

Donald J. Broehl Assistant Vice President

March 27, 1980

Trojan Nuclear Plant
Docket 50-344
License NPF-1

Mr. R. H. Engelken, Director
U. S. Nuclear Regulatory Commission
Region V
Suite 202, Walnut Creek Plaza
1990 N. California Blvd.
Walnut Creek, CA 94596

Dear Sir:

Pursuant to Portland General Electric Company (PGE) letters dated November 4 and 16, 1979 regarding steam generator tubes at the Trojan Nuclear Plant, PGE is planning to remove representative samples of the steam generator tubes of interest during the scheduled refueling outage in April 1980. The sample tubes will be used for subsequent examination and analysis in an effort to determine the mechanism which caused the leak. This letter is to provide a program description of sample tube removal and subsequent analyses as well as background information of tube plugging.

Background

Following shutdown on October 12, 1979, steam generators A and D which had been identified as containing primary coolant activity were opened to identify leaking tubes. One tube in Row 1 of steam generator A and four tubes in Row 1 of steam generator D were visually observed to be leaking. A subsequent eddy current examination disclosed that one additional Row 1 tube in each steam generator provided an eddy current indication of the same characteristic and in the same general area (U-bend region) as found in the leaking tubes. The results of these inspections were provided to the NRC in PGE letter of November 4, 1979. Subsequently, steam generators B and C were also inspected in addition to steam generators A and D, and the nine tubes identified by either an eddy current examination or a visual inspection of leakage were plugged prior to resumption of power operation in December 1979.

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Sample Tube Removal

To obtain a representative sample, a total of 29 tubes will be removed through a 6-in. access hole to be provided in steam generator D. This will provide a sample of both Row 1 and Row 2 tubes. The tubes to be removed in steam generator D are Row 1 - Columns 1 through 26 and Row 2 - Columns 1 through 3. These samples will provide one high leak rate tube, one nonleaking tube with an eddy current indication and 24 normal tubes from Row 1. In addition, 3 tubes from Row 2 are being removed to inspect the bend region as a precautionary measure even though we have no reason to suspect distress.

To perform tube removal, a 6-in. handhole will be cut in the steam generator D vessel just above the seventh tube support plate. Through this hand hole, a hole will be cut in the wrapper through which the tube samples will be cut and extracted. Prior to cutting the handholes in the steam generator shell, a weld-deposited metal buildup will be applied and machined to accommodate a flanged cover for the hand holes. The buildup will be post-weld heat treated to satisfy applicable pressure vessel code requirements. After the tube removal operation, a cover plate will be provided for covering the hole in the wrapper plate prior to closing up the steam generator for power operation. This cover plate will be a bolted design so that the plate can be removed for future tube (Row 1 and Row 2) top support inspections, if required.

The tube U-bend to be removed would be cut just above the seventh support plate. The entire U-bend section of the tubes in Row 1 can be removed through the 6-in. handhole in one piece. The tube U-bends from Row 2 will also be removed in one piece but must be brought through the secondary manway. Each tube U-bend which is removed will require tube plugging at the tube plate. Thus, the total number of plugs will be twice the number of tube U-bends removed (58 plugs). The tubes adjacent to the cut tubes will be eddy current inspected to ensure no damages were caused.

The removed tube U-bends will be visually inspected and photographed to document their condition prior to transport. All the U-bend specimens will then be packaged and shipped to the Westinghouse laboratory in Forest Hills, Pennsylvania for the nondestructive examination. After the nondestructive examination representative samples will be chosen for the destructive examination.

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Laboratory Analysis

The laboratory analysis program will tentatively consist of the following nondestructive and destructive examinations. This program is still in the planning stages and the final work scope will be determined based on nondestructive examinations of the removed samples in the laboratory.

A. Nondestructive Examination (NDE)

All the U-bend samples will be color photographed for overall appearance, with closeups of areas of interest. Eddy current examination will be performed at both 100 and 400 kHz and at other frequencies such as those used in the field evaluation. These eddy current results will be compared to those obtained in the field on the removed tubes before sample removal. The eddy current magnetic tape records and strip charts will be examined under laboratory conditions to substantiate the onsite assessment and to compare the eddy current signatures of the tubes to those obtained in prior inspections. Simulations will be made in an attempt to duplicate the eddy current signature, if necessary to further the understanding of the findings.

Outside diameter measurements will be taken along the length of each sample with emphasis at areas that have indications observed by the laboratory eddy current analysis. Finally, overall full sample radiographs will be taken, including full circumference, at any eddy current indications.

B. Destructive Examination (DE)

Metallographic samples will be prepared for the areas of interest. Metallographic examination will consist of photomicrographs of as-ground samples, photomicrographs of unetched and etched specimens at representative locations, and assessment of microstructure (i.e., grain size, carbide distribution, etc.). Microhardness traverses will also be obtained on several selected samples.

Reverse bend tests will be conducted on any relevant areas and the metallographic examination will be performed on the samples showing penetration after the bend tests. Samples

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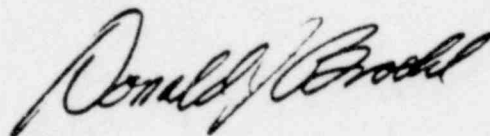
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will then be prepared and examined for pitting, local corrosion or any other form of surface attack. Surface deposits will also be analyzed chemically by Scanning Electron Microscope (SEM), energy X-ray analysis.

The results of all tests and analyses will be correlated into a final report which will document evaluation of the laboratory findings and determination of the tube degradation mechanism. The present schedule contemplates steam generator tube sample removal after the refueling operation (commencing about April 22, 1980) with completion approximately 34 days later (about May 27, 1980). The current schedule for completion of a final report is approximately 6 months after shipment of the samples to the Westinghouse laboratory (1 month for NDE, 2 months for JE and 3 months for evaluation of results and preparation of report). Due to the time required for the comprehensive laboratory analysis and reporting, we intend to issue a preliminary report containing the observations and any useful preliminary findings of the onsite visual examination of the U-bends.

In addition to the Westinghouse-performed investigation outlined above, PGE is presently evaluating the desirability of performing an independent analysis of the remaining samples which will be returned from Westinghouse after NDE. Such an analysis could be of a complete nature or could supplement the Westinghouse effort. The decision to pursue such an analysis, either complete or supplementary, will be made following discussions with EPRI and other laboratories. You will be informed as to the extent and direction of these efforts as they become more fully defined.

Sincerely,



c: Lynn Frank, Director
State of Oregon
Department of Energy

A. Schwencer, Chief
Operating Reactors Branch #1
U. S. Nuclear Regulatory Commission