



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 4, 2011

Mr. Randall K. Edington
Executive Vice President Nuclear/
Chief Nuclear Officer
Mail Station 7602
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNIT 3 - REVIEW OF THE
2010 STEAM GENERATOR TUBE INSPECTIONS DURING REFUELING
OUTAGE 15 (TAC NO. ME6244)

Dear Mr. Edington:

By letter dated May 5, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11136A106), Arizona Public Service Company (the licensee) submitted information to the U.S. Nuclear Regulatory Commission (NRC) summarizing the results of the 2010 steam generator tube inspections at the Palo Verde Nuclear Generating Station (PVNGS), Unit 3. These inspections were performed during the fifteenth refueling outage of PVNGS, Unit 3. In addition, the licensee provided some clarifying information concerning the 2010 inspections in an e-mail dated July 1, 2011 (ADAMS Accession No. ML11186A001).

The NRC staff has completed its review of the submittal and concludes that the licensee provided the information required by the PVNGS technical specifications. No additional follow-up is required at this time. The staff's review is enclosed. If you have any questions, please contact me at (301) 415-1056 or via e-mail at Lauren.Gibson@nrc.gov.

Sincerely,

A handwritten signature in cursive script that reads "Lauren Kate Gibson".

Lauren K. Gibson, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. STN 50-530

Enclosure:
As stated

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OFFICE OF NUCLEAR REACTOR REGULATION
REVIEW OF RESULTS OF 2010 STEAM GENERATOR TUBE INSPECTIONS
PERFORMED DURING REFUELING OUTAGE 15
PALO VERDE NUCLEAR GENERATION STATION, UNIT 3
DOCKET NO. STN 50-528

By letter dated May 5, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11136A106), Arizona Public Service Company (the licensee) submitted information to the U.S. Nuclear Regulatory Commission (NRC) summarizing the results of the 2010 steam generator (SG) tube inspections at the Palo Verde Nuclear Generating Station (PVNGS), Unit 3. These inspections were performed during the fifteenth refueling outage (RFO15) of PVNGS, Unit 3. In addition, the licensee provided some clarifying information concerning the 2010 inspections in an e-mail dated July 1, 2011 (ADAMS Accession No. ML11186A001).

PVNGS, Unit 3, has two replacement SGs manufactured by Ansaldo. Each SG has 12,580 thermally treated Alloy 690 tubes with an outside diameter of 0.75 inches and a wall thickness of 0.042 inches. Ferritic stainless steel eggcrate tube supports, diagonal bars, and vertical straps support the tubes at various locations. This was the second inservice inspection for the replacement SGs since they were installed during RFO13 in fall 2007. The licensee provided the scope, extent, methods, and results of its SG tube inspections in the documents referenced above. In addition, the licensee described corrective actions (i.e., tube plugging) taken in response to the inspection findings.

The following observations are noted in regard to the licensee's 2010 inspections:

- The licensee found cracking in the blowdown patch plate welds that was similar to cracking that was found in Unit 2 during RFO15. Previously, the licensee had also found similar cracking in Unit 1 that was similar to the cracking in Unit 2, as documented in its Steam Generator Tube Inspection Report for Unit 1 for RFO15 dated November 8, 2010 (ADAMS Accession No. ML103210208). By letter dated April 22, 2011 (ADAMS Accession No. ML111250573), the licensee responded to the NRC staff's request for additional information (RAI) on the cracking. Because the complete cracking found in the blowdown patch welds was similar in all three units, the NRC staff determined that the response to the RAI provided by the licensee for Unit 1 is also applicable to Unit 3. Therefore, the NRC staff is reiterating the observation that was noted in its Review of Results of 2010 Steam Generator Tube Inspections Performed during Refueling Outage 15 for PVNGS, Unit 1, dated June 20, 2011 (ADAMS Accession No. ML111680042):

There are two blowdown duct patch plates in each SG. These patch plates minimize the amount of feedwater flow that can

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bypass the economizer (preheater) and enter the hot leg side of the SG. These patch plates are welded to a divider plate on the secondary side of the SG. This divider plate is welded to the central stay cylinder and has a tongue-and-groove attachment to the upper and lower divider plate lugs. These divider plate lugs are welded to the SG shell. As a result of this design, the divider plate can move relative to the divider plate lugs. The design of the patch plate, however, indicated that the patch plate should be welded to both the divider plate and the lower lug.

During the fifteenth refueling outage in 2010, the four welds (two per SG) between the blowdown patch plate and the lower divider plate lug were completely cracked. The licensee indicated that the most likely cause of this cracking was the relative movement of the divider plate relative to the lower divider plate lug. Although the divider plate is intended to slide within the tongue-and-groove arrangement allowing relative motion between the lugs and the divider plate, the weld between the patch plate and both the divider plate and the lower lug would restrict such movement.

Analysis of the blowdown patch plate weld cracking, by the licensee, indicates that: (1) the plates will continue to meet their function of minimizing the amount of feedwater that can exit the preheater region of the SG, and (2) the likelihood of forming loose parts as a result of the cracking is minimal. The licensee will inspect the blowdown patch plates whenever a top of the tubesheet foreign object search and retrieval is performed to confirm these conclusions. The inspections will examine the remaining welds and verify they are intact and that the cracked welds are not disintegrating (chipping away) or forming a loose parts concern.

- Besides the patch plate weld cracking, the only degradation mechanism noted was tube wear.

Based on a review of the information provided, the NRC staff concludes that the licensee provided the information required by its technical specifications. In addition, the staff concludes that there are no technical issues that warrant follow-up action at this time since the inspections appear to be consistent with the objective of detecting potential tube degradation and that inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

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Sincerely,

/ra/

Lauren K. Gibson, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. STN 50-530

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ADAMS Accession No. ML112060490

*memo dated

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