20 active fuel nodes, and a single top reflector node.

3.3 Benchmarking of CASMO-4

SCE performed extensive benchmarking of CASMO-4 against plant-specific measured data, against data calculated with CASMO-3, and against data from critical experiments, consistent with NRC Generic Letter 83-11, "Licensee Qualification for Performing Safety Analyses in Support of Licensing Actions." The measured data are from zero power startup testing, at-power Isothermal Temperature Coefficient measurements, and normal operations at SONGS 2 and 3. Comparisons of results from benchmarking calculations of CASMO-4 with data from Kritz critical experiments and Babcock and Wilcox critical experiments were completed. The licensee used data from several cycles to benchmark its CASMO-4/SIMULATE-3 model for each of the units.

For each parameter with direct plant measurements available, a sample mean and standard deviation of the observed differences and the root-mean-square (RMS) of the observed differences were calculated. The sample distributions from zero-power and full-power comparisons were tested for normality using American National Standards Institute (ANSI) N15.15-1974 (Reference 8). The bias, 95/95 uncertainty, and one-sided tolerance limit are calculated for zero power and full power.

Consistent with NRC Generic Letter 83-11, the licensee verified its ability to use the methods by comparing their calculated results to an appropriate set of benchmark data, such as startup physics data. Parameters included in the verification and benchmarking are Critical Boron Concentrations at hot full power, Isothermal Temperature Coefficient at hot zero power and at At-Power, Power Coefficients, Inverse Boron Worth, and Control Rod Worth. The staff has determined that the biases and uncertainties for CASMO-4/SIMULATE-3 are similar to the values developed for CASMO-3/SIMULATE-3.

The ability of CASMO-4/SIMULATE-3 to accurately calculate core radial and axial power distributions and pin peaking factors was verified by comparisons with CASMO-3/SIMULATE-3 results.

The benchmarking results to validate the CASMO-4 program confirm its capability to accurately predict the reactivity for various PWR cores with burnable absorbers including Gadolinia. In all cases, the fuel pin fission rate RMS values are within 1.3 percent, which is smaller than the local pin power uncertainty of 1.78 percent, established in Section 5.1 of the SCE topical report (Reference 4). The cross-section generation process with CASMO-4 has also been automated such that all the requisite nuclear data for SIMULATE-3 can be generated in one execution.

The pin-by-pin power results calculated by SCE agree very well with measurements. The RMS value of the differences is 0.75 percent, which is well within the 1.78 percent local pin power uncertainty established above.

Based on the NRC staff's review of SCE's application and its supplements, the NRC staff has concluded that CASMO-4 can be used to model the SONGS 2 and 3 reactor cores with

Gadolinia burnable absorber, and that the uncertainties established in the SCE topical report are reasonable.

3.4 Reload Analyses

Under the LFA program, SCE plans to insert eight AREVA NP fuel assemblies into the SONGS Unit 2 core for Cycle 16, to be used for up to three operating cycles. These AREVA LFAs will be loaded in the core with co-resident Westinghouse fuel. SCE modeled the AREVA LFAs in the SONGS core physics models and analyzed them in the cycle-specific core physics design calculations that are part of the reload analyses. The AREVA LFAs are placed in non-limiting core locations that are defined as the locations where the peak integrated radial power peaking factor is 0.95 or less of the core maximum integrated radial peaking factor (F_r) at all times in life, which ensures that the LFAs will be non-limiting in terms of power peaking. Core physics modeling of the SONGS 2 and 3 reactor cores with the AREVA LFAs is performed using SCE's NRC-approved methodology (Reference 7).

SCE, AREVA, and Westinghouse evaluations will verify the performance of LFAs with respect to safety analyses that include thermal hydraulic compatibility, LOCA and non-LOCA criteria, mechanical design, seismic design, and core physics.

The thermal hydraulic analyses based on hydraulic flow testing on both the AREVA and Westinghouse fuel designs were performed using NRC-approved thermal hydraulic analysis codes XCOBRA-IIIC, and LYNXT. Flow tests provided the pressure drop values for the overall assembly as well as for the individual assembly components. These pressure drop coefficients are used in the approved thermal hydraulic codes to determine the flow distributions in the different fuel assemblies. These flow distributions are used in the thermal hydraulic compatibility assessment and the non-LOCA transient assessments.

AREVA's compatibility analysis included evaluation of local cross-flow velocities for fuel rod vibration response and potential for fretting wear. For the cross-flow determination, the NRC-approved LYNXT code was used to determine the axial cross flow profile.

Westinghouse will perform a compatibility analysis to ensure that the insertion of AREVA LFAs will not cause the co-resident Westinghouse fuel to exceed its operating limits and to ensure there is no adverse impact on the fuel performance or mechanical integrity.

Thermal margin calculations were performed using the XCOBRA-IIIC code to assure that the Safe Acceptable Fuel Design Limit was satisfied. This was performed by using XCOBRA-IIIC code and the NRC-approved departure from nucleate boiling (DNB) correlation for the fuel with HTP spacer grids (Reference 5). These evaluations concluded that the thermal hydraulic performance of the AREVA fuel design provided substantial margin to the DNB limits when compared with the co-resident fuel. The NRC staff concludes that the LFAs will have margin to the limits resulting from the improved thermal hydraulic performance.

Evaluation of LOCA performance of the AREVA fuel design with respect to cladding swelling, rupture and oxidation, Gadolinia content, fuel assembly power, peak cladding temperature, small break LOCA, coolable geometry and long-term core cooling has determined that the LFAs

are non-limiting with respect to the co-resident fuel and are covered by the reload analysis of record, thereby demonstrating compliance with 10 CFR 50.46(b) criteria.

Mechanical design evaluation of the AREVA fuel design using approved methodologies showed that even without considering 5 percent reduction, all of the approved criteria are met for the design lifetime of the AREVA fuel. Seismic performance evaluation of the fuel designs using an NRC-approved methodology has demonstrated that the American Society of Mechanical Engineers design criteria, as defined in Section 4.2, "Fuel System Design," of NUREG-0800, are met for the AREVA LFAs loaded with the co-resident Westinghouse fuel in the SONGS 2 and 3 reactor cores.

3.5 Conclusion

Based on its review of the application and additional information (References 1 and 3), the NRC staff has concluded that the CASMO-4/SIMULATE-3 methodology, as validated by the licensee, can be used to support the SCE reload physics design calculations at SONGS 2 and 3 as described in the above technical evaluation. Based on the analyses and benchmark results contained in the application, the staff concludes that the CASMO-4/SIMULATE-3 methodology can also be used for fuel assembly types containing Gadolinia burnable absorber and Integral Fuel Burnable Absorber. The staff has further determined that the application of the analytical methods described in the licensee's amendment request, as supplemented, demonstrate compliance with 10 CFR 50.46, 10 CFR Part 50, Appendix K, and GDC 10, 11, and 12.

A list of regulatory commitments submitted by licensee is included in Section 4.0 of this safety evaluation. The licensee is expected to implement these commitments in a timely manner as described. Changes to the plans for implementation should be communicated to the NRC staff in accordance with the guidance provided in Nuclear Entergy Institute (NEI) 99-04, "Guidelines for Managing NRC Commitment Changes."

4.0 REGULATORY COMMITMENTS

In its letter dated January 30, 2009, SCE made the following regulatory commitments in connection with the implementation of the exemption and the license amendment requests (Enclosure 2 of Reference 1):

1. Prior to use of AREVA Lead Fuel Assemblies (LFAs) for a second fuel cycle of irradiation, poolside LFA examinations will be performed to evaluate assembly and cladding performance, and acceptability for continued use.

2. Prior to use of AREVA LFAs for a third fuel cycle of irradiation, poolside LFA examinations will be performed to evaluate assembly and cladding performance, and acceptability for continued use.

3. If the AREVA LFAs are inserted for a third fuel cycle of irradiation, then poolside LFA examinations will be performed after completion of the third fuel cycle of irradiation to evaluate assembly and cladding performance.

4. The AREVA LFAs will be placed in core locations where the peak integrated radial power peaking factor in the LFAs will be 0.95 or less of the core maximum integrated radial power peaking factor at all times in life.

5. The AREVA LFAs will be modeled in the SONGS core physics models and their impact will be analyzed in the cycle-specific core physics calculations that support the reload analyses.

6. Analyses will be performed to verify the performance of the AREVA LFAs. These analyses include thermal-hydraulic compatibility, loss-of-coolant accident [LOCA] and non-LOCA criteria, mechanical design, thermal hydraulic, seismic, core physics, and neutronics compatibility of the AREVA LFAs in the SONGS reactor core. The analyses will make use of the fact that the LFAs will be operated in non-limiting core regions and will verify the reload analyses are not adversely impacted.

7. A compatibility analysis will be performed to ensure that insertion of the AREVA LFAs will not cause the remaining Westinghouse fuel to exceed its operating limits and ensure there is no adverse impact on the fuel performance or mechanical integrity.

The NRC staff considers these to be regulatory commitments and concludes that they are acceptable. These regulatory commitments made by the licensee to the staff are considered as part of the justification for the proposed licensing action. The licensee shall be responsible for creating and maintaining configuration control of the regulatory commitments made to the staff in its commitment management program. Configuration control of regulatory commitments consists of execution of the commitments in a timely fashion as stated, evaluation of changes to the commitments, when appropriate, and reporting any changes to the NRC.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the California State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on September 22, 2009 (74 FR 48320). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 FR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

7.0 CONCLUSION

The Commission has 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 the amendments will not be inimical to the common defense and security or to the health and safety of the public.

8.0 REFERENCES

1. M. Short, Southern California Edison, Letter to U.S. Nuclear Regulatory Commission, "Request for Temporary Exemption from 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 Technical Specification 5.7.1.5, 'Core Operating Limits Report (COLR)', San Onofre Nuclear Generating Station, Units 2 and 3," dated January 30, 2009 (ADAMS Accession No. ML090360738).

2. A. E. Scherer, Southern California Edison, letter to U.S. Nuclear Regulatory Commission, "SCE Response to NRC Questions re SCE Request for Temporary Exemption from 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 Technical Specification 5.7.1.5, 'Core Operating Limits Report (COLR),' San Onofre Nuclear Generating Station, Units 2 and 3" dated March 16, 2009 (ADAMS Accession No. ML090780251).

3. A. E. Scherer, Southern California Edison, letter to U.S. Nuclear Regulatory Commission, "San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361 and 50-362, Response to Request for Additional Information on Request for Temporary Exemption from 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 Technical Specification 5.7.1.5, 'Core Operating Limits Report (COLR)'," dated September 29, 2009 (ADAMS Accession No. ML092740310).

4. SCE-0901, "PWR Reactor Physics Methodology Using Studsvik Design Codes," Southern California Edison, January 2009 (ADAMS Accession No. ML090360738).

5. EMF-92-153(P)(A), Revision 1, "HTP: Departure from Nucleate Boiling Correlation for High Thermal Performance Fuel," Siemens Power Corporation, January 2005.

6. SCE-9001-A, "PWR Reactor Physics Methodology Using CASMO-3/SIMULATE-3," Southern California Edison, September 1992.

7. SCE-9801-P-A, Revision 0, "Reload Analysis Methodology for the San Onofre Nuclear Generating Station, Units 2 and 3," Southern California Edison, June 1999.

8. American National Standards Institute, ANSI N15.15-1974, "American National Standard: Assessment of the Assumptions of Normality (Employing Individual Observed Values)," October 1973.

Principal Contributor: M. Panicker

Date: December 15, 2009

December 15, 2009

Mr. Ross T. Ridenoure
Senior Vice President and Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENTS REVISING TECHNICAL SPECIFICATION 5.7.1.5, "CORE OPERATING LIMITS REPORT (COLR)" (TAC NOS. ME0604 AND ME0605)

Dear Mr. Ridenoure:

The Commission has issued the enclosed Amendment No. 222 to Facility Operating License No. NPF-10 and Amendment No. 215 to Facility Operating License No. NPF-15 for San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated January 30, 2009, as supplemented by letters dated March 16 and September 29, 2009.

The amendments revise the list of Nuclear Regulatory Commission-approved reports in TS 5.7.1.5, "Core Operating Limits Report (COLR)," to allow the licensee to use the CASMO-4 methodology to perform nuclear design calculations for SONGS, Units 2 and 3.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

James R. Hall, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosures:
1. Amendment No. 222 to NPF-10
2. Amendment No. 215 to NPF-15
3. Safety Evaluation

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ADAMS Accession No. ML093220105 *concurrence via SE

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	DSS/SNPB/BC	DIRS/ITSB/BC	OGC	NRR/LPL4/BC	NRR/LPL4/PM
NAME	JRHall	JBurkhardt	AMendiola*	REliott	LSubin	MMarkley	JRHall
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