October 3, 1996

Mr. Harold B. Ray
Executive Vice President
Southern California Edison Company
P.O. Box 128
San Clemente, California 92674-0128

SUBJECT: ISSUANCE OF AMENDMENT FOR SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 2 (TAC NO. M94624) AND UNIT NO. 3 (TAC NO. M94625)

Dear Mr. Ray:

The Commission has issued the enclosed Amendment No. 131 to Facility Operating License No. NPF-10 and Amendment No. 120 to Facility Operating License No. NPF-15 for San Onofre Nuclear Generating Station, Unit Nos. 2 and 3. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated December 6, 1995, as supplemented by letters dated August 30, 1996, and September 20, 1996.

These amendments revise TS Section 4.3 "Fuel Storage" to allow fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent (w/o) to be stored in both the spent fuel racks and the new fuel racks. Additionally, TS Section 3.7.18 "Spent Fuel Assembly Storage," Figures 3.7.18-1 "Unit 1 Fuel Minimum Burnup vs Initial Enrichment for Region II Racks," and 3.7.18-2 "Units 2 and 3 Fuel Minimum Burnup vs. Initial Enrichment for Region II Racks," are being revised and relabeled.

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,

Original Signed By

Mel B. Fields, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

NRC FILE CENTER COPY

Docket Nos. 50-361
and 50-362

Enclosures: 1. Amendment No. 131 to NPF-10
2. Amendment No. 120 to NPF-15
3. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION

Docket File	EPeyton
PUBLIC	JRoe
PDIV-2 Reading	GHill (4), T5C3
EGA1	ACRS, T2E26
WBateman	JBianchi, WCFO (2)
MFields	OGC, O15B18
CGrimes, O11E22	TLH3 (SE)
LHurley, RIV	KPerkins, WCFO
JKilcrease, RIV	RJones
TMarsh	CMiller

DOCUMENT NAME: S094624.AMD Locked 9/24/96 #83

OFC	PDIV-2/PM	PDIV-2/LA	NRR:SPLB	NRR:PERB	NRR:SRXB	OGC
NAME	MFields:ye	EPeyton	LMarsh	CMiller	RJones for	APH
DATE	9/24/96	9/2/96	9/24/96	9/25/96	9/25/96	9/26/96

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P PDR

October 3, 1996

Mr. Harold B. Ray
Executive Vice President
Southern California Edison Company
P.O. Box 128
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These amendments revise TS Section 4.3 "Fuel Storage" to allow fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent (w/o) to be stored in both the spent fuel racks and the new fuel racks. Additionally, TS Section 3.7.18 "Spent Fuel Assembly Storage," Figures 3.7.18-1 "Unit 1 Fuel Minimum Burnup vs Initial Enrichment for Region II Racks," and 3.7.18-2 "Units 2 and 3 Fuel Minimum Burnup vs. Initial Enrichment for Region II Racks," are being revised and relabeled.

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Division of Reactor Projects III/IV
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Docket Nos. 50-361
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DOCUMENT NAME: SO94624.AMD

Logged 9/24/96 #83

OFC	PDIV-2/PM	PDIV-2/LA	NRR:SPLB	NRR:PERB	NRR:SRXB	OGC
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DATE	9/24/96	10/2/96	9/24/96	9/25/96	9/25/96	9/26/96

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

October 3, 1996

Mr. Harold B. Ray
Executive Vice President
Southern California Edison Company
P.O. Box 128
San Clemente, California 92674-0128

SUBJECT: ISSUANCE OF AMENDMENT FOR SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 2 (TAC NO. M94624) AND UNIT NO. 3 (TAC NO. M94625)

Dear Mr. Ray:

The Commission has issued the enclosed Amendment No. 131 to Facility Operating License No. NPF-10 and Amendment No. 120 to Facility Operating License No. NPF-15 for San Onofre Nuclear Generating Station, Unit Nos. 2 and 3. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated December 6, 1995, as supplemented by letters dated August 30, 1996, and September 20, 1996.

These amendments revise TS Section 4.3 "Fuel Storage" to allow fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent (w/o) to be stored in both the spent fuel racks and the new fuel racks. Additionally, TS Section 3.7.18 "Spent Fuel Assembly Storage," Figures 3.7.18-1 "Unit 1 Fuel Minimum Burnup vs Initial Enrichment for Region II Racks," and 3.7.18-2 "Units 2 and 3 Fuel Minimum Burnup vs. Initial Enrichment for Region II Racks," are being revised and relabeled.

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,

Mel B. Fields

Mel B. Fields, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket Nos. 50-361
and 50-362

Enclosures: 1. Amendment No. 131 to NPF-10
2. Amendment No. 120 to NPF-15
3. Safety Evaluation

cc w/encls: See next page

cc w/encls:
Mr. R. W. Krieger, Vice President
Southern California Edison Company
San Onofre Nuclear Generating Station
P. O. Box 128
San Clemente, California 92674-0128

Chairman, Board of Supervisors
County of San Diego
1600 Pacific Highway, Room 335
San Diego, California 92101

Alan R. Watts, Esq.
Rourke & Woodruff
701 S. Parker St. No. 7000
Orange, California 92668-4702

Mr. Sherwin Harris
Resource Project Manager
Public Utilities Department
City of Riverside
3900 Main Street
Riverside, California 92522

Dr. Harvey Collins, Chief
Division of Drinking Water and
and Environmental Management
California Department of Health Services
P. O. Box 942732
Sacramento, California 94234-7320

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Harris Tower & Pavilion
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Mr. Richard Krumvieda
Manager, Nuclear Department
San Diego Gas & Electric Company
P.O. Box 1831
San Diego, California 92111

Mr. Steve Hsu
Radiologic Health Branch
State Department of Health Services
Post Office Box 942732
Sacramento, California 94234

Resident Inspector/San Onofre NPS
c/o U.S. Nuclear Regulatory Commission
Post Office Box 4329
San Clemente, California 92674

Mayor
City of San Clemente
100 Avenida Presidio
San Clemente, California 92672

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

THE CITY OF ANAHEIM, CALIFORNIA

DOCKET NO. 50-361

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 131
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 December 6, 1995, as supplemented by letters dated August 30, 1996, and September 20, 1996, 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.

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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. 131 , 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 to be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Mel B. Fields

Mel B. Fields, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 3, 1996

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 131 TO FACILITY OPERATING LICENSE NO. NPF-10

DOCKET NO. 50-361

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by Amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
3.7-32	3.7-32
3.7-33	3.7-33
3.7-34	3.7-34
4.0-4	4.0-4
4.0-5	4.0-5

3.7 PLANT SYSTEMS

3.7.18 Spent Fuel Assembly Storage

LCO 3.7.18 The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region II shall be within the acceptable burnup domain of Figure 3.7.18-1 or Figure 3.7.18-2, or the fuel assembly shall be stored in accordance with Licensee Controlled Specification 4.0.100.

The burnup of each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be greater than or equal to 18.0 GWD/T for interior locations of 5.5 GWD/T for peripheral locations, or the fuel assembly shall be stored in accordance with Licensee Controlled Specification 4.0.100.

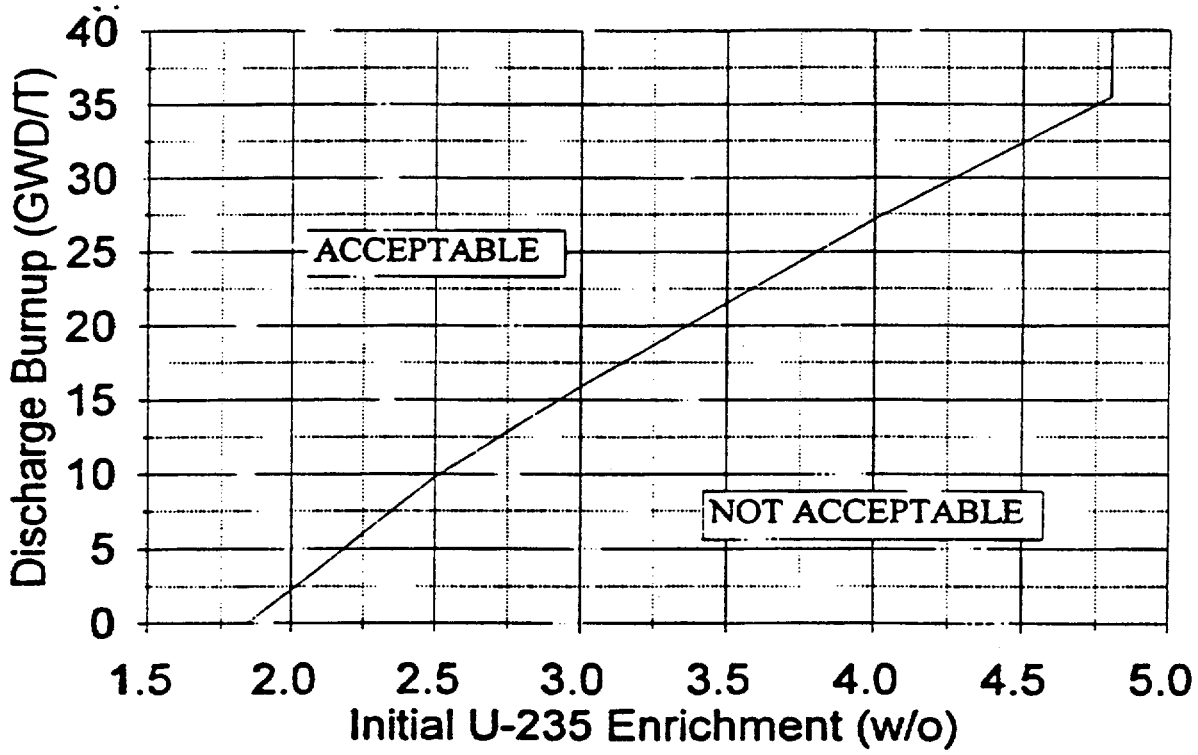
APPLICABILITY: Whenever any fuel assembly is stored in Region II of the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 --------NOTE-------- LCO 3.0.3 is not applicable. ---------- Initiate action to move the noncomplying fuel assembly from Region II.	Immediately

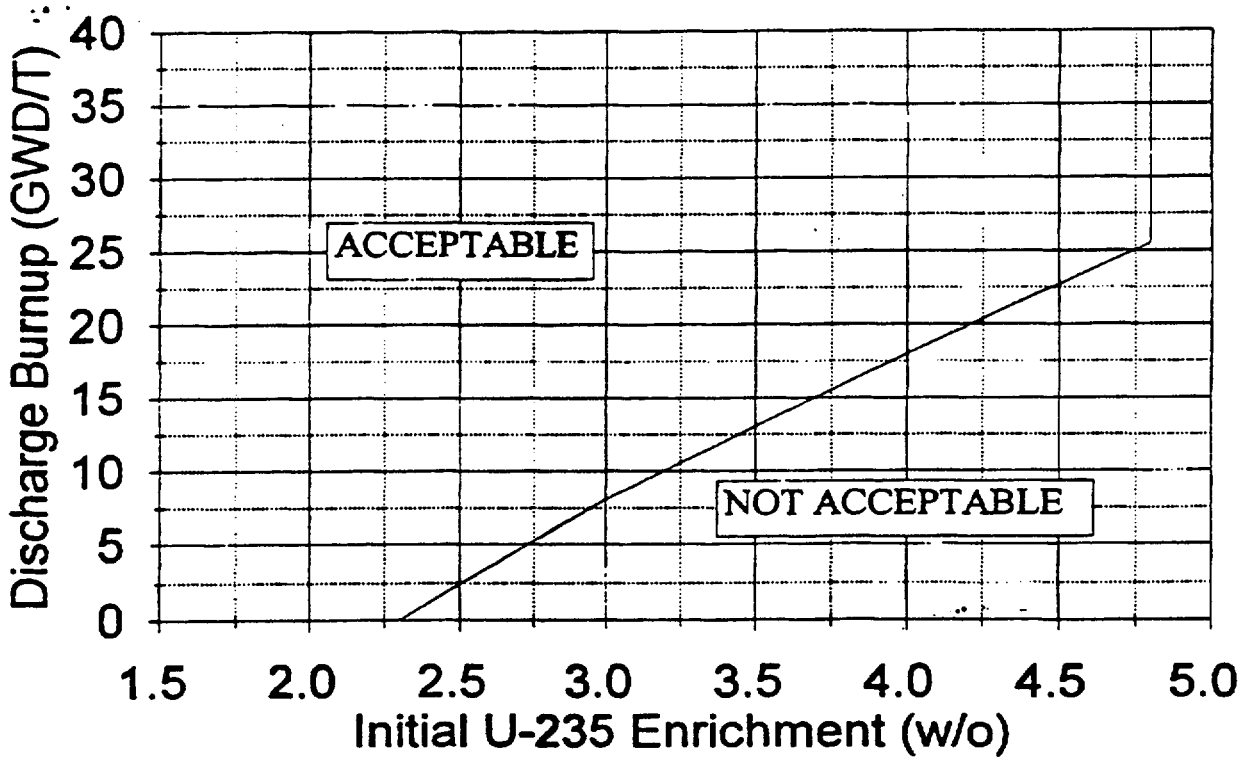
SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.18.1	Verify by administrative means the initial enrichment and burnup of the fuel assembly is in accordance with LCO 3.7.18.	Prior to storing the fuel assembly in Region II



MINIMUM BURNUP VS. INITIAL ENRICHMENT FOR UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL IN REGION II RACKS

FIGURE 3.7.18-1



MINIMUM BURNUP VS. INITIAL ENRICHMENT FOR PLACEMENT
OF SONGS 2 AND 3 FUEL IN REGION II PERIPHERAL POOL LOCATIONS

FIGURE 3.7.18-2

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. A nominal 8.85 inch center to center distance between fuel assemblies placed in Region II;

d. A nominal 10.40 inch center to center distance between fuel assemblies placed in Region I;

e. Units 1, 2, and 3 fuel assemblies may be stored in Region I with no restrictions;

f. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-1 are allowed unrestricted storage in Region II;

g. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-2 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

h. Fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1 or Figure 3.7.18-2 will be stored in compliance with Licensee Controlled Specification 4.0.100; and

i. The burnup of each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be greater than or equal to 18.0 GWD/T for interior locations or 5.5 GWD/T for peripheral locations, or the fuel assembly shall be stored in accordance with Licensee Controlled Specification 4.0.100.

(continued)

4.0 DESIGN FEATURES

4.3 Fuel Storage (continued)

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $K_{eff} \leq 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR; and

d. A minimum 29 inch center to center distance between fuel assemblies placed in the storage racks.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below Technical Specification 3.7.16 value (23 feet above the top of irradiated fuel assemblies seated in the storage racks).

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1542 fuel assemblies.

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

THE CITY OF ANAHEIM, CALIFORNIA

DOCKET NO. 50-362

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 120
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 December 6, 1995, as supplemented by letters dated August 30, 1996, and September 20, 1996, 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. 120 , 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 to be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Mel B. Fields, Project Manager
Project Directorate IV-2
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 3, 1996

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 120 TO FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NO. 50-362

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by Amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
3.7-32	3.7-32
3.7-33	3.7-33
3.7-34	3.7-34
4.0-4	4.0-4
4.0-5	4.0-5

3.7 PLANT SYSTEMS

3.7.18 Spent Fuel Assembly Storage

LCO 3.7.18 The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region II shall be within the acceptable burnup domain of Figure 3.7.18-1 or Figure 3.7.18-2, or the fuel assembly shall be stored in accordance with Licensee Controlled Specification 4.0.100.

The burnup of each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be greater than or equal to 18.0 GWD/T for interior locations or 5.5 GWD/T for peripheral locations, or the fuel assembly shall be stored in accordance with Licensee Controlled Specification 4.0.100.

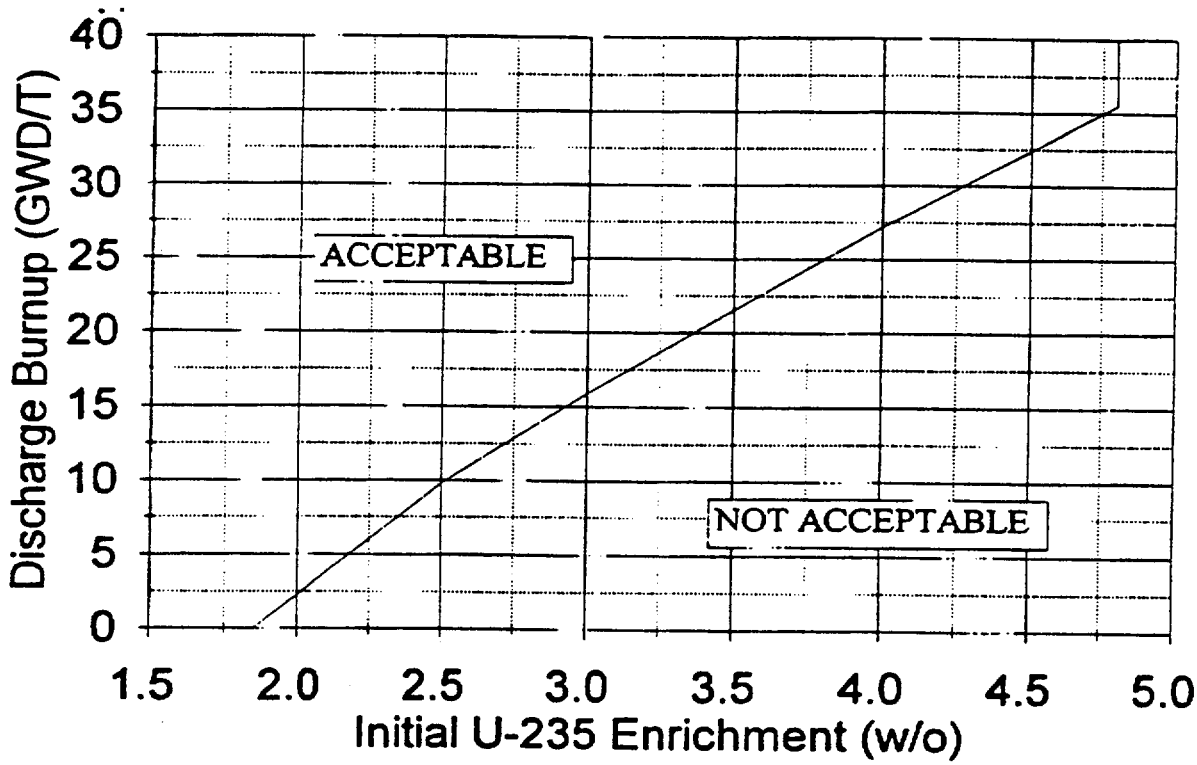
APPLICABILITY: Whenever any fuel assembly is stored in Region II of the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 --------NOTE-------- LCO 3.0.3 is not applicable. ---------- Initiate action to move the noncomplying fuel assembly from Region II.	Immediately

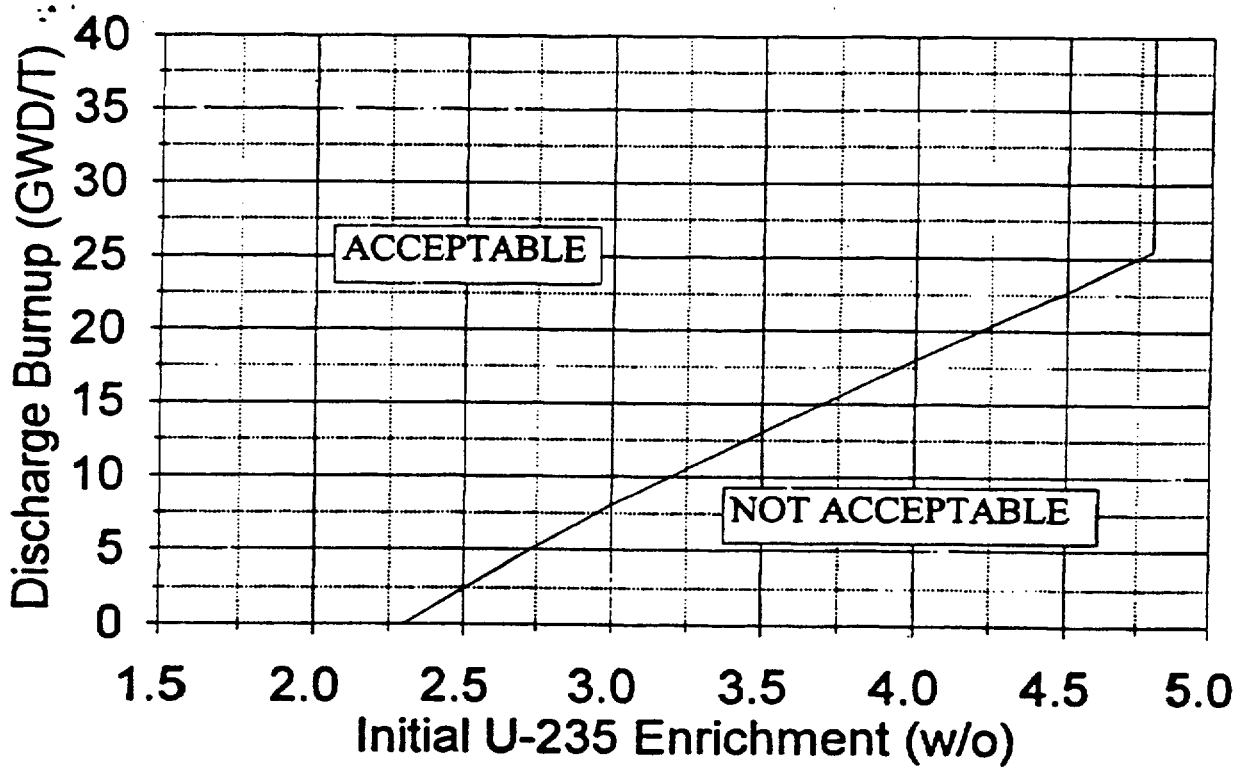
SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.18.1	Verify by administrative means the initial enrichment and burnup of the fuel assembly is in accordance with LCO 3.7.18.	Prior to storing the fuel assembly in Region II



MINIMUM BURNUP VS. INITIAL ENRICHMENT FOR UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL IN REGION II RACKS

FIGURE 3.7.18-1



MINIMUM BURNUP VS. INITIAL ENRICHMENT FOR PLACEMENT
OF SONGS 2 AND 3 FUEL IN REGION II PERIPHERAL POOL LOCATIONS

FIGURE 3.7.18-2

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. A nominal 8.85 inch center to center distance between fuel assemblies placed in Region II;

d. A nominal 10.40 inch center to center distance between fuel assemblies placed in Region I;

e. Units 1, 2, and 3 fuel assemblies may be stored in Region I with no restrictions;

f. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-1 are allowed unrestricted storage in Region II;

g. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-2 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

h. Fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1 or Figure 3.7.18-2 will be stored in compliance with Licensee Controlled Specification 4.0.100; and

i. The burnup of each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be greater than or equal to 18.0 GWD/T for interior locations or 5.5 GWD/T for peripheral locations, or the fuel assembly shall be stored in accordance with Licensee Controlled Specification 4.0.100.

(continued)

4.0 DESIGN FEATURES

4.3 Fuel Storage (continued)

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $K_{eff} \leq 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR; and

d. A minimum 29 inch center to center distance between fuel assemblies placed in the storage racks.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below Technical Specification 3.7.16 value (23 feet above the top of irradiated fuel assemblies seated in the storage racks).

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1542 fuel assemblies.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 131 TO FACILITY OPERATING LICENSE NO. NPF-10

AND AMENDMENT NO. 120 TO FACILITY OPERATING LICENSE NO. NPF-15

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

THE CITY OF ANAHEIM, CALIFORNIA

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By application dated December 6, 1995, Southern California Edison Company (SCE or the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License Nos. NPF-10 and NPF-15) for San Onofre Nuclear Generating Station (SONGS), Unit Nos. 2 and 3. The proposed changes would allow fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent (w/o) to be stored in both the spent fuel racks and the new fuel racks.

The August 30, 1996, and September 20, 1996, supplemental letters provided additional clarifying information and did not change the initial no significant hazards consideration determination which was published in the Federal Register on April 10, 1996 (61 FR 15997).

2.0 BACKGROUND

The licensee proposes to increase the allowable maximum fuel-pin enrichment from 4.1 w/o to 4.8 w/o U-235 for SONGS Units 2 and 3. This will allow an increase of the current cycle length from approximately 520 Effective Full Power Days (EFPD) to approximately 600 EFPD.

The proposed TS amendments will revise TS Section 4.3 "Fuel Storage" to allow fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent (w/o) to be stored in both the spent fuel racks and the new fuel racks. Additionally, TS Section 3.7.18 "Spent Fuel Assembly Storage," Figures 3.7.18-1 "Unit 1 Fuel Minimum Burnup vs Initial Enrichment for Region II Racks," and 3.7.18-2 "Units 2 and 3 Fuel Minimum Burnup vs. Initial Enrichment for Region II Racks," would be revised and relabeled. A single value is being provided as a burnup limit for unrestricted storage of Unit 1 spent fuel

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assemblies in Region II rack locations. Another single value is being provided as a burnup limit for storage of Unit 1 spent fuel in the Region II peripheral rack locations. Therefore, the current Figure 3.7.18-1 is being replaced with a curve applicable to Units 2 and 3 fuel assemblies and relabeled appropriately.

3.0 EVALUATION

The staff's evaluation of the proposed increase in fuel enrichment is separated into its effects on criticality, decay heat generation, and radiological dose consequences.

3.1 Criticality Analysis

The analysis of the reactivity effects of fuel storage in the new and spent fuel storage racks was performed with the three-dimensional multi-group Monte Carlo computer code, KENO V.a, using 27 energy group neutron cross sections generated by the NITAWL-II code package. Since the KENO V.a code package does not have depletion capability, burnup analyses were performed with the two-dimensional transport theory code, CASMO-3. CASMO-3 was also used to determine the reactivity effects of material and manufacturing tolerances. These codes are widely used for the analysis of fuel rack reactivity and have been benchmarked against results from numerous critical experiments. These experiments simulate the SONGS Units 2 and 3 fuel storage racks as realistically as possible with respect to parameters important to reactivity such as enrichment, assembly spacing, and absorber worth. The intercomparison between two independent methods of analysis (KENO V.a and CASMO-3) also provides an acceptable technique for validating calculational methods for nuclear criticality safety. To minimize the statistical uncertainty of the KENO V.a reactivity calculations, a minimum of 500 neutron generations with 2000 neutrons per generation were accumulated in each calculation. Experience has shown that this number of histories is quite sufficient to assure convergence of KENO V.a reactivity calculations. Based on the above, the staff concludes that the analysis methods used are acceptable and capable of predicting the reactivity of the SONGS Units 2 and 3 new and spent fuel storage racks with a high degree of confidence.

The fresh fuel storage racks provide dry storage for 80 assemblies at a nominal center-to-center spacing of 29 inches and 38 inches. The storage racks are intended for the receipt and storage of fresh fuel under dry (air) conditions. However, to assure the criticality safety under normal and accident conditions and to conform to the requirements of General Design Criterion 62 for the prevention of criticality in fuel storage and handling, two separate criteria must be satisfied as defined in NRC Standard Review Plan (SRP), Section 9.1.1. These criteria state that the maximum reactivity of the fully loaded fuel racks shall not exceed a k_{eff} of 0.95 if fully flooded with unborated water or a k_{eff} of 0.98 assuming the optimum hypothetical low density moderation (e.g., fog or foam). The maximum calculated reactivity must include a margin for uncertainties in reactivity calculations and in manufacturing tolerances such that the true k_{eff} will not exceed the

calculated maximum value at a 95 percent probability, 95 percent confidence level (95/95).

Unirradiated ABB Combustion Engineering (ABB/CE), Zircaloy-clad, 16x16 fuel assemblies will be stored in these racks. Although the requested maximum fuel rod enrichment for SONGS 2 and 3 is 4.8 w/o U-235, the criticality analyses were performed for up to 5.1 w/o U-235 and thus bound the requested value. The maximum k_{eff} for a fully loaded rack of ABB/CE fuel enriched to 5.1 w/o U-235 was calculated to be 0.904 under fully flooded conditions. For the hypothetical low-density optimum moderation condition, the maximum calculated k_{eff} was 0.856 at a moderator density of approximately 4.5 percent of full density for a fully loaded rack of 5.1 w/o fuel. The methodology bias obtained from benchmark results was included, but since the maximum k_{eff} for both adverse conditions was less than 0.91, the manufacturing tolerances and calculational uncertainties (typically less than 0.01 Δk) can be neglected. The results conform to the acceptance criteria of SRP 9.1.1 and are, therefore, acceptable.

The storage racks in the spent fuel pool are divided into two regions. Region 1 contains 312 stainless steel storage cells with each cell surrounded on all four sides by Boraflex neutron absorber panels. The cells are spaced 10.4 inches apart with a 1.1-inch water flux-trap between two adjacent Boraflex panels. Region 2 consists of 1230 storage cells surrounded with Boraflex panels and assembled in a checkerboard pattern, producing a honeycomb structure. The cells are stainless steel with an inside dimension of 8.63 inches. The spent fuel racks are normally fully flooded by water borated to at least 1850 ppm of boron as required by the TS. However, to meet the criterion stated in SRP 9.1.2, k_{eff} must not exceed 0.95 with the racks fully loaded with fuel of the highest anticipated reactivity and flooded with unborated water at a temperature corresponding to the highest reactivity. The maximum calculated reactivity must include a margin for uncertainties in reactivity calculations and in manufacturing tolerances such that the true k_{eff} will not exceed 0.95 at a 95/95 probability/confidence level.

Although the requested maximum fuel rod enrichment is 4.8 w/o U-235, the spent fuel storage racks in Region 1 were reevaluated for 5.1 w/o U-235 enriched fuel moderated by pure water at 20°C with a density of 1.0 gm/cc, which results in the highest reactivity. For the nominal storage cell design in Region 1, uncertainties due to tolerances in storage cell inner dimension, stainless steel thickness, water gap thickness, Boraflex wrapper thickness, and Boraflex density, width and thickness were accounted for, as well as eccentric fuel positioning. These uncertainties were appropriately determined at the 95/95 probability/confidence level. In addition, calculational and methodology biases and uncertainties obtained from benchmarking were included.

The reactivity calculations also considered the effects of Boraflex shrinkage and gap formation. All Boraflex panels were modeled with 4 percent width shrinkage. In addition, a 6-inch gap (4 percent axial shrinkage) was randomly placed in every Boraflex panel. Based on the results of blackness testing performed at other storage facilities, and on upper bound values recommended by Electric Power Research Institute (EPRI), the staff concurs that these

assumptions bound the current measured data and future development of additional shrinkage and gaps. The final Region 1 design, when fully loaded with fuel enriched to 5.1 w/o U-235, resulted in a k_{eff} of 0.9413 when combined with all known uncertainties and the Boraflex gap assumption. This meets the staff's criterion of k_{eff} no greater than 0.95 including all uncertainties at the 95/95 probability/ confidence level and is, therefore, acceptable.

Elevated silica concentrations have been observed in the SONGS spent fuel pool, indicating possible Boraflex erosion. Therefore, calculations were performed to investigate the reactivity consequences of loss of Boraflex thickness in the Region 1 storage racks. KENO V.a calculations assuming unirradiated 5.1 w/o U-235 fuel and a 6-inch random gap in every Boraflex panel show that about 20 percent of the Boraflex thickness can be lost uniformly before k_{eff} reaches the 0.95 criterion in pure water. The current spent fuel pool water silica level at SONGS indicates that the loss of Boraflex has been less than 3 ppm in five years and therefore, a 20 percent thickness loss appears to be reasonably conservative. However, SCE will continue to monitor the Boraflex integrity through their coupon surveillance program and the monitoring of pool silica levels. Based on this, the staff concurs that reasonable assumptions have been made to account for Boraflex deterioration in the SONGS storage racks.

The Region 2 spent fuel storage racks were reanalyzed for storage of ABB/CE 16x16 fuel assemblies with nominal enrichments up to 5.1 w/o U-235 (thus bounding the requested 4.8 w/o U-235 maximum fuel rod enrichment) using the concept of burnup reactivity equivalencing. The same initial assumptions, biases and uncertainties as used for the Region 1 analyses were included. A depletion uncertainty of 5 percent is applied to the total reactivity decrement calculated by CASMO-3 to account for the fact that the burnup history (and thus the isotopic content and distribution) is not known exactly for the discharged fuel assemblies. This uncertainty is consistent with current practice and is acceptable. The equivalencing showed that fresh fuel enriched to 1.85 w/o U-235 was equivalent to 5.1 w/o U-235 fuel irradiated to 38.6 gigawatt-days per ton (GWD/T), yielding a 95/95 rack reactivity (k_{eff}) of 0.948. These values meet the NRC acceptance criterion of 0.95 and are acceptable.

Because of the high neutron leakage from the peripheral cells which face the pool walls in Region 2, additional calculations were performed to determine the burnup required for safe storage in these cells. Fresh 2.30 w/o U-235 enriched fuel or 5.10 w/o U-235 enriched fuel irradiated to at least 28.3 GWD/T can be stored in these peripheral locations and meet the 0.95 k_{eff} criterion.

Most abnormal storage conditions will not result in an increase in the k_{eff} of the racks. However, it is possible to postulate events, such as a fuel assembly dropped between a rack module and the pool wall, or the misloading of an assembly in Region 2 with an enrichment and burnup combination outside of the acceptable area, which could lead to an increase in reactivity. However, for such events credit may be taken for the presence of approximately 1850 ppm

of boron in the pool water required by TS 3.9.17 since the staff does not require the assumption of two unlikely, independent, concurrent events to ensure protection against a criticality accident (Double Contingency Principle). The reduction in k_{eff} caused by the boron more than offsets the reactivity addition caused by credible accidents. Therefore, the staff criterion of k_{eff} no greater than 0.95 for any postulated accident is met.

Based on the review described above, the staff finds the criticality aspects of the proposed enrichment increase on the SONGS Units 2 and 3 new and spent fuel pool storage racks are acceptable and meet the requirements of General Design Criterion 62 for the prevention of criticality in fuel storage and handling.

This criticality evaluation is limited to the storage of fuel enriched up to 4.8 w/o U-235 in the new and spent fuel racks. Evaluations of reload core designs (using any enrichment) will, of course, be performed on a cycle-by-cycle basis as part of the reload safety evaluation process. Each reload design is evaluated to confirm that the cycle core design adheres to the limits that exist in the accident analyses and TS to ensure that reactor operation is acceptable.

The staff issued an exemption to 10 CFR 70.24, "Criticality Accident Requirements," for SONGS Units 2 and 3 on August 20, 1990. This exemption allows irradiated or unirradiated fuel assemblies to be handled and stored in the fuel handling building without having any criticality monitoring systems operable. The bases for the exemption is the potential of accidental criticality is precluded. The staff's evaluation of the criticality analysis as detailed above, for fuel enriched to 4.8 w/o U-235 reconfirms that accidental criticality will be precluded. Therefore, the exemption remains valid.

3.2 Decay Heat Analysis

New fuel, either in the dry storage racks or in the spent fuel pool, does not produce significant amounts of heat. The decay heat analysis presented herein is for spent fuel.

The two relevant heat load cases were considered in this safety evaluation report (SER). The normal full core offload case assumes the decay heat from a full core after 150 hours of decay concurrent with a full spent fuel pool, and assumes the failure of a single spent fuel pool cooling pump. The maximum abnormal heat load case is defined as the decay heat from one full core offload after 150 hours decay, plus the decay heat from one full core offload after 36 days decay, in addition to the decay heat of spent fuel from past offloads. Single failure is not considered in the maximum abnormal case.

The staff's SE accompanying the May 1, 1990, issuance of Amendments 87 and 77 for SONGS Units 2 and 3, respectively, approved the increase in spent fuel pool capacity that is currently part of the SONGS Units 2 and 3 design basis. The staff concluded that the assumptions used by the licensee to characterize

the maximum heat loads on the spent fuel pool cooling system were acceptable. The staff further concluded that the spent fuel pool and associated cooling system were adequately sized to handle the maximum heat loads for the increased spent fuel pool capacity. The results of this decay heat analysis is contained in the Updated Final Safety Analysis Report (UFSAR) and is presented in the table below. The licensee utilized the same methodology and assumptions, with the exceptions noted below, in analyzing the two heat load cases describe above for 4.8 w/o U-235 fuel reloads, and the results are also presented in this table.

Case	PCN 449 4.8 %	UFSAR, Rev. 12	
	Heat Load	Heat Load	Maximum Allowable Temp
Maximum Abnormal Heat Load	49.9 MBtu/hr	51.3 MBtu/hr	160°F
Maximum Refueling Full Core Offload Heat Load	42.0 MBtu/hr	43.0 MBtu/hr	160°F

As can been seen from the table, the 4.8 w/o U-235 fuel heat loads are less than the UFSAR heat loads and therefore the UFSAR maximum allowable temperatures are still applicable. The 4.8 w/o U-235 fuel heat load cases are less than the UFSAR heat load cases because of the following changed assumptions.

1. The UFSAR assumed 1572 assemblies in the spent fuel pool (30 more assemblies than the 1542 storage locations in the pool), whereas the 4.8 w/o U-235 analysis assumed 1545 assemblies were in the spent fuel pool. Fewer assemblies result in lower heat loads.

2. The UFSAR assumes a cycle length of 570 EFPD and a batch size of 108 assemblies being discharged per fuel cycle. The analysis for 4.8 w/o U-235 fuel assumes a cycle length of 635 EFPD and a batch size of 104 assemblies discharged per fuel cycle. Filling the pool at a slower rate results in a lower calculated heat load in the pool for the 4.8 w/o U-235 fuel case.

3. The UFSAR decay heat loads include the heat load from 52 Unit 1 assemblies transshipped on a regular basis, some of which are assumed to have decayed for 120 days. Transshipment is no longer occurring, since Unit 1 is no longer operating.

The staff finds the changes to the assumptions are reasonable and acceptable. The total heat loads calculated for the 4.8 w/o U-235 fuel cases more accurately reflect the licensee's current fuel management plans and, as a result, lower the total anticipated heat load in the pool. In its September 20, 1996, letter, the licensee has committed to update the UFSAR to show that the calculated heat loads for the 4.8 w/o U-235 fuel are lower than the design

basis heat loads, and to clarify the description of the heat load cases in the UFSAR. The licensee further committed to perform a Condition Specific Analysis if the UFSAR assumptions are deviated from in a non-conservative manner, and to perform the analysis specified in Section A.4.3 of American Concrete Institute Standard 349 for normal operations (full core offload) above 150°F before the next core offload. This analysis will confirm the operability of the spent fuel pool at temperatures up to 160°F.

Since the heat load cases for the 4.8 w/o U-235 fuel reloads are lower than the UFSAR design basis heat load analyses previously accepted by the staff in its May 1, 1990, SER, the staff concludes that the spent fuel pool and its associated cooling system are capable of safely storing the 4.8 w/o U-235 spent fuel assemblies assumed in the licensee's analysis.

3.3 Radiological Dose Analysis

The May 1, 1990, SE reanalyzed the fuel handling design basis accident assuming that the fuel burnup was 60,000 MWD/T. This burnup is equivalent to fuel initially enriched to about 5.3 w/o U-235, which is higher than the fuel enrichment of 4.8 w/o U-235 proposed by the licensee. Since the radiological dose consequences for fuel enriched to about 5.3 w/o U-235 was found acceptable by the staff in its May 1, 1990, SE, it follows that this conclusion also applies to the current case of 4.8 w/o U-235 fuel. The licensee committed not to move a spent fuel pool gate except in a safe load path (i.e., no fuel assemblies in the drop zone) in its letter dated August 30, 1996. This commitment removes the possibility of damaging multiple fuel assemblies due to an inadvertent drop of a fuel pool gate.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32 and 51.35, an environmental assessment and finding of no significant impact was published in the Federal Register on September 26, 1996 (61 FR 50513).

Accordingly, based upon the environmental assessment, the Commission has determined that issuance of the amendments will not have a significant effect on the quality of the human environment.

6.0 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.

Principal Contributors: Larry Kopp, SRXB
Norman Wagner, SPLB

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