April 21, 2004

Mr. Harold B. Ray
Executive Vice President
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SUMMARY OF CONFERENCE CALLS WITH SAN ONOFRE NUCLEAR GENERATING STATION (SONGS) UNIT 2 REGARDING 2004 STEAM GENERATOR (SG) TUBE INSPECTIONS (TAC NO. MC2302)

Dear Mr. Ray:

On February 27, March 9, and March 17, 2004, the NRC staff participated in conference calls with Southern California Edison Company (the licensee) to discuss the 2004 SG tube inspection activities for SONGS Unit 2. Enclosed is a summary of the discussions.

On March 17, 2004, the NRC staff also received the SG inspection summary report for SONGS Unit 2. The NRC staff will review the licensee's submittal in accordance with the plant's technical specification requirements and provide the NRC staff's evaluation of the report.

Please contact me at (301) 415-8450 if you have any questions on this issue.

Sincerely,

/RA/

Bo M. Pham, Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-361

Enclosure: Conference call summary

cc w/encl: See next page

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CONFERENCE CALL SUMMARY REGARDING STEAM GENERATOR (SG)

TUBE INSPECTIONS

FEBRUARY 27, MARCH 9, AND MARCH 17, 2004

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION (SONGS) UNIT 2

DOCKET NO. 50-361

SONGS Unit 2 began its refueling outage on February 9, 2004. On February 27, 2004, the NRC staff participated in a conference call with representatives from Southern California Edison Company (SCE or the licensee) to discuss inspection plans and results for the SG tube inspections at SONGS Unit 2. Subsequent calls were also held on March 9 and 17, 2004. The following is a summary of these calls.

During the February 27, 2004, conference call, SCE representatives indicated that they were performing rotating probe inspections from the top of the hot-leg tubesheet to 17-inches below. The tubesheet is 23-inches thick and contains holes to accommodate the SG tubes; each SG tube is explosively expanded into the entire length of the tubesheet. Prior to the current outage, SCE had planned to inspect the top 8-inches of the tube within the hot-leg portion of the tubesheet, using the rotating probe technique, however, preliminary leak rate test data recently acquired by a vendor had indicated that the 8-inch distance may not be conservative enough, given SCE's methodology for determining leak rate from postulated flaws that may exist in this region. The 8-inch and 17-inch inspection distance includes a 1-inch allotment to account for the distance from the top of the tubesheet to the bottom of the expansion transition and probe position uncertainty. Therefore, a small number of tubes (approximately 100) were inspected to a deeper depth of 18-inches because of their expansion transition location.

The most recent leak rate test data from simulated tube-to-tubesheet joints were obtained, using different test parameters than the previous test data. The recent tests differed from the previous as follows: (1) the joint length for the recent tests was reduced compared to previous tests (1-inch expansions rather than 3-inch expansions) and (2) the test medium for the recent tests was prototypic reactor coolant system water rather than deionized water. SCE indicated that other Combustion Engineering plants are aware of this preliminary test data.

SCE indicated that it planned to plug or sleeve any indications detected in the tubesheet region. Sleeving can be performed for indications in the uppermost 9 1/8-inches of the tubesheet (indications below this region must be plugged).

As of February 27, 2004, the licensee was approximately 75 percent complete with the rotating probe examinations within the tubesheet region. Based on these examinations, the licensee had detected 192 indications. Of these 192 indications, 78 were within the top 8 inches of the tubesheet and 114 were located from 8 to 17 inches below the top of the tubesheet. Approximately half of these indications were circumferential. SCE indicated that the number of flaws observed tended to decrease with tubesheet elevation (i.e., there was a decreasing trend in the number of flaws as the depth in the tubesheet increased). During the last Unit 2 outage, rotating probe inspections were performed in the top 5-inches of the tubesheet and 45 tubes were repaired for indications in this region. The number of indications detected at the time of the call were consistent with the licensee's expectations.

With respect to severity, none of the indications in the top 8-inches of the tubesheet region were through-wall; whereas, below 8-inches, some of the flaws were through-wall or near through-wall.

During the February 27, 2004, call, the NRC staff reiterated its position regarding inspections in the tubesheet region, which was also provided in a draft generic letter issued for public comment in the Federal Register (68 FR 25909 dated May 14, 2003). The staff had indicated that this issue would be addressed on a generic basis once the final generic letter is issued.

On March 9, 2004, another conference call was held with SCE to discuss SONGS Unit 2's SG inspection results. In support of this conference call, SCE provided written material, available in ADAMS under ML040980143. In addition, the following clarifications were provided by SCE:

- In early February, prior to the start of their Unit 2 refueling outage, SCE was notified by the original equipment manufacturer of preliminary leak rate test results which indicated that previous test results "may" be non-conservative. As a result of this information, SCE asked the original equipment manufacturer for a conservative estimate for the extent to which they should perform rotating probe examinations in the tubesheet region. Based on following discussions, SCE elected to inspect the top 17-inches of the portion of the tube in the hot-leg tubesheet region with a rotating probe. 93 tubes were inspected to 18-inches because of the location of the bottom of the expansion transition in these tubes.

- All indications will either be plugged or sleeved. As of March 9, 2004, repair work was still on-going in SG 88, but was complete in SG 89.

- The rotating probe inspections in the tubesheet region, which were complete, had resulted in the identification of 225 indications. In the top 8-inches of the tube within the hot-leg tubesheet, 86 indications were identified while 139 indications were identified from 8 to 17-inches below the top of the hot-leg tubesheet. Some tubes had multiple indications. Seventy five tubes required plugging or repair for indications in the top 8-inches of the hot-leg tubesheet while 80 tubes required plugging or repair for indications from 8 to 17-inches below the top of the hot-leg tubesheet.

- Three tubes were in-situ pressure tested for indications in the tubesheet region. The indications were at 8.6-inches, 9.8-inches, and 9.4-inches below the top of the tubesheet. These in-situ tests were full tube tests. These three tubes represented the largest voltage indication (13.5 volts as measured with a +Point^{TM} coil, 96 percent

through-wall), the largest circumferential extent (325 degrees farenheit), and the deepest flaw (100 percent) tested. No leakage was observed in any of these tubes under postulated accident condition differential pressures or at three times the normal operating differential pressure. All indications were circumferential in orientation.

- The number of indications observed decreased as the distance from the top of the tubesheet increased. From 8 to 10 inches from the top of the tubesheet, the density of indications was approximately 10 to 15 indications per inch whereas from 15 to 17 inches the density of indications was approximately 5 to 10 indications per inch.

- 118 tubes at Unit 2 had Combustion Engineering tungsten inert gas (TIG) welded sleeves installed during the prior (2002) refueling outage. All of these 118 tubes were inspected during the 2004 outage and 10 were found to have obstructions. The obstructions (which appeared to be localized areas where the sleeve bulged inward), based on video examinations, ranged from on an average obstruction of 20 to 25 percent of the sleeve diameter to a maximum of approximately 40 percent. Most of the obstructions were located in portions of the sleeve within the tubesheet.

- SONGS Unit 2's current outage is the fourth outage in which sleeves were installed in the SG tubes.

- The licensee reviewed its process for installing sleeves and indicated that there were no process changes between the first two outages with sleeve installation and the previous (i.e., 2002) sleeving campaign. Several changes were made to the sleeving process this cycle including: (1) performing rotating probe examinations of the parent tube in the area of the lower roll joint to verify that no degradation was present, (2) recording the visual inspection of the weld region (previous data was not recorded), and (3) performing a visual examination of the rolled joint area for scratches or excessive debris in the area.

- The licensee requires the vendor to perform ultrasonic examination of the welds of the first batch, usually 20 to 25 sleeves installed to verify that the welding process results in an acceptable weld before the licensee allowed the vendor to continue.

At the end of the March 9, 2004, conference call, the NRC staff inquired whether the obstructed tubes had adequate integrity (given the new configuration of the sleeve/tube assembly) and whether the inspection technique used to inspect sleeves could reliably detect degradation behind the nickel band of the sleeve. The licensee agreed to provide this information in a subsequent call.

On March 17, 2004, another conference call was held to further discuss the obstructed tubes' integrity and detection of degradation behind the sleeve's nickel band. In support of this conference call, SCE provided written material, available in ADAMS under ML040830478. In addition, SCE provided the following clarifications on the conference call:

- The leak into the annulus between the tube and the sleeve is most likely from the rolled joint, however, leakage through a flaw in the parent tube could not be ruled out.

- For sleeves installed before the 2004 outage, there may have been circumferential cracks behind the nickel and microlok band, since no rotating probe examinations were performed in this region. The nickel and microlok bands are located on the exterior surface of the sleeve and improve the sealing and structural integrity of the rolled joint. These cracks, if any, are not expected to challenge the structural integrity of the sleeve. No volumetric defects have been detected in the tubesheet region at SONGS Unit 2.

- Industry data on sleeve collapses have shown that most occurred following the first cycle after sleeve install.

- The licensee is investigating whether a technique can be qualified for detecting defects behind the nickel and microlok bands. The licensee is also investigating the need to revise the topical report to address the inspection of the region where the lower joint would be established, and to address the implications of having flaws behind the nickel and microlok bands.

The NRC staff did not identify any other issues that required immediate follow-up.

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