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Vice President

July 18, 2005

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: **Docket Nos. 50-361 and 50-362**
Proposed Change Number (PCN) 553
Request to Revise Technical Specifications 4.2.1, "Fuel Assemblies" and 5.7.1.5, "Core Operating Limits Report (COLR)"
San Onofre Nuclear Generating Station Units 2 and 3

Reference: August 26, 2004 letter from D. E. Nunn (SCE) to Document Control Desk (NRC), Subject: Docket Nos. 50-361 and 50-362, Proposed Change Number (PCN) 553, Request to Revise Technical Specifications 4.2.1, "Fuel Assemblies" and 5.7.1.5, "Core Operating Limits Report (COLR)," San Onofre Nuclear Generating Station Units 2 and 3

Dear Sir or Madam:

The referenced letter (PCN-553) requested changes to the San Onofre Units 2 and 3 Technical Specifications to implement ZIRLO™ fuel rod cladding material into the fuel design for San Onofre Units 2 and 3. The NRC requested additional information regarding PCN-553. Responses to NRC questions are provided in Enclosure 1 to this letter.

A revised list of commitments associated with this proposed amendment is provided in Enclosure 2.

The information provided in the Enclosures to this letter does not change the conclusions of the No Significant Hazards Consideration in the referenced letter (PCN-553).

If you have any questions or require additional information, please contact Mr. Jack Rainsberry at (949) 368-7420.

Sincerely,

Brian Katz

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Enclosures

1. Responses to Five (5) NRC Questions
2. Commitments Associated with the Proposed Amendments

cc: B. S. Mallett, Regional Administrator, NRC Region IV
B. M. Pham, 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

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) PROPOSED CHANGE NUMBER 553 – ZIRLO™ FUEL CLADDING SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

NRC RAI Question 1:

In order to use topical report CENPD-404-P-A several conditions have to be satisfied. Condition 4 states, "... the fuel duty will be limited for each CENP designed plant with some provision for adequate margin to account for variations in core design (e.g., cycle length, plant operating conditions, etc.). Details of this condition will be addressed on a plant specific basis during the approval to use ZIRLO™ in a specific plant." Your response to Condition 4 did not contain plant specific information as specified by the condition. In your response it was stated that the numbers previously used for Palo Verde would also be used for SONGS. This data does not appear to meet the requirements of the plant specific portion of the Condition. Provide the plant specific fuel duty index information that will be used at SONGS. Also describe what was meant by the phrase "approximately 600" as it applies to the base maximum fuel pin value.

Response to RAI Question 1:

Westinghouse performed calculations to develop a plant specific modified Fuel Duty Index (FDIm) limit of 586 for San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. The SONGS FDIm value is different from the Palo Verde value because SONGS specific operating parameters were used in the plant specific analysis. The basis for the SONGS Units 2 and 3 FDIm limit was determined by using (a) The Fuel Duty Index (FDI) methodology defined in CENPD-404-P-A, (b) SONGS plant specific core fuel management designs, and (c) SONGS operating parameters chosen within the range of the established plant Technical Specifications. The ZIRLO™ FDIm limit of 586 will restrict future SONGS core fuel management designs so that the ZIRLO™ cladding fuel duty will not exceed the maximum corrosion operating experience of OPTIN™ cladding.

Because Southern California Edison (SCE) is providing a plant specific FDIm value, SCE revises paragraph 2 of the response regarding Condition 4 as follows:

> SCE will restrict the modified Fuel Duty Index (FDIm) of each ZIRLO™ clad fuel pin to 110% of the established SONGS plant specific FDIm limit of 586 except under the following condition: the preceding 110% limit may be exceeded for a fraction of the fuel pins in up to eight (8) fuel assemblies. For these eight fuel assemblies, SCE will restrict the fuel duty of ZIRLO™ clad fuel pins to 120% of the SONGS plant specific FDIm limit.

Since SCE will no longer be linking the FDIm limit to the current Palo Verde limit value, the "approximately 600" part of the question has no further relevance.

NRC RAI Question 2:

On page 8 of your submittal you responded to NRC condition 4 by stating, "If the measured oxide for CENP 16x16 fuel is significantly greater than predicted ..."Explain what is meant by "significantly greater than predicted." Explain the criteria and the test methods that will be used to make this determination.

Response to RAI Question 2:

As discussed with the NRC Staff, SCE will provide this information when the oxide measurement data are reported to the NRC.

NRC RAI Question 3:

In the safety evaluation for CENPD-132, Supplement 4-P-A, "Calculative Methods For The CE Nuclear Power Large Break LOCA Evaluation Model," December 2000 it was stated, "...the 1999 EM is acceptable for licensing applications for CENP-designed PWRs subject to the limitations discussed in this safety evaluation." Explain how each of the following plant specific limitations will be implemented at SONGS.

A. "... each licensee who uses the 1999 EM must ensure that the choice of the RWST temperature for safety injection and containment spray provides a bounding PCT result of the LBLOCA events."

B. Provide confirmation that the parametric study used to analyze the impact of the three different safety injection pump actuation times in CENPD-132 Supplement 4-P-A is applicable for SONGS Units 2 and 3.

C. "... each applicant referencing this TR [CENPD-132, Supplement 4-P-A] must perform a plant-specific worst single failure study."

Response to RAI Question 3:

The SONGS Units 2 and 3 Large Break Loss-of-Coolant Accident (LBLOCA) analysis will use the 1999 Evaluation Model (EM) version of the Westinghouse LBLOCA evaluation model for Combustion Engineering (CE) Pressurized Water Reactors (PWRs), as described in CENPD-132, Supplement 4-P-A. The analysis will include a break spectrum of at least three break sizes in the Reactor Coolant Pump discharge leg and will analyze both UO_2 and erbia fuel rods with ZIRLO™ and Zircaloy-4 cladding.

The SONGS Units 2 and 3 LBLOCA analysis will implement each of the plant specific limitations from the safety evaluation for the 1999 EM topical report listed above as follows.

A. The analysis will include a Refueling Water Storage Tank (RWST) temperature sensitivity study. The study will analyze the minimum and maximum RWST temperatures. The temperature that yields the highest Peak Cladding Temperature (PCT) will be used in the break spectrum analysis of the limiting fuel design.

B. The safety injection pump (SIP) actuation time parametric study in Section 3.3.3 of Supplement 4-P-A of CENPD-132 provides the basis for the generic conclusion that the SIP actuation time used in 1999 EM analyses of CE PWRs is the following:

   - Plant-specific SIP actuation time based on a minimum value for the Safety Injection Actuation Signal (SIAS), generated on low pressurizer pressure, and a maximum delay time that includes the delays associated with emergency diesel generator startup and load sequencing.

   The conclusion was intended to be generic (i.e., applicable to all CE PWRs) based on the specific results of the parametric study, the fact that all 1999 EM analyses include a plant-specific worst single failure parametric study, and the similarity in the responses of CE PWRs to postulated Loss-of-Coolant Accidents (LOCAs).

   Cases 1 and 2 of the SIP actuation time parametric study analyzed extreme values for maximum and minimum SIP actuation times. Case 1 analyzed a maximum actuation time, namely the time noted above based on SIAS and maximum delay time for SIP startup. Case 2 analyzed a minimum possible actuation time for an Appendix K evaluation model, namely the time of annulus downflow (i.e., immediately after the end-of-bypass). The results of these two cases showed that there is an insignificant difference in PCT for these two scenarios. In particular, the parametric study showed a 1°F difference in PCT between the two cases.[1]

   The difference in PCT for the two cases is small for CE PWRs because, for a given single failure, the difference in the total safety injection flow into the Reactor Coolant System (RCS) over the subject time period for the two cases is small. The difference in the total safety injection flow rate is small since the flow from the Safety Injection Tanks (SITs) is significantly greater than that from the SIPs during the subject time period. The potentially larger impact of the number of safety injection pumps and the difference between minimum and maximum SIP flow rates on the postulated LOCA are explicitly analyzed in 1999 EM analyses as part of the plant-specific worst single failure parametric study that is performed as part of every 1999 EM analysis.

[1] The parametric study also included a third case, which analyzed a SIP start time equal to the time that the SITs empty. This is the time used in 1985 EM analyses of CE PWRs. It represents an excessively long delay time since it is greater than the maximum possible delay time that was analyzed in Case 1.

The responses of all operating CE PWRs to postulated LOCAs are similar, in the context of this discussion, because of the similarity in design of pertinent features of the safety injection system. For example, all operating CE PWRs include four SITs that are designed to provide flow rates into the RCS that rapidly refill the lower plenum and downcomer (to the elevation of the reactor vessel inlet nozzle) following a postulated large break LOCA in a Reactor Coolant Pump discharge leg. In addition, the SITs are designed with sufficient inventory such that they will not empty prior to the startup of the SIPs. Thus, as demonstrated by the results of the subject parametric study, the PCT is not significantly impacted by possible variations in SIP actuation time.

Lastly, it is noted that, in regard to the specific applicability of the SIP actuation time parametric study to SONGS Units 2 and 3, the study was performed for a 3400 MegaWatts thermal (MWt) CE PWR. SONGS Units 2 and 3 are two of the three PWRs that comprise this class of CE PWRs.

These reasons confirm that the parametric study used to analyze the impact of the three different SIP actuation times in CENPD-132 Supplement 4-P-A is applicable to all CE PWRs, including SONGS Units 2 and 3.

C. The analysis will include a plant-specific worst single failure of the ECCS study. The study will analyze failure of an emergency diesel generator, failure of a low pressure safety injection pump, failure of a high pressure safety injection pump, and no failure. The failure that yields the highest PCT will be used in the break spectrum analysis of the limiting fuel design.

NRC RAI Question 4:

In your original submittal dated August 26, 2004, regarding Restriction 4 in CENPD-404-P-A, you state:

"If the modified FDIm and measured oxide thickness for CENP 16x16 ZIRLO™ fuel correlate as expected or is lower than predicted, SCE would no longer restrict the FDIm except as required to meet the 100 micron oxide limit. If the measured oxide for CENP 16x16 fuel is significantly greater than predicted, SCE will provide justification to the NRC prior to an increase to the limits on FDIm. If the NRC lifts the FDIm condition based on sufficient accumulation of data from CENP designed plants, SCE would no longer restrict the FDIm except as required to meet the 100 micron oxide limit."

Provide a regulatory commitment ensuring the following:

A. The baseline FDIm will remain unchanged during the process of collecting additional data to support increasing the FDIm.

B. The restriction on the FDIm will be lifted only after consultation with the NRC regardless of whether or not FDIm and measured oxide thickness is found to be conservative or correlate as expected to the model predictions.

C. Measurements used to demonstrate that the oxide thickness is in good agreement with the predictions will be shared with the NRC.

D. If the measured oxide for CENP 16x16 is significantly greater than predicted, SCE will provide justification demonstrating that the current FDIm limit meets the 100 micron oxide limit, or lower it as necessary to meet the 100 micron oxide limit.

Response to RAI Question 4:

The baseline FDIm for SONGS will remain unchanged during the process of collecting additional data to support increasing the FDIm. The restriction on the FDIm for SONGS will be lifted only after consultation with the NRC. CE 16x16 ZIRLO™ oxide measurement data used to compare with the expected behavior will be shared with the NRC. The 100 micron oxide limit will be met regardless of the limit imposed on FDIm.

NRC RAI Question 5:

Condition 2 in CENPD-404-P-A states:

> *"All the conditions listed in the NRC SEs for all the CENPD methodologies used for ZIRLO fuel analysis will continue to be met, except that the use of ZIRLO cladding in addition to Zircaloy-4 is now approved."*

Condition 3 in CENPD-404-P-A states:

> *"All CENP methodologies will be used only within the range for which ZIRLO data was acceptable and for which the verification discussed in CENPD-404-P-A and responses to requests for additional information (RAI) were performed."*

In addressing these two conditions, you state these will be accomplished via the SCE Reload Topical Report. Explain how the SCE Reload Topical Report will ensure that Conditions 2 and 3 will be met.

Response to RAI Question 5:

The SCE Reload Topical Report (SCE-9801-P-A) was reviewed and approved by the NRC on June 2, 1999. This topical report demonstrates SCE's ability to implement CENP analysis methodology, including compliance with all methodology and computer code limitations and constraints. Section 4 of the SCE Reload Topical Report describes how SCE's Reactor Core Design and Monitoring Program ensures the thorough engineering and safety evaluation of all potential consequences of each reactor core design. Specifically, Section 4.5.3 describes SCE's analysis methodology controls.

As part of the NRC review of SCE-9801-P-A, a second topical report, CEN-635(S)-P, was reviewed that delineates all limitations on the CENP analysis methodology and computer codes. Both the SCE Reload Topical Report and CEN-635(S)-P are identified in Technical Specification 5.7.1.5 as one of the approved methods for determining values for the Core Operating Limits Report (COLR). This requires that SCE comply with these topical reports as part of its Operating License.

With the approval of this license amendment, CENPD-404-P-A and CENPD-132, Supplement 4-P-A will be added to TS 5.7.1.5. Therefore, compliance with the SCE Reload Topical Report, CEN-635(S)-P, CENPD-404-P-A, and CENPD-132 Supplement 4-P-A will be required by the SONGS Technical Specifications and Operating Licenses. The processes outlined in Section 4 of the SCE Reload Topical Report (SCE-9801-P-A) will continued to be used to implement all Nuclear Regulatory Commission (NRC) Safety Evaluation Report (SER) limitations in all topical reports listed in Technical Specification 5.7.1.5.

In addition to the methodology controls described in the SCE Topical Report, SCE must control methodology per 10CFR50.59. SCE follows the 10CFR50.59 guidance contained in NEI 96-07 (which was endorsed by the NRC in Regulatory Guide 1.187). Per NEI 96-07, licensees may change from one NRC approved methodology to another per 10CFR50.59, provided the new methodology is approved by the NRC for the intended application and all applicable terms, conditions, and limitations for its use are satisfied.

As shown above, both of these methodology change processes (SCE-9801-P-A and 10CFR50.59) require compliance with any restrictions imposed by the NRC on the use of the methodology.

ENCLOSURE 2

LIST OF REGULATORY COMMITMENTS

(Replaces Enclosure 3 to PCN 553 dated August 26, 2004.)

1. SCE will restrict the modified Fuel Duty Index (FDIm) of each ZIRLO™ clad fuel pin to 110% of the established SONGS plant specific FDIm limit of 586 except under the following condition: the preceding 110% limit may be exceeded for a fraction of the fuel pins in up to eight (8) fuel assemblies. For these eight fuel assemblies, SCE will restrict the fuel duty of ZIRLO™ clad fuel pins to 120% of the SONGS plant specific FDIm limit. The baseline FDIm for SONGS will remain unchanged during the process of collecting additional data to support increasing the FDIm. The restriction on the FDIm for SONGS will be lifted only after consultation with the NRC. CE 16x16 ZIRLO™ oxide measurement data used to compare with the expected behavior will be shared with the NRC. The 100 micron oxide limit will be met regardless of the limit imposed on FDIm.

2. Revise the San Onofre Units 2 and 3 Updated Final Safety Analysis Report as needed to reflect the changes contained with the Technical Specification changes in PCN-553 to allow the use of ZIRLO™ fuel cladding material. The changes shall include, but are not limited to, the following:

   A. The corrosion limit as predicted by the best-estimate model is limited to below 100 microns for all locations of the fuel for ZIRLO™ clad fuel assemblies.

   B. The maximum rod average burnup is limited to 60 GWD/MTU for ZIRLO™ clad fuel assemblies.

   C. Chapter 1 and Chapter 4 will be revised as necessary to reflect the manufacturing and implementation of ZIRLO™ clad fuel rods.

   D. The applicable sections of Chapter 6 and Chapter 15 will be revised to reflect the re-analysis performed for the ZIRLO™ cladding material.