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

April 19, 2022

Mrs. Maria L. Lacal
Executive Vice President
and Chief Nuclear Officer
Mail Station 7605
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNIT 3 – REVIEW OF THE 2021 STEAM GENERATOR TUBE INSPECTIONS DURING REFUELING OUTAGE 22 (EPID L-2021-LRO-0051)

Dear Mrs. Lacal:

By letter dated October 19, 2021, as supplemented by letter dated March 31, 2022, Arizona Public Service Company (the licensee) submitted information summarizing the results of the spring 2021 steam generator tube inspections performed at Palo Verde Nuclear Generating Station (Palo Verde), Unit 3. These inspections were performed during Refueling Outage 22. The steam generator tube inspection report was submitted in accordance with Technical Specification (TS) 5.6.8, "Steam Generator Tube Inspection Report."

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the submittal and concludes that the licensee provided the information required by Palo Verde, Unit 3, TS 5.6.8. In addition, the NRC staff concludes that there are no technical issues that warrant followup actions at this time. Enclosed is the NRC staff's review of the Palo Verde, Unit 3, steam generator tube inspection report.

If you have any questions, please contact me at (301) 415-1564 or via e-mail at Siva.Lingam@nrc.gov.

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. STN 50-530

Enclosure:
Review of Steam Generator Tube
Inspection Report

cc: Listserv

REVIEW OF THE SPRING 2021 STEAM GENERATOR TUBE INSPECTIONS

PERFORMED DURING REFUELING OUTAGE 22

ARIZONA PUBLIC SERVICE COMPANY

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

DOCKET NO. STN 50-530

By letter dated October 19, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21292A184), as supplemented by letter dated March 31, 2022 (ADAMS Accession No. ML22090A080), Arizona Public Service Company (the licensee) submitted information summarizing the results of the spring 2021 steam generator (SG) tube inspections performed at Palo Verde Nuclear Generating Station (Palo Verde), Unit 3. These inspections were performed during Refueling Outage (RFO) 22.

Palo Verde, Unit 3, has two replacement SGs designed by Combustion Engineering and manufactured by Asea Brown Boveri Ltd (ABB)/Ansaldo. Each SG contains 12,580 thermally treated Alloy 690 tubes with an outside diameter of 0.750 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.

The licensee provided the scope, extent, methods, and results of the SG tube inspections in the letter dated October 19, 2021. In addition, the licensee described corrective actions (e.g., tube plugging), if any were taken in response to the inspection findings.

Based on the review of the information provided, the U.S Nuclear Regulatory Commission (NRC) staff has the following observations:

- The only degradation mechanism identified during Unit 3 RFO 22 was SG tube support wear. A total of 30 and 20 tubes were plugged due to batwing, vertical strap, and eggcrate wear in SGs 31 and 32, respectively. This included 2 tubes and 7 tubes in SGs 31 and 32, respectively, that were plugged due to “Preventative Level III Discretion Due To Array.” In the letter dated March 31, 2022, the licensee stated that the wear indications in the tubes that were preventatively plugged due to Level III discretion were close to the plugging limit with bobbin probe and over the plugging limit with array probe.

- During Unit 3 RFO 22, the SG tube in Row 42, Column 89 (R42C89) in SG 31 was reported to have a 57 percent through wall (TW) wear indication associated with batwing 1. This wear indication grew from 18 percent TW at Unit 3 RFO 20 (spring 2018, ADAMS Accession No. ML18306A999). In the letter dated March 31, 2022, the licensee stated that the wear indication on tube R42C89 in SG 31 is due to central cavity wear region (CCWR) wear. CCWR has existed since the replacement SGs were installed in 2003. A central cavity absent of tubes exists in the stay cylinder design and the velocity of the fluid flowing through the central cavity is relatively high, causing tube vibration which results in CCWR wear. CCWR wear is more pronounced in the first three “rings” of tubes adjacent to the central cavity. In Palo Verde Unit 3, all ring 1 tubes were plugged at the factory and a majority of ring 2 tubes have been plugged. Tube R42C89 was a ring 2 tube and was plugged

during Unit 3 RFO 22. The licensee further stated that the wear indication in this tube met condition monitoring and was bounded by the previous operational assessment predictions.

- The blowdown patch plate welds in SGs 31 and 32 were found to be cracked during Unit 3 RFO 15. The weld material in the vicinity of the cracked weld on all four patch plates was inspected and found to be intact and not creating a loose parts concern during Unit 3 RFO 22.

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 NRC staff concludes that there are no technical issues that warrant additional followup action at this time since the inspections appear to be consistent with the objective of detecting potential tube degradation, and the inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNIT 3 – REVIEW OF THE 2021 STEAM GENERATOR TUBE INSPECTIONS DURING REFUELING OUTAGE 22 (EPID L-2021-LRO-0051) DATED APRIL 19, 2022

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