



Palo Verde Nuclear  
Generating Station

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U.S. Nuclear Regulatory Commission  
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Washington, DC 20555-0001

References: NEI Letter, "Steam Generator Tubesheet Inspection Information,"  
dated February 4, 2003, Alex Marion (NEI) to Richard Barrett  
(USNRC)

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2 and 3  
Docket Nos. STN 50-528/529/530  
Comments on Proposed NRC Generic Letter 2003-XX:  
Requirements for Steam Generator Tube Inspections**

On May 14, 2003, NRC made available for public comment in the Federal Register (Vol. 68, No. 93), "NRC Generic Letter 2003-XX: Requirements for Steam Generator Tube Inspections." The Enclosure to this submittal provides Arizona Public Service Company's (APS) comments concerning this proposed NRC Generic Letter. APS also endorses both the Nuclear Energy Institute (NEI) and Strategic Teaming and Resource Sharing (STARS) Alliance comments.

No commitments are being made to the NRC by this letter.

Should you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

CDM/TNW/JAP/kg

Enclosure

cc: Regional Administrator, NRC Region IV  
J. N. Donohew  
N. L. Salgado

A member of the **STARS** (Strategic Teaming and Resource Sharing) Alliance

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A047

**ENCLOSURE**

**APS - Palo Verde Nuclear Generating Station**

**Comments on NRC Proposed Generic Letter 2003-XX:  
Requirements for Steam Generator Tubesheet Inspections**

The stated purpose of the proposed Generic Letter (GL) is to promulgate the NRC Staff's position with respect to licensee compliance with plant Technical Specifications (TS) requirements in conjunction with 10CFR Part 50 Appendix B regarding steam generator (SG) tube inspection practices. Arizona Public Service (APS) appreciates the opportunity to comment on the proposed GL. APS has reviewed the contents of the draft GL and has identified a number of areas that are ambiguous or require further clarification in order to ensure proper response when the GL is issued. The ambiguity likely results from interpreting existing TS requirements that the NRC Staff has indicated on numerous occasions are outdated and by themselves do not explicitly ensure that SG tube integrity is maintained (e.g., References 1-3). Instead, the TS rely on prescriptive sampling requirements, inspection extents, and repair criteria to ensure that the widespread critical parameters of flaw detection, growth rate, and non-destructive examination (NDE) uncertainties are bounded and that tube integrity is maintained.

The NRC Staff and licensees have recognized these shortcomings with the Technical Specifications, and have accordingly developed technology and guidance to address emerging steam generator issues. This effort has led to an industry initiative (NEI 97-06) and a proposed TS that emphasizes steam generator tube integrity. Although APS is providing specific comments to the proposed GL, it is strongly recommended that in lieu of the GL, that the NRC Staff expend resources to resolve any remaining issues with the industry proposed TS. This effort, rather than reconciliation of industry comments and GL issuance, and evaluation/disposition of licensee responses, would lessen TS ambiguity by approving enhanced license requirements to ensure steam generator tube integrity within existing industry guidelines.

### Comments

1. The proposed GL emphasizes that existing TS, in conjunction with 10CFR 50 Appendix B, require that SG tube inspections must be performed using qualified techniques. Specifically, the NRC cites Criterion IX of 10CFR 50 Appendix B which requires that, "measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria and other special requirements."

In this regard, the NRC Staff, in a number of places within the proposed GL, refers to eddy current probe qualification, yet provides no frame of reference for the statements. For example, the GL states: "The bobbin probe is a high-speed probe which the industry has demonstrated to be qualified for and capable of detecting volumetric flaws..." Elsewhere, the Staff has indicated that, "the bobbin probe has not been qualified for and is not capable of reliably detecting axial or circumferential cracks in the expanded region of tubing...however specialized probes are available which have been qualified for this application."

Furthermore, the Staff has implied in the GL that qualified NDE techniques should reliably detect flaws at the 40% plugging or repair criteria via statements regarding licensee assurance that, "flaws...be detected such that the plugging or repair limits could be implemented." and that "only tubes with imperfections less than 40 percent of nominal tube wall thickness are acceptable for continued service..."

These statements imply that the NRC has a standard with respect to NDE inspection qualification and that the threshold for qualification with respect to the TS in conjunction with 10CFR 50 Appendix B is reliable detection of potential flaws at the repair limit. Further clarification with respect to this position is required to assure TS compliance, as defined in the proposed GL, is addressed in the licensee response. That is;

- A) **What are the code(s), standard(s), specification(s), criteria, and other special requirements endorsed by the NRC for steam generator tube inspections?** Typically, for inspection of Class 1, 2 and 3 equipment and components, ASME Section XI is endorsed by the NRC via the provisions of 10CFR 50.55a. However, ASME Section XI does not address detection capability for bobbin coil, nor does the ASME code provide standards for rotating coil techniques. Alternatively, the proposed GL does refer to industry NDE qualification programs. Currently, the industry is committed to NEI 97-06 and the qualification standards in the EPRI *PWR Steam Generator Examination Guidelines*. However, those standards have not been endorsed by the NRC, and the acceptance standard within the EPRI Guideline is not tied to the repair limit. However, the EPRI guidelines do satisfy Criterion IX of Appendix B with respect to control of the processes, and Criterion XVI with respect to the capability of identifying conditions adverse to quality.
- B) **What is an acceptable detection capability?** The proposed GL discusses forms of degradation, orientation of degradation and masking signals as problematic for the bobbin coil without discussion regarding the conditions that would invalidate a bobbin coil inspection for TS compliance. As indicated previously, the proposed GL appears to imply that reliable detection at the repair limit is a condition of acceptance, without defining a measure for reliability (i.e., probability of detection). Additionally, the GL does not address the inspection sample expansion criteria within the TS that specify sample classifications based on detection of flaws less than the repair limit. The rationale for this requirement is to call to attention the potential presence of an emerging problem in the steam generator. This would appear to indicate that reliable detection capability below the repair limit is also a TS requirement.

Without an acceptance standard, the GL wording can create TS compliance ambiguity with respect to the selection of NDE techniques, and potentially has the unintended consequence of inhibiting the use of improved technology. The industry has endeavored to address this TS shortcoming by endorsing a steam generator program (i.e., condition monitoring and operational assessment) that dictates tube integrity

requirements and margins, and quantifies critical parameters such as probability of detection (POD), NDE sizing uncertainty and flaw initiation and growth characteristics.

2. The proposed GL promulgates conflicting positions with respect to the type of engineering assessment permitted by the licensee. In one respect, the licensee is encouraged to determine, through degradation assessment, the locations of potential damage mechanisms and determine the scope and appropriate inspection technique to facilitate the inspection. The EPRI *PWR Steam Generator Examination Guidelines* are referred to in the proposed GL as providing guidance for this engineering assessment (although it is unclear as to whether the Staff approves of the guidance provided in the EPRI document).

Conversely, elsewhere in the GL the Staff identifies concerns with respect to "licensee controlled analyses to limit the scope..." Notwithstanding the recent specific events described in the GL, the Staff's position is inconsistent. Per 10CFR50 Appendix B, the licensee is obligated to perform an analysis and consequential inspection to determine the integrity condition of the steam generator and determine what information is required to assure integrity for the subsequent operating cycle. A similar position is promulgated in NUREG 1604, *Circumferential Cracking of Steam Generator Tubes*.

It is that assessment that determines the attributes of the inspection and NDE techniques not specifically delineated in the TS. As the Staff indicates, the rotating coil techniques do in many cases provide improved detection capability. Therefore, a 100% full tube length inspection with a plus point probe is likely to find a larger number of flaws (over the entire flaw size range) than a 100% bobbin coil exam. Does this mean that the plus point exam was required or is currently required to comply with TS despite analysis that would indicate that such detection capability is not necessary to ensure tube integrity? **The NRC should provide additional information with respect to this item in order to support licensee response to requested items 2 and 3 of the proposed GL.**

3. The proposed GL provides a Staff question as to whether an analysis of SG tube integrity within the tubesheet constitutes a change in the "method of evaluation" in accordance with the evaluation requirements of 10CFR50.59. Per the regulation, if the activity represents a change/departure from the method of evaluation described in the UFSAR, then NRC approval is required. The GL discusses the original design basis of the tube-to-tubesheet joint and the tube-to-tubesheet weld as meeting ASME Section III and, as such, the original ASME Design Report constituting a "method of evaluation" for the design basis. APS concurs with this statement. However, the analysis of tube integrity for inservice, degraded steam generator tubing is not covered under ASME Section III. Furthermore, ASME Section III does not address, or have requirements for mechanical joints such as the tube-to-tubesheet joint. As an appurtenance, only the tube-to-tubesheet weld is addressed in the ASME Section III Code Report. The tubing within the tubesheet is treated the same as the remainder of the entire tube length. Additionally, the TS definition of

the tube inspection does not mention the tube-to-tubesheet weld and inservice inspection of the weld is excluded per ASME Section XI.

As such, the analyses performed with respect to determining the inspection extent limits for supplementary exams are based on tube integrity requirements that confirm that structural and leakage integrity is assured per 10CFR50 Appendix A, General Design Criteria (GDCs) 14 and 32. For these analyses, the guidance with respect to safety margins is derived from Draft Regulatory Guide 1.121, Draft Regulatory Guide DG-1074 and NEI 97-06. Consideration is given to probability of detection (POD), NDE sizing capability and error, flaw growth rate, burst and leakage resistance. These analyses and the associated analysis parameters are not identified in ASME Section III, ASME Section XI or in the UFSAR, and therefore would not constitute a change/departure in the method of evaluation. These assessments and consequential NDE inspection plans are performed for multiple areas of the steam generator (e.g., U-bends, sludge pile, dents/dings etc.) and are performed in accordance with 10CFR50 Appendix B. For these type of assessments a license amendment pursuant to 10CFR 50.59 is not needed, nor is it applicable.

**It is therefore recommended that the proposed GL be revised to reflect that such assessments are not covered by the "method of evaluation" requirements of 10CFR50.59 and that the requested information of Item 3 be revised accordingly.**

4. The proposed GL is ambiguous regarding the implementation of the Staff's position for new generation steam generators (e.g., Alloy 600TT, Alloy 690TT) or for locations other than described in the background section of the GL. The Staff's position is that, pending a license amendment clarifying the inspection approach to be followed, licensees are required to employ inspection methods capable of detecting all flaw types which may potentially be present at locations which are required to be inspected pursuant to the Technical Specifications. The proposed Generic Letter should provide clarification on the meaning of "may potentially be present" with regard to TS and 10CFR50 Appendix B compliance. For example, the GL should be clarified for newer generation steam generators where circumferential degradation has not been identified, and guidance defined for all steam generators upon the industry discovery of a form of degradation that may or may not be plant or SG design specific. While circumferential cracking within the tubesheet is considered a potential degradation mechanism for the plants referred to in the GL, the likelihood of such degradation is significantly lower in newer SGs due to tubing material differences and fabrication improvements leading to lower residual stress conditions. Similarly, the presence of u-bend cracking in one design does not necessarily indicate a problem in all bend regions. The GL, as written, implies that only 100% inspection with a qualified technique is adequate to ensure 10CFR 50 Appendix B is satisfied and that the requirements of the TS with respect to repair limits are met.

**It is recommended that clarification of Staff position be provided in regards to new generation of steam generators, where specific degradation or flaw types have yet to be identified.**

- 5. APS regards that reporting time frame proposed in the GL as too short and not commensurate with the implications of the described condition. In previous generic communications of similar steam generator issues (GLs 95-03 and 97-05), response times of 60 and 90 days respectively were provided. A more appropriate response time of 60-90 days for this GL would avoid the need for evaluating and processing multiple extension requests, and still meets the Staff's objective of determining the adequacy of licensee inspection programs.**

**References:**

- 1. Steam Generator Tube Integrity (SGTI) – Plans for Revising the Associated Regulatory Framework, SECY-03-0080, May 16, 2003.**
- 2. Regulatory Analysis, Regulatory Approach for Steam Generator Tube Integrity, May 1997.**
- 3. Presentation “Steam Generator Generic Letter, SG Tube Integrity, Backfit Justification”, ACRS Materials and Metallurgy Subcommittee and Severe Accidents Subcommittee, August 26, 1997.**
- 4. NUREG 1604, Circumferential Cracking of Steam Generator Tubes, USNRC, April 1997.**