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September 20, 1996

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

Gentlemen:

Subject: **Docket Nos. 50-361 and 50-362**
Amendment Application Nos. 153 and 137 Supplement 1,
Storing Nuclear Fuel
San Onofre Nuclear Generating Station
Units 2 and 3

References:

1. Letter from R. M. Rosenblum (Edison) to Document Control Desk (NRC), dated December 6, 1995, Subject: Amendment Application Numbers 153 and 137, (PCN-449), Storing Nuclear Fuel

2. Letter from Dwight Nunn (Edison) to Document Control Desk (NRC), dated August 30, 1996, Subject: Amendment Application Numbers 153 and 137 Supplement 1, (PCN-449, Supplement 1), Storing Nuclear Fuel

This letter provides additional information, as requested by the NRC Project Manager for San Onofre Units 2 and 3 during a telephone call on September 11, 1996. This information (enclosed) concerns the spent fuel pool temperatures in support of Amendment Application Numbers 153 and 137, Storing Nuclear Fuel (References 1 and 2) for San Onofre Nuclear Generating Station Units 2 and 3, respectively.

If you need additional information, please let me know.

Sincerely,

J L Rainsberry

Enclosure

cc: L. J. Callan, Regional Administrator, NRC Region IV
J. E. Dyer, Director, Division of Reactor Projects, Region IV
K. E. Perkins, Jr., Director, Walnut Creek Field Office, NRC Region IV
J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 & 3
M. B. Fields, NRC Project Manager, San Onofre Units 2 and 3

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SPENT FUEL POOL TEMPERATURES AND HEAT LOADS

1. Confirm the heat loads in Updated Final Safety Analysis Report (UFSAR) Revision 12, page 9.1-13A, envelope 4.8% fuel as provided in Proposed Change Number 449 (PCN 449).

   - The Spent Fuel Pool (SFP) heat loads for 4.8% fuel are bounded by those on page 9.1-13A of the UFSAR.

     The Maximum Abnormal Heat Load and the Maximum Refueling Full Core Offload Heat Load for 4.8% fuel are conservatively calculated based on a full spent fuel pool plus three assemblies (1545 assemblies). This includes 217 assemblies of 4.8% enriched fuel offloaded after 150 hours of decay.

     As shown in the following table, the 4.8% enriched fuel heat loads are less than the UFSAR heat loads, therefore, the UFSAR maximum allowable temperatures are still applicable.

Case	PCN 449 4.8 %	UFSAR, Rev. 12	
	Heat Load	Heat Load	Maximum Allowable Temp
Maximum Normal Heat Load	24.0 MBtu/Hr	24.7 MBtu/Hr	140°F
Maximum Abnormal Heat Load	49.9	51.3	160°F
Maximum Refueling Full Core Offload Heat Load	42.0	43.0	160°F

The heat loads calculated for 4.8% enriched fuel (49.9 MBtu/Hr, 42.0 MBtu/Hr, and 24.0 MBtu/Hr) are less than the UFSAR design basis heat loads (51.3 MBtu/Hr, 43.0 MBtu/Hr, and 24.7 MBtu/Hr) because of the following changed assumptions:

	4.1% Fuel	4.8% Fuel	Comments
a)	The UFSAR assumes 1572 assemblies in the spent fuel pool (30 more assemblies than the 1542 storage locations in the pool).	The 4.8% enrichment heat loads are based on 1545 assemblies in the pool. (Three more assemblies than the 1542 storage locations in the pool).	Fewer assemblies results in a lower calculated heat load for 4.8% enriched fuel.
b)	The UFSAR assumes a cycle length of 570 EFPD and a batch size of 108 assemblies being discharged per fuel cycle. This discharge rate plus the Unit 1 contribution from c) below fills the SFP by Cycle 11.	The analysis for 4.8% fuel assumes a cycle length of 635 EFPD and a batch size of 104 assemblies discharged per fuel cycle. This discharge rate fills the SFP by Cycle 14.	The pool is being filled at a slower rate resulting in a lower calculated heat load in the pool for 4.8% enriched fuel.
c)	The UFSAR decay heat loads include the heat load from 52 Unit 1 assemblies transhipped on a regular basis, some of which are assumed to have decayed for 120 days. (UFSAR table 9.1-1C).	Transshipment is no longer occurring, and Unit 1 is no longer operating.	This results in a lower calculated heat load in the pool for 4.8% enriched fuel.

The total heat loads provided for the 4.8% fuel are more realistic and consistent with current fuel management plans and therefore result in lower total heat loads anticipated in the pool. The UFSAR will be changed to show that the calculated heat loads for the 4.8% enriched fuel are lower than the design basis heat loads.

2. Discuss the actions if one or more of the assumptions is deviated from in the refueling operations heat load evaluation (UFSAR, Rev. 12, page 9.1-13A)

- Prior to moving fuel from the reactor to the SFP, a Condition Specific Analysis will be performed if the UFSAR assumptions will be deviated from in a non-conservative manner.

3. Are the heat load in the pool and the time to boil affected by increasing the fuel enrichment to 4.8%?

- Increasing the enrichment to 4.8% and increasing fuel burnup from 570 EFPD to 635 EFPD tend to increase the heat load of the SFP and reduce the time to boil. Changes to the assumptions listed in the answer to question 1 above tend to reduce the heat load to the SFP and reduce the time to boil. The overall effect is that the calculated heat loads for 4.8% enriched fuel are lower than the values currently in the UFSAR, and the time to boil is increased.

4. The SFP temperature is stated to be less than or equal to 160°F for a full core normal refueling offload. The ACI Code states that specific actions are needed if concrete exceeds 150°F. Please discuss.

- Edison has not exceeded 150°F in the SFP for any refueling outage to date. The SFP temperature will not exceed 150°F under normal operations (i.e., with both SFP trains in operation) for the Maximum Refueling Full Core Offload Heat Load. For the single active failure "accident" condition of a loss of one SFP pump, SFP temperature will not exceed 160°F.

  Although 160°F is the SONGS Unit 2 and 3 design and licensing basis, calculations show that for the current Maximum Refueling Full Core Offload Heat Load of 43.0 MBtu/Hr, the Unit 2 SFP temperature will be 143.4°F and Unit 3 SFP temperature will be 145.8°F with both trains of SFP cooling in operation. With one SFP pump secured, one pump in operation, and two heat exchangers in operation, the Unit 2 SFP temperature has been calculated to be 153.7°F and Unit 3 SFP temperature has been calculated to be 156.1°F for this 43.0 MBtu/Hr heat load (the difference between the Unit 2 and Unit 3 SFP temperatures is because the calculation assumes that certain component cooling water heat loads, common to Units 2 and 3, are aligned to Unit 3).

Edison will not begin offloading any fuel until a ACI 349, Section A.4.3 evaluation has been completed that demonstrates that operation of the SFP at temperatures up to 160°F will not affect S P OPERABILITY.

5. On UFSAR page 9.1-13, paragraphs 3 and 4 of Section 9.1.3.1 begin with "normal maximum" and "maximum normal." Are "normal maximum" and "maximum normal" the same?

   - "normal maximum" and "maximum normal" are the same. The UFSAR will be changed to make the wording consistent.

6. UFSAR Table 9.1-3, page 9.1-19, in the Effect on System column, says that there is no appreciable effect on normal refueling when the SFP temperature is less than 140°F. The maximum refueling full core offload heat load has a maximum allowable temperature of 160°F. Determine if the 140°F temperature should be changed to 160°F.

   - The Effect on System column of Table 9.1-3, page 9.1-19 will be changed as follows (without bold/italic emphasis):

   Before: No appreciable effect during normal refueling with one pump and two heat exchangers, fuel pool water temperature will not exceed 140°F.

   After: No appreciable effect during ***maximum normal heat load.*** With one pump and two heat exchangers ***in operation***, fuel pool water temperature will not exceed 140°F. ***No appreciable effect during maximum refueling full core offload heat load. With one pump and two heat exchangers in operation, fuel pool water temperature will not exceed 160°F.***

7. The Remarks column of Table 9.1-3, page 9.1-19 refers to a full core offload as "abnormal."

   - The Remarks column of UFSAR Table 9.1-3, page 9.1-19 will be changed as follows (without bold/italic emphasis):

   Note: Refer to page 9.1-13A for the definition of "maximum abnormal heat load."

   Before: A single active failure need not be considered for the abnormal case of full core offload.

   After: A single active failure need not be considered for the ***maximum abnormal heat load.***