SOUTHERN CALIFORNIA
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Brian Katz
Vice President

September 11, 2007

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: **Docket Nos. 50-361 and 50-362**
Amendment Application Numbers 243, Supplement 2 and 227, Supplement 2, Proposed Change Number (PCN) 556, Revision 2
San Onofre Nuclear Generating Station Units 2 and 3

References: 1) Letter from Brian Katz (SCE) to the U. S. Nuclear Regulatory Commission dated June 15, 2007; Subject: Docket Nos. 50-361 and 50-362, Amendment Application Numbers 243 Supplement 1 and 227 Supplement 1, Proposed Change Number (PCN) 556, Revision 1, Request to Revise Fuel Storage Pool Boron Concentration, San Onofre Nuclear Generating Station Units 2 and 3

2) Letter A. E. Scherer (SCE) to the U. S. Nuclear Regulator Commission (Document Control Desk) dated July 27, 2007, Subject: Docket Nos. 50-361 and 50-362, Response to Request for Additional Information in Support of Amendment Application Numbers 243 and 227, Proposed Change Number (PCN) 556, Revision 1, Request to Revise Fuel Storage Pool Boron Concentration, San Onofre Nuclear Generating Station Units 2 and 3

Dear Sir or Madam:

By letter dated June 15, 2007 (Reference 1) Southern California Edison (SCE) requested approval of Amendment Application Numbers 243 Supplement 1 and 227 Supplement 1, which consist of PCN 556 Revision 1. PCN 556 Revision 1 proposes to revise Technical Specifications 3.7.17, "Fuel Storage Pool Boron Concentration," 3.7.18, "Spent Fuel Assembly Storage," and 4.3, "Fuel Storage." This proposed change will increase the minimum allowed boron concentration of the spent fuel pool and allow credit for soluble boron, guide tube inserts (GT-Inserts) made from borated stainless steel, and fuel storage patterns in place of Boraflex.

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NRR

By letter dated July 27, 2007 (Reference 2), SCE provided additional information in the form of responses to NRC request for additional information (RAI) questions 25 and 26. The response to NRC question 26 included commitment to apply a 6.6% reduction to the CECOR computer code determination of fuel assembly burnup for all fuel assemblies prior to determination of the allowable storage location per the proposed Technical Specification 4.3.1 and Licensee Controlled Specification 4.0.100.

This letter provides a clarification to the SCE response to NRC question 25. Also included are revised pages for Attachments C, D, E, F, I, and J of PCN 556 to incorporate the SCE commitment related to fuel assembly burnup determination. In addition to the 6.6% reduction for Units 2 and 3 fuel a burnup reduction of 10.0% will be applied to Unit 1 fuel. These revised pages are provided as Amendment Application Numbers 243, Supplement 2 and 227, Supplement 2, consisting of PCN 556, Revision 2.

SCE has evaluated PCN 556, Revision 2 under the standards set forth in 10CFR50.92(c) and determined that SCE's original finding of "no significant hazards consideration" is not changed.

If you have any questions or require additional information, please contact Ms. Linda T. Conklin at (949) 368-9443.

Sincerely,

Brian Katz

Enclosures:
1) Notarized Affidavits for Amendment Applications 243, Supplement 2 and 227, Supplement 2
2) Revised responses to NRC Question 25
3) Replacement pages for Attachments C, D, E, F, I and J of PCN 556 Revision 1

cc:
B. S. Mallett, Regional Administrator, NRC Region IV
N. Kalyanam, NRC Project Manager, San Onofre Units 2 and 3
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 and 3
S. Y. Hsu, California Department of Health Services, Radiologic Health Branch

Enclosure 1

Notarized Affidavits

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA	)	
EDISON COMPANY, ET AL. for a Class 103	)	Docket No. 50-361
License to Acquire, Possess, and Use	)	
a Utilization Facility as Part of	)	Amendment Application
Unit No. 2 of the San Onofre Nuclear	)	No. 243, Supplement 2
Generating Station	)	

SOUTHERN CALIFORNIA EDISON COMPANY et al., pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 243, Supplement 2. This amendment application consists of proposed change No. NPF-10-556, Revision 2 to Facility Operating License NPF-10. Proposed change No. NPF-10-556, Revision 2 provides revised pages to Attachments C, D, E, F, I, and J in support of the request to revise Technical Specification 3.7.17, "Fuel Storage Pool Boron Concentration," 3.7.18, "Spent Fuel Assembly Storage," 4.3, "Fuel Storage," and Licensee Controlled Specification 4.0.100, "Fuel Storage Patterns." This proposed change will revise the minimum allowed boron concentration of the spent fuel pool and implement a Fuel Storage Program to allow credit for soluble boron, guide tube inserts, and Fuel Storage Patterns in place of Boraflex.

State of California
County of San Diego

Brian Katz
Brian Katz, Vice President

Subscribed and sworn to (~~or affirmed~~) before me this 11th day of

September, 2007.

by: Brian Katz,

personally known to me ~~or proved to me on the basis of satisfactory evidence~~ to be the

person who appeared before me.

Dawn A. Farrell
Notary Public

DAWN A. FARRELL
Commission # 1623105
Notary Public - California
San Diego County
My Comm. Expires Nov 20, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA	)	
EDISON COMPANY, ET AL. for a Class 103	)	Docket No. 50-362
License to Acquire, Possess, and Use	)	
a Utilization Facility as Part of	)	Amendment Application
Unit No. 3 of the San Onofre Nuclear	)	No. 227, Supplement 2
Generating Station	)	

SOUTHERN CALIFORNIA EDISON COMPANY et al., pursuant to 10 CFR 50.90, hereby submit Amendment Application No. 227, Supplement 2. This amendment application consists of proposed change No. NPF-15-556, Revision 2 to Facility Operating License NPF-15. Proposed change No. NPF-15-556, Revision 2 provides revised pages to Attachments C, D, E, F, I, and J in support of the request to revise Technical Specification 3.7.17, "Fuel Storage Pool Boron Concentration," 3.7.18, "Spent Fuel Assembly Storage," 4.3, "Fuel Storage," and Licensee Controlled Specification 4.0.100, "Fuel Storage Patterns." This proposed change will revise the minimum allowed boron concentration of the spent fuel pool and implement a Fuel Storage Program to allow credit for soluble boron, guide tube inserts, and Fuel Storage Patterns in place of Boraflex.

State of California
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Subscribed and sworn to (~~or affirmed~~) before me this 11th day of

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Dawn A. Farrell
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Enclosure 2

Revised Response to NRC Question 25

Part (a) (iii) and Part (b)

SCE revised response to Question 25, Part (a) (iii):

(iii) The pool temperature bias has been evaluated for both Region I and Region II storage patterns. An infinite 2-D CASMO-3 model is used for both Region I and Region II. For both storage regions, the temperature range is from 68°F to 160°F, and the soluble boron range is from 0 ppm to 1000 ppm. One-thousand ppm bounds the total soluble boron requirement of 970 ppm to maintain K_{eff} less than or equal to 0.95. The Region I enrichment range is from 1.85 weight percent (w/o) to 5.1 w/o. (The effective fresh fuel enrichment limit for Region I is 2.47 w/o). The Region II enrichment range is from 1.20 w/o to 1.85 w/o. (The effective fresh fuel enrichment limit for Region II is 1.23 w/o.) See Table 4-1 of Attachment L of PCN 556, Revision 1 (Reference 1). The most adverse value for the whole enrichment range and from 0 ppm to 1000 ppm for each SFP region is used. This is an additional conservatism for the no soluble boron $K_{eff} < 1.0$ cases.

As shown in Table 4-1, a conservative bias is used. For example, a temperature reactivity bias of 0.00285 derived from 1.85 w/o at 1000 ppm will be used for the 0 ppm case which exhibits a decrease in reactivity with increasing temperature. 68°F is the lowest expected temperature. The upper temperature limit of 160°F is the maximum expected non-accident spent fuel pool temperature from UFSAR Section 9.1.3.1.

For Region I, the fuel temperature bias is determined for up to 5.1 w/o which bounds the effective fresh fuel enrichment of 2.47 w/o, which is the highest fresh fuel enrichment for unrestricted storage in Region I. As shown in Table 4-1 of Attachment L to the submittal, the highest temperature bias which occurs at 5.1 w/o is selected. For Region II which doesn't have a water gap between storage cells, the temperature reactivity effect is significantly smaller than the Region I values and is negative (more conservative) at 0 ppm. A conservative temperature bias of 0.003 based on the 1000 ppm case is used for both the 0 ppm case and the borated cases. This value is more conservative than the temperature reactivity for the effective fresh fuel enrichment limit of 1.23 w/o,

As shown in the Beaver Valley Unit 2 Spent Fuel Rack Criticality Analysis With Credit For Soluble Boron (CAA-98-158-Rev 1, November 1998), the pool temperature bias Δk decreases as less (3-out-of-4, 2-out-of four, etc) than a fully loaded rack (every location contains an assembly) is modeled. Thus SCE has analyzed the worst fuel pattern (fully loaded rack) to determine the pool temperature bias.

In addition, the fuel assembly grids are not modeled. The negative reactivity provided by the grids (0.11% Δρ), which is applicable to 0 ppm and borated cases, would also compensate for enrichment and fuel pattern effects.

Furthermore, as described in Section 5 of Attachment L to the submittal, a discretionary conservative allowance (margin) of 154 ppm is included in the soluble boron requirement. As discussed in response to RAI #14, this discretionary margin is equivalent to an additional conservatism of 0.017 Δk for borated cases.

SCE revised response to Question 25, Part (b):

"Axial Burnup Effect" refers to the potential non-conservative results due to the 2D approximation that uses the axially averaged assembly burnup values in the criticality calculation. Initially, fuel in the reactor will deplete with a slightly skewed cosine power shape. As burnup progresses, the power distribution will tend to flatten due to the more highly burned fuel in the central regions than in the upper and lower regions. At high burnups, the more reactive fuel near the ends of the fuel assembly occurs in regions of high neutron leakage (top and bottom of the assembly). Consequently, it is expected that over most of the burnup history, fuel assemblies with distributed burnups will exhibit a slightly lower reactivity than that calculated for the uniform average burnup. As burnup increases, the distribution tend to be self-regulating as controlled by the axial power distribution, precluding the existence of large regions of significantly reduced burnup. The effect was evaluated in a paper by S. E. Turner, "Uncertainty Analyses - Burnup Distributions," presented at the DOE/SANDIA Technical Meeting on Fuel Burnup Credit, Special Section, ANS/ENS Conference, Washington D.C., November 2, 1988." In summary, the effect is typically minor and generally negative reactivity effect of the axially distributed burnups at values less than about 30 GWD/T with small positive reactivity effects at higher burnup values.

However, depending on plant designs, the top region of the assembly may have burnups significantly lower than the average for highly depleted assemblies. For example, the use of Axial Power Shaping Rod (APSR) in B&W reactors may result in a highly skewed axial burnup profile with low burnups in the top region. In this instance, the axial burnup effect may be significant.

Section 3.2.5 of Attachment L of the SCE submittal discussed the process used to determine whether the use of conservative temperatures can override the "axial burnup effect" for SONGS fuel. The process is summarized below.

Step 1. Construct a single assembly SIMULATE-3 model in 3D geometry for the assembly of interest. Deplete the assembly with the nominal moderator and fuel temperatures to various burnup points of interest. These temperatures produce a realistic, axially-varying isotopic inventory.

Step 2. Construct a single assembly SIMULATE-3 model in 2D geometry for the assembly in Step 1 above. Instead of the nominal moderator and fuel temperatures, the 2D depletion was performed at a constant moderator temperature of 600°F and a constant fuel temperature of 1200°F. These constant temperatures produce a more conservative isotopic make-up due to the harder neutron spectrum. The burnup and temperature history were expanded to the 3D geometry consistent with the geometry in

Step 1 above. All axial elevations of the fuel will have the same burnup and temperature history. This is consistent with the 2D modeling employed in CASMO-3.

Step 3. Using the results from Steps 1 and 2 above, perform SIMULATE-3 restarts at burnup values of 0, 10, 20, 30, 40, 50, and 60 GWD/T; at 0 ppm; 68°F; and no xenon to simulate the spent fuel rack conditions. K_{eff} values from the case with the conservative moderator and fuel temperatures (Step 2) and the case with nominal temperatures (Step 1) were compared to verify that the conservative temperature approach was sufficient to override the axial burnup effect.

As shown in response to RAI #10, the conservative temperature approach (2D) was more conservative. Therefore, the axial burnup bias is conservatively set at 0.0 Δk.

Additional calculations have been performed to bound the off-nominal temperature/power operations. The calculations have been performed for enrichment values of 1.87 w/o, 4.45 w/o, and 5.0 w/o. For each enrichment, the 3-D depletion was performed at inlet temperatures of 533°F and 560°F. This temperature range bounds the SONGS Tech. Spec limit of 535°F to 558°F. In addition, another 3-D depletion was performed at 533°F and at 30 percent power to bound extended part power operations. As shown in Tables 1, 2, and 3 below, the 2-D depletion with conservatively high coolant temperature of 600°F resulted in the most conservative K_{eff} values for all enrichment cases. For example, for the 5.00 w/o fuel, at 50 GWD/T, the 2-D, high coolant temperature approach is more conservative by 0.005 Δk. This is due to the hardening of the neutron spectrum resulting in a more conservative isotopic make-up. The above calculations were performed at a spent fuel pool temperature of 68°F. Another check case was performed at 160°F to verify that the conclusion is valid for the entire spent fuel pool temperature range (68°F to 160°F. The enrichment selected is 3.00 w/o, which is about the mid-range of the enrichment of interest. As shown in Table 4, the 2-D depletion with conservatively high coolant temperature of 600°F resulted in the most conservative K_{eff} values at the spent fuel pool temperature of 160°F also.

Oak Ridge report, NUREG/CR-6801, "Recommendations for Addressing Axial Burnup in PWR Burnup Credit Analyses," presents studies of the axial burnup effect using axial burnup profiles provided by PWR plants of various designs. As described in Section 4.2.2 of the report, CE fuel types tend to exhibit a smaller end effect on average. As shown in Figures 31, 32, 33, and 34 of the report, Δk values for CE fuel are close to zero and are very small as compared to a maximum axial burnup effect of up to 0.04 Δk for B&W fuel. The small end effect of CE fuel is the key reason that contributes to the conservative results in the SONGS approach. This is consistent with Calvert Cliffs (another CE plant) results using plant specific axial burnup profiles (See Calvert Cliffs Three-Dimensional to Two Dimensional Reactivity Bias table in Section 9.E.2.1 of the Calvert Cliffs submittal dated September 30, 2003, ADAMS number ML033140579).

In the submittal approved in Reference 6, an independent method was used to show that the San Onofre fuel assembly axial bias is 0.0 Δk. The burnup distribution from a discharged San Onofre assembly was converted to equivalent fresh enrichments. The equivalent fresh enrichments were input to a 3-D KENO model. A second 3-D KENO model with uniform enrichment corresponding to the assembly average burnup was also set up. This comparison also showed that the 2-D (uniform axial distribution) approach is conservative for San Onofre fuel.

Table 1: Comparison of 3-D to 2-D K_{eff} for 1.87 w/o fuel, 68°F

Enrichment: 1.87 w/o				
Burnup (GWD/T)	T-inlet=600°F 2D K_{eff}	T-inlet=560°F Full Power Depl 3D K_{eff}	T-inlet=533°F Full Power Depl 3D K_{eff}	T-inlet=533°F 30% Power Depl 3D K_{eff}
0	1.24454	1.24454	1.24454	1.24454
10	1.11561	1.10850	1.10709	1.10490
20	1.01562	1.00878	1.00496	1.00046
30	0.94019	0.93346	0.92798	0.92199
40	0.88513	0.87830	0.87189	0.86544
50	0.84777	0.84081	0.83401	0.82774
60	0.82274	0.81489	0.80810	0.80236

Table 2: Comparison of 3-D to 2-D K_{eff} for 4.45 w/o fuel, 68°F

Enrichment: 4.45 w/o				
Burnup (GWD/T)	T-inlet=600°F 2D K_{eff}	T-inlet=560°F Full Power Depl 3D K_{eff}	T-inlet=533°F Full Power Depl 3D K_{eff}	T-inlet=533°F 30% Power Depl 3D K_{eff}
0	1.45672	1.45671	1.45671	1.45671
10	1.34135	1.33419	1.33383	1.33329
20	1.25052	1.24340	1.24148	1.23945
30	1.16868	1.16173	1.15776	1.15397
40	1.08984	1.08362	1.07724	1.07167
50	1.01564	1.00999	1.00110	0.99401
60	0.94916	0.94295	0.93176	0.92361

Table 3: Comparison of 3-D to 2-D K_{eff} for 5.00 w/o fuel, 68°F

Enrichment: 5.00 w/o				
Burnup (GWD/T)	T-inlet=600°F 2D K_{eff}	T-inlet=560°F Full Power Depl 3D K_{eff}	T-inlet=533°F Full Power Depl 3D K_{eff}	T-inlet=533°F 30% Power Depl 3D K_{eff}
0	1.47775	1.47774	1.47774	1.47774
10	1.36755	1.36062	1.36044	1.35994
20	1.28119	1.27421	1.27278	1.27097
30	1.20332	1.19638	1.19324	1.18980
40	1.12761	1.12133	1.11607	1.11090
50	1.05452	1.04890	1.04122	1.03439
60	0.98617	0.98034	0.97014	0.96187

Table 4: Comparison of 3-D to 2-D K_{eff} for 3.00 w/o fuel, 160°F

Enrichment: 3.00 w/o, 160°F				
Burnup (GWD/T)	T-inlet=600°F 2D K_{eff}	T-inlet=560°F Full Power Depl 3D K_{eff}	T-inlet=533°F Full Power Depl 3D K_{eff}	T-inlet=533°F 30% Power Depl 3D K_{eff}
0	1.36674	1.36674	1.36674	1.36674
10	1.23654	1.22858	1.22746	1.22673
20	1.13529	1.12735	1.12365	1.12108
30	1.04856	1.04078	1.03439	1.03000
40	0.97298	0.96564	0.95704	0.95120
50	0.91215	0.90480	0.89511	0.88843
60	0.86677	0.85836	0.84846	0.84161

Enclosure 3

Replacement pages for Attachments C, D, E, F, I, and J of PCN 556, Revision 2

Attachment C

(Proposed Technical Specification Pages)

(Revised Page 4.0-4a)

(Redline and Strikeout, Unit 2)

4.0 DESIGN FEATURES (continued)

4.3.1 Criticality (continued)

~~f~~g. Prior to using the storage criteria of LCO 3.7.18 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

Supplement 2

~~f~~h. 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~~I;

~~g~~i. 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~~I;

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

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

~~h.~~l. Units 2 and 3 ~~F~~fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1, Figure 3.7.18-2, Figure 3.7.18-3, and Figure 3.7.18-~~2~~4 will be stored in compliance with ~~the~~ Licensee Controlled Specification 4.0.100 Rev. 2, dated xx/xx/xx; and

~~i.~~m. ~~The burnup of e~~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 Rev. 2, dated xx/xx/xx.

(continued)

Attachment D

(Proposed Technical Specification Pages)

(Revised Page 4.0-4a)

(Redline and Strikeout, Unit 3)

4.0 DESIGN FEATURES (continued)

4.3.1 Criticality (continued)

~~f~~g. Prior to using the storage criteria of LCO 3.7.18 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

Supplement 2

~~f~~h. 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~~I;

~~g~~i. 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~~I;

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

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

~~h.~~l. Units 2 and 3 ~~F~~fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1, Figure 3.7.18-2, Figure 3.7.18-3, and Figure 3.7.18-~~2~~4 will be stored in compliance with ~~the~~ Licensee Controlled Specification 4.0.100 Rev. 2, dated xx/xx/xx; and

~~i.~~m. ~~The burnup of e~~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 Rev. 2, dated xx/xx/xx.

(continued)

Attachment E

(Revised Pages 4.0-4 and 4.0-4a)

(Proposed Technical Specification Pages, Unit 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. $K_{eff} < 1.0$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $K_{eff} \leq 0.95$ if fully flooded with water borated to 1700 ppm, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

d. Three or five Borated stainless steel guide tube inserts (GT-Insert) may be used. When three Borated stainless steel guide tube inserts are used, they will be installed in an assembly's center guide tube, the guide tube associated with the serial number, and the diagonally opposite guide tube. Fuel containing GT-Inserts may be placed in either Region I or Region II. However, credit for GT-Inserts is only taken for Region II storage.

   A five-finger CEA may be installed in an assembly. Fuel containing a five-finger CEA may be placed in either Region I or Region II. Credit for inserted 5-finger CEAs is taken for both Region I and Region II.

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

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

Supplement 2

(continued)

4.0 DESIGN FEATURES (continued)

4.3.1 Criticality (continued)

g. Prior to using the storage criteria of LCO 3.7.18 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

Supplement 2

h. 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 I;

i. 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 I;

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

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

l. Units 2 and 3 fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1, Figure 3.7.18-2, Figure 3.7.18-3, and Figure 3.7.18-4 will be stored in compliance with Licensee Controlled Specification 4.0.100 Rev. 2, dated xx/xx/xx; and

m. Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Licensee Controlled Specification 4.0.100 Rev. 2, dated xx/xx/xx.

(continued)

Attachment F

(Revised Pages 4.0-4 and 4.0-4a)

(Proposed Technical Specification Pages, Unit 3)

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. $K_{eff} < 1.0$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $K_{eff} \leq 0.95$ if fully flooded with water borated to 1700 ppm, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

d. Three or five Borated stainless steel guide tube inserts (GT-Inserts) may be used. When three Borated stainless steel guide tube inserts are used, they will be installed in an assembly's center guide tube, the guide tube associated with the serial number, and the diagonally opposite guide tube. Fuel containing GT-Inserts may be placed in either Region I or Region II. However, credit for GT-Inserts is only taken for Region II storage.

A five-finger CEA may be installed in an assembly. Fuel containing a five-finger CEA may be placed in either Region I or Region II. Credit for inserted 5-finger CEAs is taken for both Region I and Region II.

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

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

Supplement 2

(continued)

4.0 DESIGN FEATURES (continued)

4.3.1 Criticality (continued)

g. Prior to using the storage criteria of LCO 3.7.18 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

Supplement 2

h. 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 I;

i. 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 I;

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

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

l. Units 2 and 3 fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1, Figure 3.7.18-2, Figure 3.7.18-3, and Figure 3.7.18-4 will be stored in compliance with Licensee Controlled Specification 4.0.100 Rev. 2, dated xx/xx/xx; and

m. Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Licensee Controlled Specification 4.0.100 Rev. 2, dated xx/xx/xx.

(continued)

Attachment I

(Revised Pages 4.0-100-1 through 4.0-100-3)

(Proposed LCS 4.0.100 Unit 2)

(The date XX/XX/XX on each page of LCS 4.0.100 will be the date of NRC approval of License Amendment Application 243)

4.0 DESIGN FEATURES

LCS 4.0.100 Fuel Storage Patterns ~~for Region II Racks and Region II Racks Reconstitution Station~~

NOTE 1:

This Licensee Controlled Specification is listed by revision number and date in Technical Specification 4.3.1. All changes to pages 1 through 61, Rev. 2 dated XX/XX/XX of this LCS (i.e., excluding the Bases pages) must be approved by the NRC via the amendment application process in conjunction with an associated change to Technical Specification 4.3.1.

NOTE 2:

Prior to using the storage criteria in 4.0.100.1, 4.0.100.2, and 4.0.100.4 below, the following uncertainties shall be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 fuel assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

Supplement 2

VALIDITY STATEMENT: Rev. 2~~1~~ effective upon NRC approval ~~12/1/97~~, to be implemented within ~~3~~180 days.

4.0.100 New or burned fuel (which does not meet the criteria of LCO 3.7.18 for unrestricted storage or storage at the pool periphery) may be stored in Region I or Region II ~~if all the~~ in accordance with the allowable Storage Patterns described in this LCS. ~~following conditions are met.~~

4.0.100.1 Region I = Region I Storage Patterns are given in Tables I-1 through I-8 and Figures I-1 through I-9.
~~Fuel Type 1 = New or burned fuel which does not meet the criteria of LCO 3.7.18 for unrestricted storage or storage at the pool periphery.~~

4.0.100.2 Region II = Region II Storage Patterns are given in Tables II-1 through II-15 and Figures II-1 through II-22.

~~Fuel Type 2 = Fuel which does meet the criteria of LCO 3.7.18 for the unrestricted storage in Region II.~~

~~(A) Fuel Type 1 shall have initial enrichment ≤ 4.8 w/o U-235.~~

~~(B) Fuel Type 1 shall be stored in Region II in a checkerboard pattern. The four (4) basic requirements for Region II storage are:~~

~~(1) Type 1 fuel assemblies can not be in adjacent locations. They can, however, be in diagonal locations.~~

~~(2) Type 1 fuel assemblies stored in Region II shall have at least two (2) sides facing an empty location.~~

~~(3) The checkerboard pattern does not need to be separated by an empty row from other fuel assemblies normally stored in Region II.~~

~~(4) Figure 4.0.100-1 provides an illustration of an acceptable fuel storage pattern.~~

4.0.100.3 SONGS Unit 1 Fuel shall not be stored in Region I Racks.

4.0.100.4 The burnup of each SONGS Unit 1 uranium dioxide spent fuel assembly stored in Region II shall meet the following criteria:

~~(C) A reconstitution station is a special case of a checkerboard pattern. The above rules for checkerboarding permit a reconstitution station anywhere in the Region II racks. Single or multiple row reconstitution stations are permitted. Figure 4.0.100-2 provides an illustration.~~

~~(D) San Onofre Unit 1 fuel assemblies may be stored in Region II in a 'Three-out-of-four' pattern if the assembly burnup is at least 1.7 GWD/T.~~

4.0.100.4.1 SONGS Unit 1 nominal 3.40 w/o assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 25,000 MWD/T, and
the cooling time is greater than 5 years.

4.0.100.4.2 SONGS Unit 1 nominal 4.00 w/o assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 26,300 MWD/T, and the cooling time is greater than 20 years.

the burnup is greater than 27,100 MWD/T, and the cooling time is greater than 15 years.

the burnup is greater than 28,200 MWD/T, and the cooling time is greater than 10 years.

4.0.100.4.3 SONGS Unit 1 nominal 4.00 w/o assemblies can be stored in the Region II Racks (SFP periphery) if:

the burnup is greater than 20,000 MWD/T, and the cooling time is greater than 0 years.

4.0.100.5 Design Requirements For Guide Tube Inserts

(i) GT-Inserts shall be 0.75 inches O.D. minimum, completely cover the active fuel region (150 inches), and have a minimum boron content of 0.02434 grams of B-10 per cm^3.

(ii) Three (3) or 5 GT-Inserts are allowed. The orientation of every fuel assembly with 3 guide tube inserts shall be the same (Figure II-23).

(iii) A 5-finger, full length Control Element Assembly (CEA) may be used in place of GT-inserts.

4.0.100.6 Design requirements For Erbia

Assemblies containing 40 or 80 erbia rods shall have the erbia rods distributed per Figures II-24 and II-25. The minimum initial nominal erbia loading shall be 2.0 w/o Er203.

4.0.100.7 The Failed Fuel Rod Storage Basket (FFRSB)

The Failed Fuel Rod Storage Basket (FFRSB) shall be treated as if it were an assembly with enrichment and burnup of the rod in the basket with the most limiting combination of enrichment and burnup.

Attachment J

(Revised Pages 4.0-100-1 through 4.0-100-3)

(Proposed LCS 4.0.100 Unit 3)

(The date XX/XX/XX on each page of LCS 4.0.100 will be the date of NRC approval of License Amendment Application 227)

4.0 DESIGN FEATURES

LCS 4.0.100 Fuel Storage Patterns ~~for Region II Racks and Region II Racks Reconstitution Station~~

NOTE 1:

This Licensee Controlled Specification is listed by revision number and data in Technical Specification 4.3.1. All changes to pages 1 through 61 Rev. 2 dated XX/XX/XX of this LCS (i.e., excluding the Bases pages) must be approved by the NRC via the amendment application process in conjunction with an associated change to Technical Specification 4.3.1.

NOTE 2:

Prior to using the storage criteria in 4.0.100.1, 4.0.100.2, and 4.0.100.4 below, the following uncertainties shall be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 fuel assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

Supplement 2

VALIDITY STATEMENT: Rev. ~~1~~2 effective upon NRC approval ~~12/1/97~~, to be implemented within ~~30~~ 180 days.

4.0.100 New or burned fuel (which does not meet the criteria of LCO 3.7.18 for unrestricted storage or storage at the pool periphery) may be stored in Region I or Region II ~~if all~~ the stored in accordance with the allowable Storage Patterns described in this LCS. ~~following conditions are met.~~

4.0.100.1 Region I = Region I Storage Patterns are given in Tables I-1 through I-8 and Figures I-1 through I-9.
~~Fuel Type 1 = New or burned fuel which does not meet the criteria of LCO 3.7.18 for unrestricted storage or storage at the pool periphery.~~

4.0.100.2 Region II = Region II Storage Patterns are given in Tables II-1 through II-15 and Figures II-1 through II-22.

~~Fuel Type 2 = Fuel which does meet the criteria of LCO 3.7.18 for the unrestricted storage in Region II.~~

~~(A) Fuel Type 1 shall have initial enrichment ≤ 4.8 w/o U-235.~~

~~(B) Fuel Type 1 shall be stored in Region II in a checkerboard pattern. The four (4) basic requirements for Region II storage are:~~

~~(1) Type 1 fuel assemblies can not be in adjacent locations. They can, however, be in diagonal locations.~~

~~(2) Type 1 fuel assemblies stored in Region II shall have at least two (2) sides facing an empty location.~~

~~(3) The checkerboard pattern does not need to be separated by an empty row from other fuel assemblies normally stored in Region II.~~

~~(4) Figure 4.0.100-1 provides an illustration of an acceptable fuel storage pattern.~~

4.0.100.3 SONGS Unit 1 Fuel shall not be stored in Region I Racks.

4.0.100.4 The burnup of each SONGS Unit 1 uranium dioxide spent fuel assembly stored in Region II shall meet the following criteria:

~~(C) A reconstitution station is a special case of a checkerboard pattern. The above rules for checkerboarding permit a reconstitution station anywhere in the Region II racks. Single or multiple row reconstitution stations are permitted. Figure 4.0.100-2 provides an illustration.~~

~~(D) San Onofre Unit 1 fuel assemblies may be stored in Region II in a 'Three-out-of-four' pattern if the assembly burnup is at least 1.7 GWD/T.~~

4.0.100.4.1 SONGS Unit 1 nominal 3.40 w/o assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 25,000 MWD/T, and
the cooling time is greater than 5 years.

4.0.100.4.2 SONGS Unit 1 nominal 4.00 w/o assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 26,300 MWD/T, and the cooling time is greater than 20 years.

the burnup is greater than 27,100 MWD/T, and the cooling time is greater than 15 years.

the burnup is greater than 28,200 MWD/T, and the cooling time is greater than 10 years.

4.0.100.4.3 SONGS Unit 1 nominal 4.00 w/o assemblies can be stored in the Region II Racks (SFP periphery) if:

the burnup is greater than 20,000 MWD/T, and the cooling time is greater than 0 years.

4.0.100.5 Design Requirements For Guide Tube Inserts

(i) GT-Inserts shall be 0.75 inches O.D. minimum, completely cover the active fuel region (150 inches), and have a minimum boron content of 0.02434 grams of B-10 per cm^3.

(ii) Three (3) or 5 GT-Inserts are allowed. The orientation of every fuel assembly with 3 guide tube inserts shall be the same (Figure II-23).

(iii) A 5-finger, full length Control Element Assembly (CEA) may be used in place of borated stainless steel or aluminum guide tube inserts.

4.0.100.6 Design requirements For Erbia

Assemblies containing 40 or 80 erbia rods shall have the erbia rods distributed per Figures II-24 and II-25. The minimum initial nominal erbia loading shall be 2.0 w/o Er203.

4.0.100.7 The Failed Fuel Rod Storage Basket (FFRSB)

The Failed Fuel Rod Storage Basket (FFRSB) shall be treated as if it were an assembly with enrichment and burnup of the rod in the basket with the most limiting combination of enrichment and burnup.