

July 31, 2003

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: SAN ONOFRE NUCLEAR GENERATING STATION (SONGS), UNIT 3 -
EVALUATION OF STEAM GENERATOR TUBE INSPECTION REPORT FROM
2003 OUTAGE (TAC NO. MB7751)

Dear Mr. Ray:

By letter dated February 7, 2003, as supplemented by letter dated June 27, 2003, Southern California Edison submitted to the Nuclear Regulatory Commission (NRC) its special report summarizing the steam generator (SG) tube inspections for SONGS, Unit 3, performed in January 2003.

Enclosed is the NRC staff's evaluation of the SG tube inspection report. The staff did not identify any issues warranting additional plant-specific follow-up at this time; however, several items regarding the SG inspection program are noted at the end of the evaluation.

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. 50-362

Enclosure: Inspection Report Evaluation

cc: See next page

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DOCUMENT NAME: C:\ORPCheckout\FileNET\ML032120701.wpd

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SPECIAL REPORT: INSERVICE INSPECTION OF STEAM GENERATOR TUBES, CYCLE 12
SOUTHERN CALIFORNIA EDISON COMPANY
SAN ONOFRE NUCLEAR GENERATING STATION (SONGS), UNIT 3
DOCKET NO. 50-362

By letters dated February 7, and June 27, 2003, Southern California Edison, the licensee for SONGS, Unit 3, submitted a special report summarizing the steam generator (SG) tube inspections performed in January 2003. A June 27, 2003, letter contained the licensee's response to the NRC's request for additional information during a May 12, 2003, conference call. A summary of the NRC's evaluation of the inspection results is provided below.

SONGS, Unit 3, has two Combustion Engineering Model 3410 SGs. There are 9350 mill annealed Alloy 600 tubes in each of the SGs. The tubes have an outside diameter of 3/4-inch, a wall thickness of 0.048-inch, and are supported at various locations by eggcrate tube supports, diagonal bars, and/or vertical straps.

During January 2003, the licensee performed tube inspections in both SGs at SONGS, Unit 3. The scope and results of the inspection are discussed in the material provided by the licensee. The NRC staff's review of the material provided by the licensee identified several noteworthy issues that are discussed below.

During the 2003 inspection, the licensee used a rotating probe equipped with a Plus-Point probe to inspect from 4-inches above the hot-leg tubesheet to a minimum of 7-inches below the bottom of the expansion transition. During these examinations, approximately 20 tubes were identified with indications below the bottom of the expansion transition. Some of these tubes had multiple indications below the bottom of the expansion transition and some had indications both below the expansion transition and at the expansion transition. The length of tube inspected in the tubesheet region (7-inches) is based in part on providing adequate resistance to tube pullout from the tubesheet region. To determine this inspection distance, laboratory testing was performed to determine the amount of resistance to pullout that a specific length of expanded tubing will provide. This testing is typically performed with non-degraded tubing. Given that the presence of degradation in this region of tubing can adversely affect the pullout resistance of the tube, the NRC staff asked the licensee to address how the degradation detected during the 2003 outage affected the pullout resistance of these tubes, and how degradation in this region will be accounted for in the development of the appropriate inspection distance for the next tube inspection. The licensee's response was provided in its June 27, 2003, submittal, in which the licensee provided several qualitative arguments regarding the adequacy of the inspection and approach.

The licensee inspected the U-bend region of 100 percent of the tubes in rows 1 through 4 with a Plus-Point probe during the 2003 outage. The licensee also inspected the U-bend region of a number of higher row tubes with a Plus-Point probe. Given recent industry experience with degradation found in the higher row tubes before detection in the lower row tubes, the licensee indicated that they were following this issue closely and were considering industry experience in developing future inspection plans.

The licensee detected axial crack indications in the free span portion of five tubes. Subsequently, these five tubes were plugged. The licensee is currently performing an operational assessment to address this degradation mechanism, and expects the results of this assessment will be favorable given that the cracking is minor, i.e., the cracking did not warrant in-situ pressure testing. The licensee is using data from the free span cracks detected and plugged in SONGS, Unit 2 to provide a basis for the growth rates at Unit 3.

Based on our review of the licensee's special report on the SG inspection at SONGS, Unit 3, the NRC staff concludes that the information required to be submitted per the technical specifications was adequately provided and that no additional follow-up is required at this time. However, the NRC staff notes the following:

- The NRC staff has raised a number of technical and regulatory issues associated with inspections performed in the tubesheet region, and is currently addressing these issues generically (May 14, 2003 *Federal Register*, Pages 25909 to 25912). The NRC staff considered these technical issues (e.g., effect of degradation in the determination of the inspection distance, limitations of in-situ pressure testing in this region, etc.) in the review of the 2003 SONGS, Unit 3, inspection report, and did not identify any issues that warranted additional plant-specific follow-up at this time.
- The NRC staff is currently evaluating the generic implications of results from inspections in the U-bend region, which indicate the potential for cracking to occur in higher row U-bends. Given the inspection results at SONGS, Unit 3, during the 2003 outage, the NRC staff did not identify any issues that warranted additional follow-up at this time. The staff also notes that the licensee plans to monitor this issue for future developments.
- The growth rate of flaws depends on many factors including stresses and operating environments. The use of growth rate from one unit to assess the growth rate at another unit must be performed with consideration that growth rates can vary significantly from one unit to another.

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Date: July 31, 2003