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Director, Nuclear Regulatory Affairs and
Emergency Planning

January 25, 2013 10 CFR 50.4

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

Subject: **Docket No. 50-361**
Response to Request for Additional Information (RAIs 5, 7, and 9)
Regarding Confirmatory Action Letter Response
(TAC No. ME 9727)
San Onofre Nuclear Generating Station, Unit 2

References:

1. Letter from Mr. Elmo E. Collins (USNRC) to Mr. Peter T. Dietrich (SCE), dated March 27, 2012, Confirmatory Action Letter 4-12-001, San Onofre Nuclear Generating Station, Units 2 and 3, Commitments to Address Steam Generator Tube Degradation
2. Letter from Mr. Peter T. Dietrich (SCE) to Mr. Elmo E. Collins (USNRC), dated October 3, 2012, Confirmatory Action Letter – Actions to Address Steam Generator Tube Degradation, San Onofre Nuclear Generating Station, Unit 2
3. Letter from Mr. James R. Hall (USNRC) to Mr. Peter T. Dietrich (SCE), dated December 26, 2012, Request for Additional Information Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2

Dear Sir or Madam,

On March 27, 2012, the Nuclear Regulatory Commission (NRC) issued a Confirmatory Action Letter (CAL) (Reference 1) to Southern California Edison (SCE) describing actions that the NRC and SCE agreed would be completed to address issues identified in the steam generator tubes of San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. In a letter to the NRC dated October 3, 2012 (Reference 2), SCE reported completion of the Unit 2 CAL actions and included a Return to Service Report (RTSR) that provided details of their completion.

By letter dated December 26, 2012 (Reference 3), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 1 of this letter provides the responses to RAIs 5, 7, and 9.

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NRR

P.O. Box 128
San Clemente, CA 92672

There are no new regulatory commitments contained in this letter. If you have any questions or require additional information, please call me at (949) 368-6240.

Sincerely,

Enclosure:

1. Response to RAIs 5, 7, and 9

cc: E. E. Collins, Regional Administrator, NRC Region IV
J. R. Hall, NRC Project Manager, SONGS Units 2 and 3
G. G. Warnick, NRC Senior Resident Inspector, SONGS Units 2 and 3
R. E. Lantz, Branch Chief, Division of Reactor Projects, NRC Region IV

ENCLOSURE 1

SOUTHERN CALIFORNIA EDISON

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

REGARDING RESPONSE TO CONFIRMATORY ACTION LETTER

DOCKET NO. 50-361

TAC NO. ME 9727

Response to RAIs 5, 7, and 9

RAI 5

Regarding Reference 4, third paragraph from the bottom of page 4-3, why is non-detected wear only assigned to no degradation detected (NDD) tubes and not to NDD tube/AVB intersections in tubes with detected wear at other intersections?

RESPONSE

Note: RAI Reference 4 is the "Operational Assessment for SONGS Unit 2 SG for Upper Bundle Tube-to-Tube Wear Degradation at End of Cycle 16," prepared by Intertek APTECH for Areva, Report No. AES 12068150-2Q-1, Revision 0, September 2012.

Both tube populations had non-detected (undetected) wear assigned but two different techniques were used in assigning undetected wear. This was done because of the distinct differences between the two groups. The tubes with no degradation detected (NDD) received 100% bobbin examination. The tubes with detected wear received a 100% bobbin examination followed by a special examination using the +Point™ probe. Also, a very conservative method for assigning undetected wear locations in the population of NDD tubes was used in order to simplify the assessment of that large group of tubes.

The population of 1350 NDD tubes was assumed to have undetected wear to account for the possibility of having active wear at some tube/support locations in these tubes at the beginning of the next operating cycle. Depths for undetected wear at these active wear locations were determined from the probability of detection (POD) performance for the bobbin probe.

Tubes with detected wear at anti-vibration bar (AVB) intersections were assigned active wear locations to account for the initiation of new wear sometime during the next operating cycle. This topic is discussed in Section 4.4.2 of RAI Reference 4. It is conservatively assumed that the new active wear locations all exist at the start of the next operating.

Further discussion of the method by which new wear locations are added is given in the response to RAIs 7 and 8.

RAI 7

Regarding Reference 4, page 4-5, what is meant by the words, "each active wear location" in the 1350 NDD tubes? How are the "active wear" locations determined?

RESPONSE

The population of 1350 NDD tubes in SG 2E-089 may have undetected wear in some tubes. As a conservative treatment of this tube population, every tube is assumed to have some amount of undetected wear. The locations of possible undetected wear, either at AVB or at TSP intersections, are referred to as "active wear locations."

Active wear locations are assigned to each tube using the data from the Unit 2 tube population with detected AVB and/or TSP wear. The locations that are assumed to have undetected active wear are randomly assigned based on the cumulative distribution function (CDF) for a number of support locations with detected wear in SG 2E-089. The CDFs for assigning active wear locations were developed from the Unit 2 histograms discussed in RAI Reference 4 as shown in

Figure 3-3 for AVB supports and Figure 3-4 for TSP supports. The model algorithm assigns five active wear locations, on average, in each NDD tube (two minimum).

RAI 9

It is stated in Reference 4, at the top of page 4-9 that the simulation results of the bench marking process are shown in Figure 4-6. Provide additional detail on what Figure 4-6 is showing and how it relates to the benchmarking process. As part of this additional detail, explain the meaning of the ordinate label "number of observations" in the figure.

RESPONSE

The initiation model for TTW for SONGS Unit 3 was developed from Unit 3 data using a Beta distribution to represent the probability of the presence of TTW at a given tube wear index value. A similar model was then developed for Unit 2 by modifying the Unit 3 model. Both of these models are shown in Figure 4-4 of RAI Reference 4. The Unit 2 model was developed by benchmarking the model predictions for Unit 3 against the two detected TTW indications for Unit 2. Another benchmark condition required that the Unit 2 initiation model approaches the Unit 3 model behavior as the input wear index distribution approaches that of Unit 3.

The benchmarking process involved a probabilistic simulation to predict the number of Unit 2 TTW indications based on Unit 2 wear index values. The simulation results were compared to what was actually observed for Unit 2 (two detected TTW indications in SG 2E-089). Final benchmarking was achieved when the model produced two detected indications at the estimated threshold detection level for the +Point™ probe.

The benchmarking was performed in a simulation process of 1000 trial calculations. Figure 4-6b of RAI Reference 4 shows the histogram for the results of the 1000 trials using the Unit 3 initiation model with the Unit 2 wear indices as model input. The "number of observations" in the ordinate label of Figure 4-6 is the number of trials out of 1000 that produces the corresponding TTW occurrences (initiations). The summation of all observations equals 1000. The average number of TTW initiations from this simulation is about 34, producing approximately 5-6 detections. This number of detections is larger than the value that would be required to conservatively benchmark Unit 2. After the Unit 2 model was benchmarked as discussed on page 4-8 of RAI Reference 4, the simulation produced the histogram shown in Figure 4-6a of RAI Reference 4.