

CONSUMERS POWER COMPANY
Docket 50-255
Request for Change to the Technical Specifications
License DPR-20

For the reasons hereinafter set forth, it is requested that the Technical Specifications contained in the Provisional Operating License DPR-20, Docket 50-255, issued to Consumers Power Company on October 16, 1972, for the Palisades Plant be changed as described in Section I below:

I. Changes

Change Section 4.14 in its entirety to read as follows:

"4.14 AUGMENTED INSERVICE INSPECTION PROGRAM FOR STEAM GENERATORS

Applicability

Applies to the tubes within both steam generators.

Objective

To provide assurance of continued integrity of the steam generator tubes over their service lifetime.

Specification

4.14.1 General

Inspections will be made at a frequency of not less than 12 nor more than 24 calendar months after the previous inspection.

For the purpose of this Technical Specifications, "Tubes" refers to that portion of the steam generator U-tube from the point of entry on the hot leg side completely around the U-bend to the top support of the cold leg, or from the point of entry on the cold leg side to the top support of the cold leg.

If inspection of unplugged tubes with ET indications of greater than or equal to 30% (which are obstructed by ET and repair equipment) leads to significant added personnel radiation exposure, alternate tubes may be selected for examination. In any event, unplugged tubes with ET indications greater than or equal to 30% will be inspected at a frequency not to exceed three intervals specified above.

4.14.2 Inspection

Tubes requiring ET inspection for flaw surveillance are divided into three categories as follows:

Category A - This inspection sample consists of all tubes which contain ET indications greater than or equal to 45% in either of the previous two inspections.

Category B - This inspection sample consists of a percentage of tubes containing ET indications greater than or equal to 30% and less than 45% in either of the previous two inspections and do not meet the requirements of Category A.

Category C - This inspection sample consists of a random sample of 2% of the unplugged tubes in the hot leg and 1% of the unplugged tubes in the cold leg in each steam generator. The tubes selected to fulfill the Category C examinations shall contain ET indications less than 30% in both the previous two inspections.

Inspection methods shall be qualified for detecting and sizing flaws in all unblocked tube lengths chosen for inspection. Table 4.14.1 summarizes the inspection populations and the applicable inspection method.

TABLE 4.14.1

Inspection Plan and ET Techniques

Inspection Sample	Inspection Technique	
	Technique A	Technique B
	(Equivalent to the Standard .540" dia probe 440 KHz single frequency technique.)	Qualified for determining flaw size in the presence of denting in which Technique A's results are uninterpretable.
Category A (≥ 45%)	100% of Inspection Sample	Those tubes in this sample in which Technique A produces uninterpretable results.

Inspection Sample	Inspection Technique	
	Technique A	Technique B
"Category B ($\geq 30\%$ and $< 45\%$)	33% of inspection sample. Tubes shall be selected such that a similar percentage of tubes not previously inspected shall be required until 100% of the Category B sample has been inspected.	Those tubes in this sample in which the ET results of Technique A are uninterpretable.
Category C ($< 30\%$)	Random sample consisting of 2% of the hot leg tubes and 1% of the cold leg tubes.	

NOTE: Technique B may be used to fulfill Technique A requirements provided that all Technique A requirements are met.

4.14.3 Repair Criteria

A tube shall require repair when inspection reveals that:

- (1) Tube degradation exceeds 58% of the tube wall for indications other than multiple ET indications.
- (2) Tube degradation exceeds 35% of the tube wall for multiple ET indications.
- (3) Passage of a 0.540" ET probe is prohibited.

Acceptable repair techniques for (1) and (2) above are plugging the affected tube or sleeving the tube region containing the defect. For tubes containing sleeves, the acceptance criteria in Table 4.14.2 shall apply.

Additional Inspections

4.14.4 Sleeving

Sleeves shall be installed such that, considering the axial location tolerances, swagging does not take place in an area of known degradation. A baseline ET inspection of all newly installed sleeves shall be inspected or plugged during subsequent steam generator tube inspections.

"4.14.5 Reporting

A steam generator inspection report shall be submitted to the NRC within 90 days of completion of the inspection and any required repairs.

Basis

Consumers Power has concluded that the change from coordinated phosphate to volatile chemistry control for the secondary side of the steam generators has reduced the previous corrosion rate to essentially zero. Palisades has not observed any tube leakage since June 1974. Furthermore, mean wastage increase has been essentially zero since February 1976. The continuing inspection program provides for verifying that the corrosion has been arrested.

The inspection program is also consistent with current industry practices and includes appropriate measures to identify additional degradation of the Palisades steam generators.

Calculations have been performed to demonstrate that a tube uniformly thinned to 36% of its original nominal wall thickness (64% degradation) can withstand a differential pressure of 1380 psid. Likewise, a sleeved tube can withstand the same differential pressure when the limits in Table 4.14.2 are observed. Combustion Engineering, Inc Report #CEN-59(P) "Palisades Steam Generator Tube Repair by Sleeving," dated August 26, 1977, contains the analytical and test results of tube sleeving.

In dented regions when the presence of a tube support plate tends to cause interference in the eddy current signals, the standard ET inspection technique will not be able to detect flaws embedded in these regions. However, there are several advanced inspection probes under development which have been shown to be effective in detecting flaws by screening out the interference signals caused by the presence of the tube support plates or dents.

"TABLE 4.14.2Maximum Allowable Degradation

<u>Location</u>	<u>Maximum Allowable Degradation</u> ⁽⁵⁾
Unsleeved Sections	Degradation = 64%
Sleeved Section	
Region 1 ⁽¹⁾	Sleeve degradation = 34% <u>and</u> tube degradation exceeding the maximum allowable degradation for an unsleeved section. ⁽⁴⁾
Region 2 ⁽²⁾	Either (a) sleeve degradation = 25% when tube degradation in Region 1 exceeds the maximum allowable degradation for an unsleeved section; <u>or</u> (b) tube degradation to Region 2 equal to the maximum allowable degradation for an unsleeved tube. ⁽⁴⁾
Region 3 ⁽³⁾	Tube degradation equal to the maximum allowable degradation for an unsleeved section.

Footnotes:

- (1) The undeformed region of the tube/sleeve assembly containing the original imperfection requiring sleeving.
- (2) The region containing the expansion joint. Specifically, the region of the tube/sleeve assembly bounded by lines approximately 1/4 inch and 2 inches inboard from the sleeve ends.
- (3) The region of the tube/sleeve assembly containing approximately 1/4 inch of each end of the assembly.
- (4) Degradation occurring in the parent tube at any location in a region and degradation occurring in the sleeve at any location in the same region that exceeds the applicable maximum allowable degradation will require tube plugging.
- (5) Subtracted from these Maximum Allowable Degradation values shall be an approved operating allowance of 6%."

II. Discussion

The Technical Specifications revision is proposed to reflect the unchanging degradation status of the steam generators and improved inspection capabilities. The two major areas involved in this change request are:

- A. Modify eddy current test (ET) tube sampling requirements to reflect current steam generator conditions.
- B. Establish a standard operating allowance and repair criteria.

A summary of current and proposed Technical Specifications requirements is presented in Table 1. As shown in Table 1, the maximum period for reinspection of unplugged tubes containing ET indications greater than or equal to 30% but less than 45% tube wall degradation would be increased from one to three inspection intervals. Tube sampling would be selected so that 100% of the total sample would be examined within three inspections by a technique qualified for detecting and sizing flaws in the presence of dents. In contrast to previous inspections, valid flaw readings were frequently not obtained for indications in this category due to the presence of denting.

Inspection and sampling requirements for unplugged ET indications equal to or greater than 45% are unchanged.

The operating allowance is set at 6% by the proposed Technical Specifications, which correlates to a plugging or repair criteria of 58% tube wall degradation for ET indications as was used in previous inspections (maximum allowable tube degradation remains unchanged at 35% for multiple ET indications). No changes are proposed for sleeved tube inspection sampling or acceptance criteria as shown in Table 4.14.2.

NOTE: An editorial change has been made to Footnote 5 of Table 4.14.2.

The number of tubes (based on the latest inspection results) which require inspection by various ET techniques under current and proposed Technical Specifications requirements are shown in Table 2. As indicated, the proposed Technical Specifications should result in a significant increase in the number and percentage of valid ET readings in the greater than or equal to 30% but less than 45% category. The increase in valid ET readings would be obtained from interpretable inspections of dented intersections achieved by utilization of multifrequency ET equipment and process developments, which were not available during previous inspections.

Personnel radiation exposure and time required for ET of the Palisades steam generators is estimated to be reduced by approximately 20% by the proposed Technical Specifications and ET technique developments.

As concluded in the reports of ET inspections of the Palisades steam generators in 1978 and 1979, adherence to strict secondary water purity limits and the policy of keeping the secondary side in wet lay-up when the steam generators are not operating has essentially stopped the tube corrosion previously experienced. Therefore, we believe the requested Technical Specifications changes are in accordance with ALARA concepts and also provide the information required to assess the unchanging conditions of the Palisades steam generator tubing.

III. Conclusion

Based on the foregoing, both the Palisades Plant Review Committee and the Safety and Audit Review Board have reviewed these changes and find them acceptable.

CONSUMERS POWER COMPANY

By R B DeWitt 575
R B DeWitt, Vice President
Nuclear Operations

Sworn and subscribed to before me this 5th day of May 1981.

Helen I. Dempski
Helen I Dempski, Notary Public
Jackson County, Michigan
My commission expires December 14, 1983.