

March 23, 2006

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

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 -  
REQUEST FOR ADDITIONAL INFORMATION ON THE PROPOSED C\*  
AMENDMENT FOR STEAM GENERATOR TUBE INSPECTION AND REPAIR  
IN THE TUBESHEET (TAC NOS. MC8850 and MC8851)

Dear Mr. Rosenblum:

By letter dated November 3, 2005 (Agencywide Documents Access and Management System Accession No. ML053110284), Southern California Edison submitted an application to change the San Onofre Nuclear Generating Station, Units 2 and 3, technical specifications related to steam generator tube inspection. The changes would define the depth of the required tube inspections and plugging criteria within the tubesheet.

After reviewing your request, the Nuclear Regulatory Commission staff has determined that additional information is required to complete the review. We discussed this information with your staff by telephone and they agreed to provide the additional information requested in the enclosure by April 30, 2006.

If you have any questions, please contact me at (301) 415-1480.

Sincerely,

**/RA/**

N. Kalyanam, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosure: Request for Additional Information

cc w/encl: See next page

March 23, 2006

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

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 -  
REQUEST FOR ADDITIONAL INFORMATION ON THE PROPOSED C\*  
AMENDMENT FOR STEAM GENERATOR TUBE INSPECTION AND REPAIR  
IN THE TUBESHEET (TAC NOS. MC8850 and MC8851)

Dear Mr. Rosenblum:

By letter dated November 3, 2005 (Agencywide Documents Access and Management System Accession No. ML053110284), Southern California Edison submitted an application to change the San Onofre Nuclear Generating Station, Units 2 and 3, technical specifications related to steam generator tube inspection. The changes would define the depth of the required tube inspections and plugging criteria within the tubesheet.

After reviewing your request, the Nuclear Regulatory Commission staff has determined that additional information is required to complete the review. We discussed this information with your staff by telephone and they agreed to provide the additional information requested in the enclosure by April 30, 2006.

If you have any questions, please contact me at (301) 415-1480.

Sincerely,  
**/RA/**  
N. Kalyanam, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosure: Request for Additional Information

cc w/encl: See next page

DISTRIBUTION

PUBLIC	LPLIV r/f	RidsNrrDorl (CHaney/CHolden)
RidsNrrDorlLplg (DTerao)	RidsNrrPMNKalyanam	RidsNrrLALFeizollahi
RidsNrrDciCsgb	RidsAcrrAcnwMailCenter	RidsOgcRp
RidsRgn4MailCenter (TPruett)	RidsNrrDorlDpr	GMakar

**ACCESSION NO: ML060830024**

\* No major change from Staff provided RAI

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/DE/EEEE*	NRR/LPL4/BC
NAME	NKalyanam	LFeizollahi	AHiser	DTerao
DATE	3/22/06	3/22/06	3/26/06	3/23/06

OFFICIAL RECORD COPY

DOCUMENT NAME: E:\Filenet\ML060830024.wpd

REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST FOR PROPOSED TECHNICAL SPECIFICATION  
CHANGE REGARDING REPAIR CRITERIA AND INSPECTION DEPTH FOR STEAM  
GENERATOR TUBES WITHIN THE TUBESHEET REGION  
SOUTHERN CALIFORNIA EDISON  
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3  
DOCKET NOS. 50-361 AND 50-362

By letter dated November 3, 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML053110284), Southern California Edison submitted an application to change the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, technical specifications (TS) related to steam generator tube inspection. The changes would define the depth of the required tube inspections and plugging criteria within the tubesheet, with the depth of inspection defined as "C\*" ("C-star"). The technical basis for these changes was initially documented for the hot leg in Westinghouse topical report WCAP-16208-P, Revision 0, "NDE Inspection Length for CE Steam Generator Tubesheet Region Explosive Expansions," dated October 2004.

In a letter dated December 16, 2004 (ADAMS Accession No. ML043510406), the Nuclear Regulatory Commission (NRC) staff requested additional information from Florida Power and Light (FPL) about their C\* amendment application for St. Lucie, Unit 2. FPL's response to this request was issued March 31, 2005 (ADAMS Accession No. ML050960517), and Revision 1 of WCAP-16208-NP was subsequently issued in May 2005 (ADAMS Accession No. ML051520417). The licensee for SONGS, Units 2 and 3, referenced WCAP-16208, Revision 1, and submitted a Supplement 1, which applies the C\* methodology in the cold leg of the SONGS, Units 2 and 3, steam generators.

In order to complete its review of the license amendment for SONGS, Units 2 and 3, the NRC staff needs the additional information requested below.

1. Please confirm that your operating parameters (e.g., temperature, pressure, etc.) will always be conservatively bounded by the conditions for which the hot-leg and cold-leg C\* distances were determined in WCAP-16208-P, Revision 1 (including Supplement 1). If the conditions will not always be bounded, what controls are in place to ensure an adequate depth of inspection in the tubesheet?

For example, please confirm that the hot-leg temperature at SONGS, Unit 2 and 3, is greater than that assumed (600 degrees Fahrenheit) in the tubesheet deflection analyses and in determining the increase in contact pressure as a result of differential thermal expansion between the tube and the tubesheet. If the hot-leg temperature in either unit is lower than 600 degrees, please discuss the effect on the C\* distance.

2. The SONGS, Units 2 and 3, currently allow the installation of leak-tight sleeves according to Asea Brown Boveri/Combustion Engineering, Inc. (ABB/CE) Topical Report CEN-630-P, Revision 2. The proposed revision of TS 5.5.2.11.h excludes from inspection the portions of the tube below the C\* distance in the tubesheet. Since sleeves could extend into the tubesheet below the C\* distance, the proposed TS would no longer require the sleeve or tube to be inspected in this region. Sleeves were not addressed in the testing and analysis used to justify excluding part of the tube from inspection (WCAP-16208-P, Revision 1, including Supplement 1). What plans do you have to ensure the lower ends of sleeves (i.e., those within the tubesheet below the C\* distance) will be inspected, including the pressure-retaining portion of the parent tube in contact with the sleeve, the sleeve-to-tube weld, and the pressure retaining portion of the sleeve? Please discuss your plans to modify your TS to address this issue. Consider, for example, the following wording:

For a tube with no portion of a sleeve extending below (a) 10.4 inches from the bottom of the hot-leg expansion transition or the top of the tubesheet (whichever is lower) or (b) 10.7 inches from the bottom of the cold-leg expansion transition or the top of the tubesheet (whichever is lower), a tube inspection means an inspection of the steam generator tube from 10.4 inches below the bottom of the hot-leg expansion transition or top of the tubesheet (whichever is lower) completely around the U-bend to 10.7-inches below the bottom of the cold-leg expansion transition or top of the tubesheet (whichever is lower).

For all other tubes, a tube inspection means an inspection from the bottom of the sleeve completely around the U-bend to either (a) 10.4 inches below the bottom of the hot-leg expansion transition or top of the tubesheet (whichever is lower) or (b) 10.7 inches below the bottom of the cold-leg expansion transition or top of the tubesheet (whichever is lower), as appropriate.

3. It is the NRC staff's understanding that load at first slip, rather than maximum load, was reported and plotted in Figure 5-1 of WCAP-16208-P, Revision 1. If the load at first slip was not used in all cases, please discuss the effect on the required inspection distance if the load at first slip was used. In addition, if the load at first slip was not used in Table 6-8 of WCAP-16208-P, Revision 1 ("Burst Based Inspection Length"), please provide Table 6-8 values to confirm the 10.4 inch (hot leg) and 10.7 inch (cold leg) proposed inspection distances are bounded when the most limiting specimen is evaluated using load at first slip. In addition, please discuss the effect on the leakage-based inspection distance (Tables 6-9 and 6-15). If the leakage-based inspection length increased, discuss your plans to modify your TS accordingly.
4. Please discuss your plans to revise your TS to include the reporting requirements listed below:
- (a) Number of total indications, location of each indication, orientation of each indication, size of each indication, and whether the indications are initiated from the inside or outside surface.

- (b) The cumulative number of indications detected in the tubesheet region as a function of elevation within the tubesheet.
  - (c) Projected end-of-cycle (EOC) accident-induced leakage from tubesheet indications. This leakage shall be combined with the postulated EOC accident-induced leakage from all other sources. If the preliminary estimated total projected EOC accident-induced leakage from all sources exceeds the leakage limit, the NRC staff shall be notified prior to unit restart.
- 5. The proposed revision of TS 5.5.2.11.f.1.f provides exceptions, based on the C\* distance, to applying the tube Repair Limit within the hot-leg tubesheet for tubes that have not been repaired and tubes that have been repaired (sleeved). These exceptions are not included for the cold-leg tubesheet. It is, therefore, the NRC staff's understanding that any tube degradation detected below the bottom of the cold-leg expansion transition or cold-leg top-of-tubesheet, whichever is higher, shall be removed from service or repaired on detection. Please confirm or correct the staff's understanding. Please provide a justification for the difference in plugging/repair requirements for degradation in the hot-leg and cold-leg tubesheet in your proposed TS, or discuss your plans for modifying the proposed TS for consistency between the hot- and cold-leg tubesheet repair requirements.
- 6. According to Enclosure 3 to your November 3, 2005, submittal, the primary-to-secondary accident-induced leakage limit for SONGS, Units 2 and 3, is 0.5 gpm per steam generator (SG). For Unit 3, this limit is the same as the limiting condition for operation in your TS LCO 3.4.13.d since no sleeves are installed. For Unit 2, LCO 3.4.13.d specifies a maximum operational leakage rate of 0.1 gpm per SG since sleeves are installed. Since the operational leakage limit is equal to the accident-induced leakage limit, please address the following for Unit 3:
  - a. During a steamline break the differential pressure across the tubes is greater than the differential pressure during normal operation. As a result, the primary-to-secondary leakage may be greater during a steamline break than during normal operation. Since you could be operating with leakage as high as your normal operating leakage limit (0.5 gpm), the amount of leakage during a steamline break (or other postulated accidents) could be greater than that assumed in your accident analyses. If so, please discuss what controls are in place to ensure that you do not exceed your accident-induced leakage limit simply as a result of normal operating leakage.
  - b. As part of the C\* amendment, you will be assuming there is 0.2 gpm accident-induced primary-to-secondary leakage as a result of flaws within the tubesheet region. In addition, you may have accident-induced leakage from other sources such as sleeves or other degradation. This latter amount of leakage will need to be limited to 0.3 gpm to ensure you do not exceed your accident-induced leakage limits in your updated final safety analysis report (UFSAR). Since the source of any normal operating leakage is not known (i.e., it could be from sources other than the tubesheet or sleeves or other defects assumed to leak in

your operational assessment) and it could be as high as your TS limit of 0.5 gpm (or even higher during some postulated accidents due to the increased differential pressure), it is not clear that you will be able to stay within your accident-induced leakage limits unless you change your TS normal operating leakage or your UFSAR accident analysis leakage limit. Please discuss whether you will be able to stay within your accident-induced leakage limits and your proposed C\* inspection requirements.

7. Do all of the tubes in your SGs have adequate expansion in the tubesheet to meet the leakage and pullout criteria? That is, are all of the tubes nominally expanded for the full depth of the tubesheet? If any tubes are not nominally expanded for the full depth of the tubesheet, have you verified that the expansion length is adequate to ensure structural and leakage integrity consistent with the C\* approach? For those tubes which may not have adequate expansion lengths, discuss how you will ensure structural and leakage integrity for these tubes (e.g., inspection of the tube-to-tubesheet weld). Also, discuss whether any changes are needed to your TSs to address this issue.
8. Please describe the expected condition of the tube-to-tubesheet crevice, such as the amount of corrosion product and sludge at the top of the tubesheet. Discuss the effects of these conditions on tube-to-tubesheet contact pressure and the potential for leakage.

San Onofre Nuclear Generating Station  
Units 2 and 3

cc:

Mr. Daniel P. Breig  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P. O. Box 128  
San Clemente, CA 92674-0128

Mr. Douglas K. Porter, Esquire  
Southern California Edison Company  
2244 Walnut Grove Avenue  
Rosemead, CA 91770

Mr. David Spath, Chief  
Division of Drinking Water and  
Environmental Management  
P. O. Box 942732  
Sacramento, CA 94234-7320

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

Mark L. Parsons  
Deputy City Attorney  
City of Riverside  
3900 Main Street  
Riverside, CA 92522

Mr. Gary L. Nolff  
Assistant Director - Resources  
City of Riverside  
3900 Main Street  
Riverside, CA 92522

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011-8064

Mr. Michael Olson  
San Diego Gas & Electric Company  
P.O. Box 1831  
San Diego, CA 92112-4150

Mr. Ed Bailey, Chief  
Radiologic Health Branch  
State Department of Health Services  
Post Office Box 997414 (MS7610)  
Sacramento, CA 95899-7414

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

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

Mr. James T. Reilly  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128

Mr. James D. Boyd, Commissioner  
California Energy Commission  
1516 Ninth Street (MS 31)  
Sacramento, CA 95814

Mr. Ray Waldo, Vice President  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92764-0128

Mr. Brian Katz  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92764-0128

Mr. Steve Hsu  
Department of Health Services  
Radiologic Health Branch  
MS 7610, P.O. Box 997414  
Sacramento, CA 95899

Mr. A. Edward Scherer  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, CA 92674-0128