

February 11, 2003

Mr. Gregg R. Overbeck  
Senior Vice President, Nuclear  
Arizona Public Service Company  
P.O. Box 52034  
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNIT 3 - SUMMARY OF  
CONFERENCE CALL ON UNIT 3 REFUELING OUTAGE STEAM GENERATOR  
TUBE INSPECTION (TAC NO. MB2986)

Dear Mr. Overbeck:

In its letter of October 2, 2001, the Nuclear Regulatory Commission (NRC) staff identified the importance of inservice inspections of steam generator (SG) tubes in assuring the integrity of the tubes, and stated that a teleconference had been set up with your staff to discuss the results of the SG tube inspections that were conducted during the October 2001 refueling outage of Palo Verde Nuclear Generating Station, Unit 3, after about 75 percent of the tubes had been inspected. A list of discussion points for the teleconference was enclosed with the letter.

The discussion with your staff on the results of the SG tube inspection was to allow the NRC staff to collect information on Unit 3 SG tube degradation earlier than would be reported within 12 months of the inspection, in accordance with Technical Specification (TS) 5.6.8, "Steam Generator Tube Inspection Report." The teleconference is not part of a Unit 3 licensing action being conducted by the NRC staff, and the subject TAC is not fee billable to the Unit 3 license.

On October 17, 2001, a teleconference on the results of the SG tube inspection being then conducted at Unit 3 was held between your staff and the NRC staff. Enclosed is a summary of the information provided by your staff. The summary was reviewed by your staff for technical accuracy, and its comments were incorporated in the enclosed summary. This closes out the staff's work for the subject TAC NO. MB2986. If you have any questions, please contact me at 301-415-1307, or through the Internet at [jnd@nrc.gov](mailto:jnd@nrc.gov).

Sincerely,

*/RA/*

Jack Donohew, Senior Project Manager, Section 2  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. STN 50-530

Enclosure: Summary of Teleconference  
Held on October 17, 2001

cc w/encl: See next page

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SUMMARY OF CONFERENCE CALL

REGARDING OCTOBER 2001 STEAM GENERATOR TUBE INSPECTION RESULTS

ARIZONA PUBLIC SERVICE COMPANY

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

DOCKET NO. STN 50-530

In its letter of October 2, 2001, the Nuclear Regulatory Commission (NRC) staff identified the importance of inservice inspections of steam generator (SG) tubes in assuring the integrity of the tubes, and stated that a teleconference had been set up with the licensee's staff to discuss the results of the SG tube inspections that were to be conducted during the October 2001 refueling outage of Palo Verde Nuclear Generating Station, Unit 3 (PVNGS-3), after about 75 percent of the tubes had been inspected. A list of discussion points for the teleconference was enclosed with the letter.

NRC staff participated in a conference call with the Arizona Public Service Company (the licensee) staff on October 17, 2001, to discuss the ongoing steam generator (SG) inspection activities in PVNGS-3 refueling outage 9 (i.e., U3R9). PVNGS-3 has two SGs designated "SG 31" and "SG 32." The issues discussed included those listed in the enclosure to the NRC staff's letter dated October 2, 2001 (ADAMS Accession No. ML012700121). The licensee provided written material, which is attached to this summary, in support of this call.

At the time of the call, data acquisition and analysis by the licensee were complete. In situ pressure testing and plugging activities were ongoing. Details of the licensee's initial inspection scope and expansion criteria are described in the licensee's written materials. Clarification of several of these topics were discussed during the conference call.

- The U-bend region of 100% of the inservice tubes in Rows 1 through 5 were inspected with a rotating probe (RPC) equipped with a Plus point (+Pt) coil
- The dents that were inspected with a RPC equipped with a +Pt coil were located in the first through third tube support plate (TSP) on the hot leg (HL) side. At PVNGS-3, the largest dents and the majority of the dents are located in the lower TSPs. Cracking has not been identified in dents at PVNGS-3 and this is not considered to be an active damage mechanism.
- The licensee is not using the X-Probe this outage.
- All geometry signals (GEO) in the low row U-bends (Rows 1 through 5) were to be preventively plugged, however, none were identified this outage.

The licensee provided a table summarizing their preliminary inspection results. This table is attached. Several of the items in the table were clarified during the conference call, as discussed below.

#### ARC Single/Multiple Axial Indications (S/MAI)

These flaws are in upper bundle region tubes exhibiting SCC, which on a tubesheet map forms an arc. ARC is the name given to the region by the licensee.

These flaws are located at TSPs and in the freespan (FS) in the upper bundle region of the steam generator. This location is somewhat unique to the System80 steam generators at PVNGS. This region has observed active degradation since 1993. Typically, the majority are located at or near the TSP, however, this outage a larger number were located in the FS. The licensee indicated that the flaws this outage have been longer than normal, which they believe may be due to tube bowing and increased tube deposits which they have seen. To further assess the extent of degradation, the licensee expanded their scope of inspections of the ARC region. Additional axial indications were identified in this region. In addition, the licensee planned to perform an in situ pressure test of three tubes with flaws in the ARC region. One was required to be tested per the Electric Power Research Institute (EPRI) Guidelines (i.e., the burst pressure was predicted to be just below the structural integrity performance criteria). The other two did not meet the in situ criteria, but were to be tested for conservatism. All three tubes passed the in situ test.

#### Batwing Stay Cylinder (BWSC) Wear

The licensee applies an administrative plugging limit of 20 percent throughwall (TW) to these wear indications, in lieu of the 40 percent TW plugging limit in the PVNGS-3 Technical Specifications, due to a potentially higher growth rate than expected at other batwing intersections. Twenty one (21) indications were to be plugged due to BWSC wear at the time of the conference call. The licensee stated that only one flaw exceeded the 40 percent TW plugging limit (i.e., it was approximately 45 percent TW).

#### Possible Loose Part Indication/Possible Loose Part (PLI/PLP)

The licensee found a loose part in SG "31" which could not be removed. Two tubes were affected and had some wear (approximately 5 percent TW). Because the part could not be removed, the licensee plugged and stabilized the two tubes.

#### Apex Anomalies (APA) in Rows 6 - 18

From the bobbin probe inspection, the licensee identified geometry signals at the apex of several tubes in Rows 6 through 18. These tubes were subsequently inspected with a RPC probe equipped with a +Pt coil to determine whether a crack was present. In addition, the licensee determined that several of the APAs were located in Column 13, and they expanded the +Pt coil inspection to include all tubes in Column 13.

The licensee concluded that two tubes contained outside diameter (OD) axial cracks within the apex anomalies, one which exceeded the EPRI in situ test criteria. This tube passed the in situ pressure test for both leakage and structural integrity concerns.

#### In Situ Testing

A total of seven (7) tubes were in situ pressure tested. As previously stated, three were tested due to axial indications in the ARC region, and one was tested due to an axial indication at an APA. The fifth was tested due to a circumferential indication at the expansion transition near the top of the tubesheet. The sixth was tested due to an axial indication in the sludge pile region, and the seventh was tested due to an axial indication at the first HL TSP. Only two of these indications exceeded the administrative structural integrity in situ screening criteria and were required to be tested in accordance with the EPRI Guidelines. The remaining five indications were tested to be conservative.

The in situ tests occurred after the conference call was completed. However, the licensee notified the NRC staff on October 22, 2002, by phone, that all seven tubes passed the in situ test with zero leakage.

The NRC staff did not have any further questions and determined a follow-up call was not required.

The following information, designated as draft or preliminary, was provided by the licensee to support the call, and is given in attachments (ADAMS Accession No. ML030360657) to this summary, as indicated below:

1. Steam Generator Tube Inspection Discussion Points - Briefing Paper
2. PVNGS Administrative Plugging Criteria
3. U3R9 Preliminary In Situ Screening
4. SGWG Recommended SG Inspection, Testing & Repair Scope
5. U3R9 Operational Assessment [of Steam Generator Tube Degradation Mechanisms]

The following acronyms are not in the above summary, but are used in one or more of the above information documents:

- TSH Tubesheet hot leg
- S/MCI Single and multiple circumferential indications
- 35% W/0% 35% throughwall without
- HIST Historical % throughwall information
- SVI Single Volumetric Indication
- SGWG Steam Generator Working Group

Attachment 1 provides the licensee's responses to the list of discussion points for the teleconference that were enclosed with the NRC staff's letter of October 2, 2001.

Attachments: as listed above

Principal Contributor: Cheryl Khan

Date: February 11, 2003