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aps

102-06834-TNW/DHK
February 20, 2014

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS) Unit 1
Docket No. STN 50-528
License No. NPF-41
Response to NRC Request for Additional Information 2013
Steam Generator Tube Inspections

By letter number 102-06781, dated October 16, 2013 (Agencywide Documents Access and Management Systems (ADAMS) Accession No. ML13294A021), Arizona Public Service Company (APS) submitted information summarizing the results of the 2013 steam generator (SG) tube inspections at Palo Verde Nuclear Generating Plant (PVNGS) Unit 1.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the information provided by APS and determined that additional information was needed to complete its review of the SG tube inspections. On January 24, 2014, the NRC staff provided a Request for Additional Information (RAI) to APS and requested that a response be submitted within 30 days. The APS response to the NRC RAI is provided in the Enclosure to this letter.

No commitments are being made to the NRC by this letter. Should you need further information regarding this submittal, please contact David H. Kelsey, Licensing Section Leader, at (623) 393-5730.

Sincerely,

Mark C. McGhee
FOR T. N. WEBER

Thomas N. Weber
Department Leader, Regulatory Affairs

A001
NRR

TNW/DHK/CJS/hsc

Enclosure: Response to Request for Additional Information
Unit 1 2013 Steam Generator Tube Inspections

cc:	M. L. Dapas	NRC Region IV Regional Administrator
	J. K. Rankin	NRC NRR Project Manager (electronic and hard copy)
	A. E. George	NRC NRR Project Manager (electronic and hard copy)
	M. A. Brown	NRC Senior Resident Inspector for PVNGS

Enclosure

Response to Request for Additional Information
Unit 1 2013 Steam Generator Tube Inspections

Introduction

By letter dated October 16, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13294A021), Arizona Public Service Company (APS) submitted information summarizing the results of the 2013 steam generator (SG) inspections at the Palo Verde Nuclear Generating Station (PVNGS), Unit 1. These inspections were performed during the seventeenth refueling outage (1R17) of Unit 1 which ended in April 2013.

In order to complete its review of the documents listed above, the U.S. Nuclear Regulatory Commission (NRC) staff requested additional information (RAI) in e-mail dated January 24, 2014. This enclosure provides the APS response to the NRC RAI. Each NRC request is stated, followed by the APS response.

NRC Request 1

The report indicates that half of a castle nut from a feedwater heater was found in the cold-leg annulus region of SG 12. Please discuss whether the other half of the nut was retrieved and/or assessed for possibly causing additional tube wear.

APS Response

During U1R17, extensive visual inspections were performed in the high flow areas of both SGs at the top of tubesheet level. No additional castle nut remnants were found as a result of these inspections. The other half of the castle nut was not, therefore, retrieved. It is very likely that the half of a castle nut that was discovered in the cold leg annulus region of SG12 was the only remnant that entered the SG (from the feedwater train).

PVNGS operating history indicates numerous castle nuts and remnants were found in the original Steam Generators in all 3 PVNGS units and the remnants did not result in measured tube wear. The composition of the castle nuts is aluminum-bronze.

NRC Request 2

Please provide the effective full power years of operation for the last several refueling outages/SG inspection outages.

APS Response

The steam generators have been replaced at each of the PVNGS units. The following table provides the respective refueling outages when the steam generators were replaced and the effective full power years (EFPY) of operation for cycles 12 through 17, for each unit.

	SG Replacement Outages for PVNGS Units		
	U1R12	**U2R11**	**U3R13**
Refueling Outages	**Unit 1 (EFPY)**	**Unit 2 (EFPY)**	**Unit 3 (EFPY)**
Cycle 12	1.28	1.21	1.14
Cycle 13	0.83	1.29	1.26
Cycle 14	1.14	1.31	1.18
Cycle 15	1.32	1.25	1.32
Cycle 16	1.34	1.31	1.32
Cycle 17	1.32	1.41	1.42
Replacement SG Accumulated EFPY	5.95	7.78	5.24

NRC Request 3

The SG Inspection Report indicated that no severe erosion or corrosion was found during the visual inspection of the wet layup recirculation piping. With respect to the secondary side visual inspections (including the inspections of the wet layup recirculation piping), please discuss whether any erosion or corrosion was identified. If so, please discuss the nature/severity of the degradation.

APS Response

A visual inspection was performed on the upper internals of both steam generators. The examinations provided visual documentation of the overall condition of the components in the accessible areas above the primary separator deck, below the primary separator deck (inside the shroud) and the internal feed ring piping (outside the shroud). The upper hand hole (HH#5) was opened and a camera was inserted into the no-tube lane to inspect the top of the 7th egg-crate tube support, the bottom of the 8th egg-crate tube support and the center stay opening.

Specific areas visually examined during the inspection above the primary separator deck included 194 steam separators, the dryer deck drain lines, the bottom of the dryer deck, the bottom of the dryers and accessible nozzles.

Specific areas visually examined below the primary separator deck included I-Beam attachments, recirculation piping and nozzles, recirculation pipe stanchions, U-bolt attachments and vanes underneath the primary separators. The square bend region was visually inspected including the tube bundle in this area, diagonal supports and vertical supports. The square bend region showed evidence of scale deposits, as expected, and is being monitored. No anomalies were noted.

The downcomer feedwater ring was also inspected visually. No anomalies, corrosion or erosion were noted. The PVNGS replacement steam generator downcomer feedwater ring is constructed of chrome-moly carbon steel and erosion/corrosion is not considered relevant for this component of the PVNGS replacement steam generators at the current accumulated EFPY.

No erosion or corrosion was documented in the inspection report on any of the components that were visually inspected.

NRC Request 4

Please discuss the scope and results of any primary channel head inspections, if any were performed.

APS Response

During U1R17, a Steam Generator primary channel head inspection was performed in each SG. This inspection involved a complete video scan of the SG channel head (tubesheet, walls, bottom of the channel head) in accordance with the *Steam Generator Channel Head Video Inspection* procedure (MRS-GEN-1214). The intent of this video inspection is to make a record of items such as debris or tools left in the SG, damage to the tube sheet, any tube plug discrepancies, tube locations that have water dripping from them, or any other unexplained anomalies of interest.

Furthermore, in response to Westinghouse *Engineering Nuclear Safety Advisory Letter* (NSAL) 12-1, an enhanced inspection was performed in accordance with Field Change Request 1 to the *Steam Generator Channel Head Video Inspection* procedure. The enhanced inspection was limited to the lower portion of the channel head, approximately 36 inches radially away from the lowest point of the bowl on each side of the divider plate (72 inches total), centered on the bottom of the bowl.

The inspection took video or digital photographs (i.e., stills) on a "macro" level, not a "micro" level. The inspection looked for the following conditions:

- Through-holes or breaches in either the divider plate bar-to-clad weld or in the cladding itself that would expose the carbon steel base material underneath the cladding.

- Classic "rust-colored" discoloration or stains clearly visible on the clad surface caused by contact of primary water with the carbon steel base material underneath the cladding.

No discrepancies were identified as a result of the inspections.