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SUBJECT: Forwards revised "Unit 1 SG Tube Insp Plan," reflecting rev  
to criteria for eddy current expansion (MRPC).

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102-02710-ECS/RAB/JRP  
October 27, 1993

BERT C. SIMPSON  
VICE PRESIDENT  
NUCLEAR SUPPORT

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
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Reference: Letter number 102-02647, dated September 17, 1993, from W. F. Conway,  
Executive Vice President, Nuclear, APS, to USNRC

Dear Sirs:

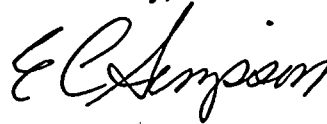
**Subject: Palo Verde Nuclear Generating Station (PVNGS)**  
**Unit 1**  
**Docket No. STN 50-528**  
**Revised Unit 1 Steam Generator Tube Inspection Plan**  
**File: 93-056-026**

The referenced letter submitted the Steam Generator Tube Inspection Plan for Unit 1 for the fourth refueling outage as required by NRC letter dated August 19, 1993.

Arizona Public Service Company (APS) has revised the criteria for eddy current expansion (MRPC) and enclosed with this letter is the revised Steam Generator Tube Inspection Plan for Unit 1. The revisions are noted by the use of revision bars in the margins.

Should you have further questions, please contact Richard A. Bernier at (602) 393-5882.

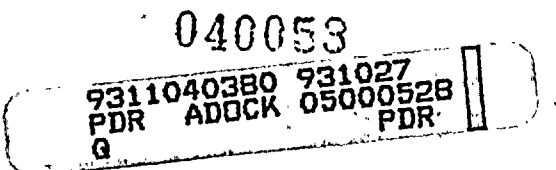
Sincerely,



ECS/RAB/JRP/rv

Enclosure

cc: W. F. Conway  
B. H. Faulkenberry  
B. E. Holian  
J. A. Sloan



Adol  
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STATE OF ARIZONA       )  
                                  )ss.  
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I, E. C. Simpson, represent that I am Vice President Nuclear Support, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true and correct.

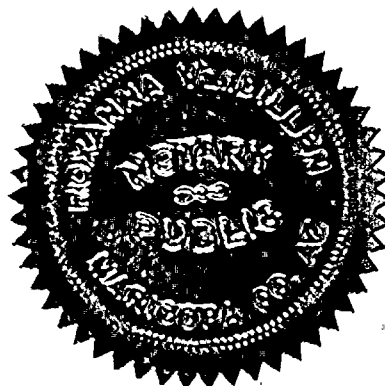
E C Simpson  
E. C. Simpson

Sworn To Before Me This 27 Day Of October, 1993.

Boanna VanDillen  
Notary Public

My Commission Expires

My Commission Expires June 12, 1997





ENCLOSURE

UNIT 1 STEAM GENERATOR TUBE INSPECTION PLAN

(REVISED)



## UNIT 1 STEAM GENERATOR TUBE INSPECTION PLAN (REVISED)

The Unit 1 steam generator will be inspected for tube defects using Eddy Current Testing (ECT) technology as opposed to ultrasonic or other NDE methods. The inspection scope and criteria for scope expansion are described below:

### INITIAL SCOPE:

- 100% Full Length Bobbin Coil Eddy Current Inspection.
- 20% hot leg tube sheet and 01H support with Motorized Rotating Pancake Coil (MRPC).
- MRPC the 08H support to the first vertical support in highest risk arc of approximately 1800 tubes (highest risk arc is based on the Unit 2 pattern of defects). See Figure 1.
- MRPC the 08H support to the first vertical support, approximately 570 tubes outside the arc of 1800 tubes.

Bases: 100% full length bobbin coil ECT provides assurance that a widespread pattern of flaws does not exist. The MRPC sample at the tubesheet and 01H support assures circumferential cracks are not forming, and the previously noted cracking at 01H is not progressing. The 1800 tube arc was empirically determined to be the highest risk area from Unit 2 eddy current test data, and if cracks are developing due to the same phenomenon seen in Unit 2 this is where they are expected to be found. The sample of 570 tubes outside the highest risk area provides confidence that cracks are not developing outside the highest risk area.

### CRITERIA FOR EDDY CURRENT EXPANSION (MRPC):

- For each tube with a hot leg "I" bobbin indication (NQI, DSI, DTI, BLI, and PLI)<sup>1</sup>, conduct MRPC of the indication area. A selected portion of these tubes (34 tubes in S/G 11 and 22 tubes in S/G 12) will be examined by MRPC from the 08H support to the first vertical support.

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<sup>1</sup> NQI - Non-Quantifiable Indication; DSI - Distorted Support Signal with Indication; DTI - Distorted Top of Tubesheet with Indication; BLI - Baseline Indication; PLI - Possible Loose Part with Indication.



Bases: MRPC is required to resolve what "I" code indications are. In the interest of increasing the data base each time an "I" code indication is examined with MRPC, the 08H support to the first vertical support will also be examined in the selected portion to increase the data base at this elevation.

- Treat the arc of 3800 tubes as the area of interest.
  - If less than 1% (1-17 tubes) of the MRPC sample has NBI axial midspan flaw(s) conduct a 6% (228 tubes) expansion with MRPC from the 08H support to the first vertical support. In all cases a five tube buffer will be maintained, from the NBI tube.
  - If 1% (18 tubes) or more of the sample has NBI axial midspan flaws MRPC the entire area of interest from the 08H support to the first vertical support.

Bases: The Unit 2 ECT data has shown the Unit 2 failure mechanism to be limited to an analytically determined arc of approximately 3800 tubes where thermal-hydraulic conditions can create an aggressive chemical environment. By treating the susceptible area separately, we can apply Technical Specification methodology to MRPC and establish expansion criteria that zeroes in on the area at risk.

- The area outside the arc of 3800 tubes is treated independently.
  - If one or more tubes are discovered to have an NBI axial indication, MRPC the 08H support to the first vertical support in a 6% sample of the area outside the arc (433 tubes) including surrounding tubes until a buffer zone of five tubes is established. Use the results from this sample to define an area of interest and determine what if any further expansions should be done.
  - Define areas of interest if a pattern of NBI flaws develops.

Bases: The selection of a 6% sample expansion is analogous to Technical Specifications Table 4.4-2. The results of the 6% sample will be used to identify if a pattern exists so that the area at risk will be examined.



- Any circumferential crack at the tubesheet triggers a 100% MRPC of the tubesheet area.

### SECONDARY SIDE INSPECTION:

A visual examination of one steam generator secondary side will be conducted by looking through the manway to determine whether resin has entered the generators, with further actions being based on the results of that inspection.

During the current outage, APS will be installing handholes in the secondary side of the Unit 1 steam generators. An inspection will be conducted of the accessible areas of the tubesheet in each steam generator, in conjunction with the handhole installation.

### STEAM GENERATOR TUBE PULLING:

Preparations will be made for tube pulling as a contingency. However, the decision to pull tubes from Unit 1 steam generator(s) will depend on the eddy current test results. The plans regarding this contingency are presented below.

- Tube pulls will only be done to determine the root cause of failure for significant failure mechanisms not consistent with known phenomenon.
- If tube pulls occur, up to two tubes will be selected that satisfy as many of the following objectives as possible:
  - o Tubes which appear to show failure to comply with Regulatory Guide 1.121
  - o Confirm burst test correlation
  - o Gather ECT detectability data
  - o Gather growth rate data
  - o Support MRPC flaw sizing effort



### ADVANCED INSPECTION TECHNOLOGY:

Conam will be the vendor used to conduct ECT in the Unit 1 outage. Various technical advances will be used to explore methods to increase the resolution and speed of ECT inspection. These include:

- Multiple MRPC probes will be used to allow simultaneous testing of up to four tubes.
- Rotating field MRPC probe may be tested, but not used for primary data collection.
- High speed MRPC probes will be tested, and may be used for primary data collection.
- Bobbin inspection from the cold leg side will be conducted simultaneously with MRPC inspection from the hot leg side.