Portland General Electric Company

Bart D. Withers Vice President

June 14, 1985

Trojan Nuclear Plant
Docket 50-344
License NPF-1

Mr. Hugh L. Thompson, Jr., Director
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington DC 20555

Dear Mr. Thompson:

Steam Generator Tube Integrity
Generic Letter 85-02

Generic Letter 85-02 of April 17, 1985 requested licensees to provide information which would allow the NRC to assess the licensee's overall program for assuring steam generator tube integrity and for steam generator tube rupture mitigation. A description of our overall program as compared to the NRC recommended actions is attached. We have not completed our response to Enclosure 2 of the Generic Letter. We expect this response to be complete by September 1, 1985.

Sincerely,

Bart D. Withers
Vice President
Nuclear

Attachment

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

Mr. S. J. Green
EPRI

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STEAM GENERATOR TUBE INTEGRITY PROGRAM

1. Prevention and Detection of Loose Parts.

   a. Inspections.

      NRC Recommendation

      Visual inspections should be performed on the steam generator secondary side in the vicinity of the tube sheet, both along the entire periphery of the tube bundle and along the tube lane, for purposes of identifying loose parts or foreign objects on the tube sheet, and external damage to peripheral tubes just above the tube sheet. An appropriate optical device should be used (eg, mini TV camera, fiber optics). Loose parts or foreign objects which are found should be removed from the steam generators. Tubes observed to have visual damage should be eddy current inspected and plugged if found to be defective.

      These visual inspections should be performed:

      (1) For all steam generators at each plant at the next planned outage for eddy current testing,

      (2) After any secondary side modifications, or repairs to steam generator internals, and

      (3) When eddy current indications are found in the free-span portion of peripheral tubes, unless it has been established that the indication did not result from damage by a loose part or foreign object.

      For PWR OL applicants, such inspections should be part of the preservice inspection.

      For steam generator models where certain segments of the peripheral region can be shown not to be accessible to an appropriate optical device, licensees and applicants should implement alternative actions to address these inaccessible areas, as appropriate.

      Licensees should take appropriate precautions to minimize the potential for corrosion while the tube bundle is exposed to air. The presence of chemical species, such as sulfur may aggravate this potential, and may make exposure to the atmosphere inadvisable until appropriate remedial measures are taken.

PGE Response

PGE has procedures in place which require visual inspections on the steam generator secondary side any time that the secondary side is opened for maintenance or any time foreign objects are suspected. These inspections are conducted with appropriate optical devices and include both the entire periphery of the tube bundle and along the tube lane. If the results of the visual inspections are determined to be unsatisfactory, either because loose parts or degraded tubes are found, then the appropriate supervisors are notified and they determine the corrective action.

Since 1983, peripheral inspections using a boroscope have been performed on the steam generators following opening. Loose parts were found and removed from the "A" steam generator in 1984. The inspection program has been upgraded in 1985 due to the acquisition of a new video boroscope. Video tapes of the steam generator inspections are now made in lieu of 35 mm photographs. Video cassette tapes will provide a historical reference for future use.

b. Quality Assurance.

NRC Recommendation

Quality assurance/quality control procedures for steam generators should be reviewed and revised as necessary to ensure that an effective system exists to preclude introduction of foreign objects into either the primary or secondary side of the steam generator whenever it is open (eg, for maintenance, sludge lancing, repairs, inspection, operations, modifications). As a minimum, such procedures should include:

(1) Detailed accountability procedures for all tools and equipment used during an operation,

(2) Appropriate controls on foreign objects such as eyeglasses and film badges,

(3) Cleanliness requirements, and

(4) Accountability procedures for components and parts removed from the internals of major components (eg, reassembly of cut and removed components).

PGE Response

PGE's procedures require that material control be established at all times when a manway to the primary or secondary side of the steam generator is open with the exception that it is not required for the primary side if nozzle covers or dams are installed. The material control requirements include detailed accountability for all material entering and leaving the steam generators. All personnel entering a steam generator are required to appropriately secure personal items, such as eyeglasses and anti-contamination clothing. PGE's procedures also contain specific cleanliness requirements for the steam generators.

2. Inservice Inspection Program.

a. Full-Length Tube Inspections.

NRC Recommendation

The Standard Technical Specifications (STS) and Regulatory Guide 1.83, Part C.2.f, currently define a U-tube inspection as meaning an inspection of the steam generator tube from the point of entry on the hot-leg side completely around the U-bend to the top support of the cold-leg side. The staff recommends that tube inspections should include an inspection of the entire length of the tube (tube end to tube end), including the hot-leg side, U-bend, and cold-leg side.

This recommended action does not mean that the hot-leg inspection sample and the cold-leg inspection sample should necessarily involve the same tubes. That is, it does not preclude making separate entries from the hot- and cold-leg sides and selecting different tubes on the hot- and cold-leg sides to meet the minimum sampling requirements for inspection.

Consistent with the current STS requirement, supplemental sample inspections (after the initial 3-percent sample) under this staff recommended action may be limited to a partial length inspection provided the inspection includes those portions of the tube lengths where degradation was found during initial sampling.

PGE Response

It is currently PGE's practice to inspect both the cold- and hot-leg sides of the steam generator tubes, including the U-bend portion.

b. Inspection Interval.

NRC Recommendation

The maximum allowable time between eddy current inspections of an individual steam generator should be limited in a manner consistent with Section 4.4.5.3 of the STS, and in addition, should not extend beyond 72 months.

PGE Response

PGE's current practice is to perform eddy current inspections within the 72-month recommended limit. As evidence of this, the following list indicates the steam generator eddy current inspections performed each year since Trojan received its operating license (1975). In only one case, for the "C" steam generator, was the 72-month limit exceeded.

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
S/G A			X						X	X	
S/G B				X						X	X
S/G C			X							X	X
S/G D						X				X	

3. a. Secondary Water Chemistry Program.

NRC Recommendation

Licensees and applicants should have a secondary water chemistry program (SWCP) to minimize steam generator tube degradation.

The specific plant program should incorporate the secondary water chemistry guidelines in SGOG Special Report EPRI-NP-2704, "PWR Secondary Water Chemistry Guidelines", October 1982, and should address measures taken to minimize steam generator corrosion, including materials selection, chemistry limits, and control methods. In addition, the specific plant procedures should include progressively more stringent corrective actions for out-of-specification water chemistry conditions. These corrective actions should include power reductions and shutdowns, as appropriate, when excessively corrosive conditions exist. Specific functional individuals should be identified as having the responsibility/authority to interpret plant water chemistry information and initiate appropriate plant actions to adjust chemistry, as necessary.

The referenced SGOG guidelines above were prepared by the Steam Generators Owners Group Water Chemistry Guidelines Committee and represent a consensus opinion of a significant portion of the industry for state-of-the-art secondary water chemistry control.

PGE Response

Trojan Technical Specification 6.8.4.c requires that a secondary water chemistry program be in place. Trojan's secondary water chemistry program incorporates the operating guidelines in the SGOG Special Report, EPRI-NP-2704, "PWR Secondary Water Chemistry Guidelines", October 1982. This program includes chemistry limits, control methods, measures to minimize corrosion, and progressively more stringent corrective actions for out-of-specification water chemistry conditions. The corrective actions include power reductions when excessively corrosive conditions exist. The Plant Chemistry Supervisor is identified as having the responsibility and authority for the secondary water chemistry program.

Trojan has continued to follow the SGOG guidelines, but even more so has strived to keep steam generator water chemistry at the best chemistry possible. One exception to the operating guidelines has been taken and that is for the dissolved oxygen action level. Trojan does not decrease power to 30 percent if dissolved oxygen exceeds 10 ppb for 7 days since power reductions significantly change the oxygen ingress and, therefore, do not allow for identification of leakage in the condenser. Trojan does have an aggressive program for oxygen detection and is fully committed to keeping oxygen within the guidelines of 10 ppb.

b. Condenser Inservice Inspection Program.

NRC Recommendation

Licensees should implement a condenser inservice inspection program. The program should be defined in plant-specific safety-related procedures and include:

(1) Procedures to implement a condenser inservice inspection program that will be initiated if condenser leakage is at such a magnitude that a power reduction corrective action is required more than once per 3-month period;

(2) Identification and location of leakage sources, either water or air;

(3) Methods of repair of leakage;

(4) Methodology for determining the cause(s) of leakage; and

(5) A preventive maintenance program.

PGE Response

Trojan has a program for the inspection of the condenser for both air and water in-leakage. The program is not currently defined in specific plant safety-related procedures, however. Trojan uses helium leak detection methods to detect air in-leakage. Every effort is made to repair leakage rapidly. The helium leak detection methods have also been used in the circulating water boxes to detect water leakage into the condenser. Additionally, visual inspections of the secondary side of the condenser are performed following the breaking of vacuum with full circulating water pressure in order to detect any small tube leaks or tube-to-tube sheet leaks that may be present but are not large enough to affect steam generator chemistry. This program has been very effective in identifying extremely low-level leaks before they become a problem to the overall chemistry program. Eddy current testing (ECT) has been performed as needed, however, no ECT program is presently planned since nylon inserts have been installed in the condenser tubes because of roll transition cracking. Retubing of the condensers is currently under consideration.

4. Primary to Secondary Leakage Limit.

NRC Recommendation

All PWRs that have Technical Specification limits for primary-to-secondary leakage rates which are less restrictive than the Standard Technical Specifications (STS) limits should implement the STS limits.

PGE Response

Trojan Technical Specifications are consistent with the STS.

5. Coolant Iodine Activity Limit.

NRC Recommendation

PWRs that have Technical Specification limits and surveillance for coolant iodine activity that are less restrictive than the STS should implement the STS limits. Those plants identified above that also have low-head high-pressure safety injection pumps should either:

1. Implement iodine limits which are 20 percent of the STS values, or

2. Implement reactor coolant pump trip criteria which will ensure that if offsite power is retained, no loss of forced reactor coolant system flow will occur for steam generator tube rupture events up to and including the design basis double-ended break of a single steam generator tube, and implement iodine limits consistent with the STS.

PGE Response

Trojan's Technical Specifications are consistent with the STS.

6. Safety Injection Signal Reset.

NRC Recommendation

The control logic associated with the safety injection pump suction flow path should be reviewed and modified, as necessary, by licensees to minimize the loss of safety function associated with safety injection reset during an SGTR event. Automatic switchover of safety injection pump suction from the boric acid storage tanks (BAST) to the refueling water storage tanks should be evaluated with respect to whether the switchover should be made on the basis of low BAST level alone without consideration of the condition of the SI signal.

PGE Response

This issue is not applicable to Trojan.

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Mr. H. L. Thompson
June 14, 1985
Attachment 2

REQUEST FOR INFORMATION CONCERNING CATEGORY C-2

NRC Request

The enclosed draft NUREG-0844, Section 2.2.1.2 describes certain limitations which the staff believes to be inherent in the present Technical Specification steam generator ISI requirements pertaining to Category C-2 inspection results. Licensees and applicants are requested to provide a description of their current policy and actions relative to this issue and any recommendations they have concerning how existing Technical Specification steam generator ISI requirements pertaining to Category C-2 inspection results could be improved to better ensure that adequate inspections will be performed. This description should include a response to the following questions:

1. What factors do, or would, the licensee or applicant consider in determining: (a) whether additional tubes should be inspected beyond what is required by the Technical Specifications, (b) whether all steam generators should be included in the inspection program, and (c) when the steam generator should be reinspected?

2. To what extent do these factors include consideration of the degradation mechanism itself and its potential for causing a tube to be vulnerable to rupture during severe transients or postulated accidents before rupture or leakage of the tube occurs during normal operation?

PGE Response

PGE is still in the process of completing our response to this concern. It is expected that our response will be completed by September 1, 1985.

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