March 24, 1988

Corrected Copy
March 29, 1988

Docket No. 50-255

Mr. Kenneth W. Berry
Director, Nuclear Licensing
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

Dear Mr. Berry:

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SUBJECT: AMENDMENT NO. 112 TO PROVISIONAL OPERATING LICENSE NO. DPR-20: STEAM GENERATOR AUGMENTED INSERVICE INSPECTION PROGRAM (TAC NO. 56365)

The Commission has issued the enclosed Amendment No. 112 to Provisional Operating License No. DPR-20 for the Palisades Plant. This amendment consists of changes to the Technical Specifications in partial response to your application dated September 28, 1984, as supplemented by submittals dated June 5, September 15, and December 17, 1987.

This amendment revises the Technical Specifications to modify the inservice inspection program for the steam generators to be more consistent with the NRC Standard Technical Specifications and provide additional inspection requirements, techniques and criteria for an improved ability to identify and isolate degraded tubes.

The other changes requested in your September 28, 1984, application were granted in Amendment No. 106 dated August 26, 1987. This amendment completes our action on your September 28, 1984, application.

A copy of our related Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

original signed by/

Thomas V. Wambach, Project Manager
Project Directorate III-1
Division of Reactor Projects - III, IV, V
& Special Projects

Enclosures:
1. Amendment No. 112 to License No. DPR-20
2. Safety Evaluation

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

March 24, 1988

Docket No. 50-255

Mr. Kenneth W. Berry
Director, Nuclear Licensing
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

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Thomas V. Wambach, Project Manager
Project Directorate III-1
Division of Reactor Projects - III, IV, V
& Special Projects

Enclosures:
1. Amendment No. 112 to
License No. DPR-20
2. Safety Evaluation

cc w/enclosures:
See next page

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

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No. 112
License No. DPR-20

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Consumers Power Company (the licensee) dated September 28, 1984, as supplemented June 5, September 15, and December 17, 1987, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public; and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 3.B of Provisional Operating License No. DPR-20 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 112 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

for Thomas V. Wambach

Martin J. Virgilio, Director
Project Directorate III-1
Division of Reactor Projects - III, IV, V
& Special Projects

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 24, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 112

PROVISIONAL OPERATING LICENSE NO. DPR-20

DOCKET NO. 50-255

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
4-68	4-68
4-68a	4-68a
4-68b	4-68b
4-68c	4-68c
4-68d	4-68d
4-69	4-69

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 Inspection Interval

Inspections will be performed at an interval of up to 24 calendar months after the previous inspection.* Additional tube inspections shall be performed when primary to secondary leakage (not including leaks originating from tube to tube sheet welds) exceeds the leakage limits delineated in Specification 3.1.5d.

4.14.2 Inspection Requirements

4.14.2.1 For the purposes of this specification, "tube" refers to that portion of the steam generator tubing from the point of entry on the cold leg side to the top support of the cold leg, or from the point of entry on the hot leg side to the top support of the cold leg.

4.14.2.2 Tubes requiring inspection will include all unplugged tubes with eddy current indications of tube wall degradation greater than or equal to 30% in either of the previous two inspections. Limited access tubes subject to this requirement, which result in significant added radiation exposure to inspect, shall be inspected during an interval not to exceed two consecutive inspections.

4.14.2.3 Tubes requiring inspection will also include a random sample of 2% of the hot leg tubes and 1% of the cold leg tubes in each steam generator. Random samples shall be drawn from those unplugged tubes that do not have tube wall degradation identified as greater than or equal to 30% during the previous two inspections.

4.14.2.4 A baseline inspection of all newly installed sleeves shall be performed prior to plant operation. Inspection of each installed sleeve shall be performed once per three steam generator tube inspection intervals, with approximately one-third of the sleeves inspected during each inspection interval.** In the event of sleeve degradation the sleeve inspection interval shall be evaluated.

*The interval may be extended to 30 months if the mean degradation increase for the previous steam generator inspection interval was less than +1%.

**Inspection of the installed sleeves during the inspection beginning in December 1987 is not required.

4.14.2.5 In the case where a tube is sufficiently restricted to prevent passage of an 0.540-inch diameter probe (blocked), all unplugged tubes surrounding the blocked tube will be gauged to ensure acceptable denting levels.

4.14.2.6 In the event that tube inspections are required due to primary to secondary leakage, a 6% sample of unplugged tubes in the affected leg(s) in each steam generator with leakage in violation of the limits of Specification 3.1.5d shall be inspected.

4.14.3 Supplementary Sampling Requirements

4.14.3.1 If the inspection pursuant to 4.14.2.2 and 4.14.2.3 or 4.14.2.6 yields results that exceed one or more of the following criteria, then additional samples of unplugged tubes shall be inspected according to Figure 4.14.1.

a) More than 10% of the inspected tubes in a leg have detectable wall degradation (greater than or equal to 30% through wall) where no previous degradation was detected.

b) More than 10% of the inspected tubes in a leg exhibit further wall degradation (greater than a 10% increase in through wall degradation).

c) More than 1% of the inspected tubes in a leg have indications of tube wall degradation in excess of the repair criteria of Specification 4.14.4 where no wall degradation greater than 30% was detected in the previous two inspections.

4.14.3.2 In the event that any of the above limits are exceeded, prompt notification to the Nuclear Regulatory Commission pursuant to 10 CFR 50.72 shall occur.

4.14.3.3 When applying the criteria of Specification 4.14.3.1 to the inspection sample of Specification 4.14.2.6, the leaking tubes that initiated the inspection are not to be reflected in the sample inspection results.

4.14.3.4 When applying the criteria of Specification 4.14.3.1 to the tube sample inspection results, the samples are not to be treated cumulatively. The criteria shall be applied only to the inspection results from the immediate additional sample when deciding whether or not to inspect the next additional sample in the progression of Figure 4.14.1.

4.14.4 Repair Criteria

4.14.4.1. A tube shall be declared defective and shall be repaired using methods consistent with Specification 4.14.4.5 under the following conditions:

a) Inspection of the tube produces an eddy current indication of volumetric degradation exceeding the limits as listed in Specifications 4.14.4.2 and 4.14.4.3.

b) Inspection of the tube identifies the presence of a crack indication.

c) Inspection of the tube produces an eddy current indication of tube wall degradation that is uninterpretable and was greater than or equal to 45% during the previous inspection.

d) Tube restrictions prevent passage of an 0.540-inch diameter probe.

4.14.4.2 The following volumetric degradation limits shall be used to identify defective tubes:

a) Indications greater than 51% through wall identified by the 4C4F eddy current technique or equivalent.

b) Indications greater than 58% through wall identified by a bobbin probe eddy current technique or equivalent.

c) Multiple indications greater than 29% through wall identified by a bobbin probe eddy current technique or equivalent.

4.14.4.3 The volumetric degradation limits for regions in the tube/sleeve assemblies are as follows:

Region	Degradation Limit
1. The undeformed region of the tube/sleeve assembly containing the original imperfection requiring sleeving.	Sleeve degradation > 28% and tube degradation exceeds the degradation limit for an unsleeved tube.
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 in board from the sleeve ends.	Either sleeve degradation > 19% when tube degradation in region 1 exceeds the degradation limit for an unsleeved section; or tube degradation in region 2 is greater than the degradation limit for an unsleeved tube.
3. The region of the tube/sleeve assembly containing approximately 1/4 inch of each end of the assembly.	Tube degradation exceeds the degradation limits for an unsleeved tube.

4.14.4.4 If the mean degradation increase over the interval since the previous steam generator inspection is greater than or equal to 1%, then new degradation limits shall be submitted to the NRC for review and approval prior to plant restart.

4.14.4.5 Plugging each end of a defective tube is considered as acceptable repair for all cases in Specification 4.14.4.1. However, sleeving may be selected as an alternative repair method. NRC approval for the sleeving method is necessary prior to repairing.

4.14.5 Reporting Requirements

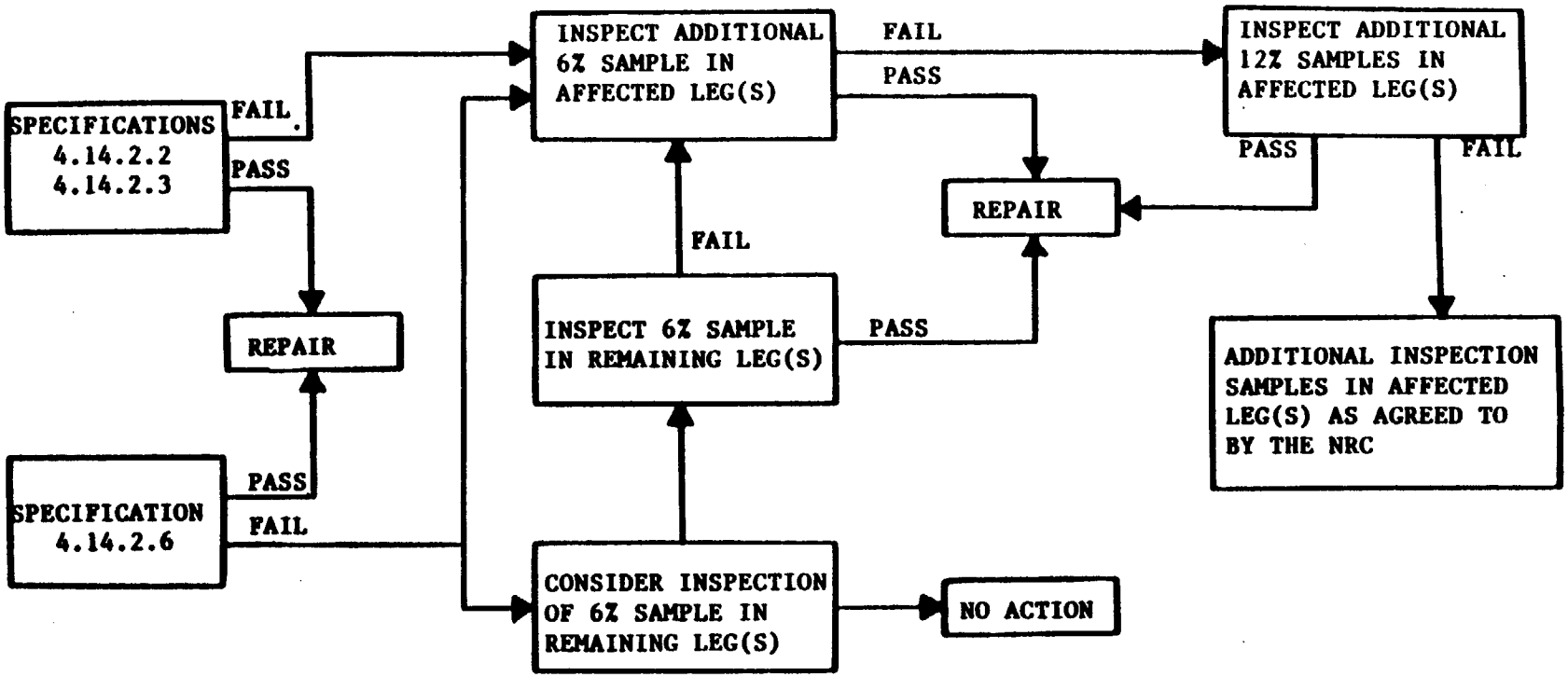
A steam generator inspection report shall be submitted to the Nuclear Regulatory Commission within 30 days of completion of the inspection and required repairs.

Basis

Guidance for establishing the requirements of this specification is taken from Regulatory Guides 1.83 and 1.121, Combustion Engineering Standard Technical Specifications, and past experience with the Palisades steam generator problems.

In October 1974, the secondary side water chemistry treatment was changed from coordinated phosphate treatment to all volatile treatment in order to arrest the degradation that had been observed in the steam generators. Both intergranular attack and wastage were present at the time and appeared to be growing. The steam generators suffered from excess leakage in January 1973, in August 1973, and in May 1974.

FIGURE 4.14.1 - SUPPLEMENTARY SAMPLING FLOW CHART



PASS - STEAM GENERATOR LEG(S) PASSING THE CRITERIA OF SPECIFICATION 4.14.3.1
FAIL - STEAM GENERATOR LEG(S) FAILING THE CRITERIA OF SPECIFICATION 4.14.3.1

4.14 Basis (Continued)

In March 1982, a primary to secondary leak in excess of the technical specification limit of 0.3 gallons per minute occurred in steam generator 'A'. Initial eddy current examination of possible leakers with the bobbin probe showed no new tube defects.

Subsequent examinations with a pancake type eddy current probe and additional bobbin probe examinations showed the leaking defects to be through wall with a circumferential orientation. At this point, Consumers Power Company committed to develop a pancake probe (4C4F) for use in the 1983 refueling outage.

The 1983 bobbin coil inspection confirmed that there was no degradation increase in the steam generators. However, a 100% inspection of the steam generators with the 4C4F probe revealed a number of circumferential crack indications that had apparently been in existence for some time but had gone undetected during previous bobbin probe examinations. In addition, a number of intergranular attack indications that were not previously recognized were also characterized throughout both generators using the 4C4F probe.

Inspection techniques are used which separately or in combination are capable of measuring wastage and intergranular attack within the presence of dents.

In Specification 4.14.1, the inspection interval requirement has been established at a maximum of up to 30 months. While the intent is to conduct an inspection during each scheduled refueling outage, the long outage durations experienced at the Palisades Plant indicate a 30 month rather than a 24 month interval limit is appropriate to prevent unscheduled shutdowns for inspection.

The inspection of a 6% sample of tubes in steam generator legs exhibiting leakage is intended to provide information as to whether or not degradation is increasing. The leaking tube(s) will not be included in the initial inspection sample results. Inclusion of the leaking tubes could distort the inspection results and lead to unnecessary inspections and personnel radiation exposure. Such tube leakage could be due to isolated effects rather than general degradation increases.

The supplementary sampling requirements in Specification 4.14.3 are intended to provide guidance in determining the appropriate action in the event that any of the criteria of Specification 4.14.3.1 are exceeded. These requirements will serve to help clarify the nature and extent of additional or new degradation in the steam generators. The results of inspection samples are not treated cumulatively because as the nature and extent of the additional or new degradation becomes clearer with the inspection of more tubes, the criteria for selecting tubes for additional samples may change. Therefore, it is not appropriate to combine the results of two separate inspection samples when the tube selection criteria differ between them.

The volumetric degradation limit for the 4C4F eddy current technique is based upon the findings of the qualification program. Details of the 4C4F technique qualification program are in the 1983/1984 Steam Generator Evaluation and Repair Report, Docket 50-255, License DPR-20.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 112 TO PROVISIONAL OPERATING LICENSE NO. DPR-20

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

INTRODUCTION

Consumers Power Company (the licensee) submitted proposed changes to Section 4.14 of the Palisades Technical Specifications concerning inservice inspection requirements for steam generators by letter dated September 24, 1984. The licensee modified its proposed changes by letters dated June 5, September 15, and December 17, 1987, based on comments received from the NRC staff during phone conversations. Amendment 106 granted approval for a portion of the proposed changes permitting the steam generator inspection interval to be extended to 30 months if certain conditions during the previous inspection are met. This Safety Evaluation addresses the balance of the requested changes.

EVALUATION

Except where otherwise stated, the discussion herein refers to the proposed Technical Specification changes in the licensee's September 15, 1987 letter. The proposed changes include a major reorganization of Section 4.14 of the Technical Specifications. This discussion is limited to substantive technical changes as opposed to editorial changes.

Proposed Technical Specification Section 4.14.1

This section adds a new requirement that a tube inspection be performed when primary to secondary leakage exceeds the Technical Specification leak rate limits as specified in Section 3.1.5d. This change is consistent with what is already in place at the vast majority of plants and in the Standard Technical Specifications. This change is therefore acceptable to the NRC staff.

Proposed Technical Specification Sections 4.14.2.1, 4.14.2.2, and 4.14.2.3

Requirements in these sections are unchanged from current Technical Specification requirements.

Proposed Technical Specification Section 4.14.2.4

Specification 4.14.2.4 addresses inspection requirements for sleeves. The Palisades steam generators have a total of 33 sleeves in 26 different tubes.. The current Technical Specifications require that all sleeves be eddy current inspected at each steam generator inspection. In its September 15, 1987 letter, the licensee proposed that each sleeve should be inspected at a minimum frequency of once every third steam generator inspection. The licensee stated

that past inspection of the sleeves took about three days and involved approximately 12 man-rems exposure. Assuming that all the sleeves would be inspected simultaneously at every third inspection, the proposed change would eliminate these time and exposure impacts for two out of three inspections. The licensee further stated that the proposed change was justified in view of the fact that there has been no significant degradation of the sleeves to date.

During phone conversations, the NRC staff commented that each inservice inspection should include a sample of sleeves consistent with the approach that has been applied to non-sleeved tubes at this and other plants. The staff noted that the above-mentioned time and exposure impacts associated with past sleeve inspections are attributable to limitations in the equipment used at Palisades to perform these inspections. The staff further noted that eddy current test technology has progressed to the point that the above-mentioned time and exposure impacts associated with sleeve inspections can be largely avoided.

In response to the staff comments, the licensee submitted a revised proposal for Specification 4.14.2.4 by letter dated December 17, 1987. The revised proposal would require that approximately one-third of the sleeves be inspected during each inspection, with all sleeves being inspected at least once during any three inspections. The proposed Technical Specifications would require the licensee to reevaluate the inspection interval for sleeves in the event that sleeve degradation is observed in the future. The staff finds this revised proposal (as identified in the licensee's December 17, 1987 submittal) to be acceptable.

The licensee is presently procuring new eddy current probe assemblies for inspecting the sleeves which are adaptable to the hardware used for normal tube (i.e., unsleeved tube) inspections. The new probe assembly is expected to considerably reduce the time and occupational exposure associated with sleeve inspections. However, the new probe assembly was not yet available during steam generator inspections performed during an unscheduled outage in December 1987. The licensee stated in its December 17, 1987 letter that the manufacture of the new probe assemblies could be expedited, but due to the unknown risks associated with qualification testing and initial use, did not believe that the probe development program warranted the additional resources needed to make these probes available for the December 1987 inspection. Further, the licensee concluded that the inspection of the sleeves during the December 1987 outage did not warrant the additional 12 man-rems exposure that would result if present equipment were employed. Thus, the licensee has proposed a one time exemption from the present (and proposed) sleeve inspection requirements which would be applicable to the December 1987 inspection only. The staff concludes that this one time exemption is acceptable based on the fact that 100% inspection of all the sleeves during each inspection dating back to their initial installation in the 1970s has indicated no evidence of significant degradation.

Proposed Technical Specification Section 4.14.2.5

This section adds a proposed new requirement; namely that when a tube is found to restrict passage of a .540-inch diameter probe, all unplugged tubes surrounding the restricted tube will be gauged to assure acceptable levels of denting. This proposed requirement is consistent with existing practice at Palisades and is acceptable to the staff.

Proposed Technical Specification Section 4.14.2.6

This section adds a proposed new requirement; namely that when tube inspections are required by Technical Specification Section 4.14.1 due to primary to secondary leakage in excess of specified limits, that a 6% sample of unplugged tubes in the affected leg(s) shall be inspected. This proposed requirement is consistent with similar requirements which already exist for virtually all other plants. The staff finds that this proposal is an enhancement of existing requirements and is therefore acceptable.

Proposed Technical Specification Section 4.14.3.1

This section adds a proposed new requirement; namely should initial inspection sampling in accordance with Sections 4.14.2.2, 4.14.2.3, or 4.14.2.6 yield results exceeding one or more of the following criteria, then supplementary samples of unplugged tubes shall be inspected in accordance with Figure 4.14.1.

a) More than 10% of the inspected tubes in a leg have detectable wall degradation (greater than or equal to 30% through wall) where no previous degradation was detected.

b) More than 10% of the inspected tubes in a leg exhibit further wall degradation (greater than a 10% increase in through wall degradation).

c) More than 1% of the inspected tubes in a leg have indications of tube wall degradation in excess of the repair criteria of Specification 4.14.4 where no wall degradation greater than 30% was detected in the previous two inspections.

In the event that one or more of the above criteria are exceeded during initial inspection sampling, Figure 4.14.1 would require that an additional 6% sample of tubes be inspected. If the results of the second sample exceed the above criteria, then an additional 12% sample would have to be inspected. If the results of this third sample exceed the above criteria, then additional inspection samples must be performed as agreed to by the NRC.

The current Technical Specifications for Palisades contain no requirements for supplementary sample inspections. The supplementary sampling requirements now being proposed are still less stringent than what is specified in the Technical Specifications for virtually all other plants. The staff finds this not to pose any immediate concern since corrosion degradation has been largely arrested since the 1970s. Given the current status of corrosion degradation in the Palisades steam generators the staff believes the Technical Specification

requirements (including the proposed changes) are adequate for minimizing the the potential for steam generator tube ruptures and for identifying any significant change in the status of corrosion degradation. Should there be a significant change in the future regarding the status of corrosion degradation, the need for further upgrades to steam generator inspection programs and/or Technical Specifications can be considered at that time.

The above comments notwithstanding, the proposed supplementary sampling requirements in Section 4.14.3.1 represent an upgrade of existing requirements and are therefore acceptable to the staff.

Proposed Technical Specification Section 4.14.3.2

This section adds a new requirement for prompt notification of the NRC in the event that any of the criteria in Section 4.14.3.1 are exceeded. This enhances existing reporting requirements and is therefore acceptable to the staff.

Proposed Technical Specification Sections 4.14.3.3 and 4.14.3.4

These sections provide clarifications to the proposed requirements in Section 4.14.3.1. The staff has reviewed these clarifications and finds that they are consistent with normal industry practice. The staff concludes these clarifications to be acceptable.

Proposed Technical Specification Section 4.14.4

This section addresses repair criteria for degraded tubes. Tubes exceeding these criteria must be repaired by plugging or sleeving (in accordance with Section 4.14.4.5). The licensee has proposed to add the following new criteria to existing criteria in the Technical Specifications:

1) tubes exhibiting crack indications;

2) tubes restricting passage of a .540-inch diameter probe;

3) tubes exhibiting uninterpretable indications which were interpretable as $\geq$ 45% during a previous inspection.

The staff finds that these criteria enhance the already existing criteria in the Technical Specifications and are therefore acceptable.

Proposed Technical Specification Sections 4.14.4.2, 4.14.4.3, and 4.14.4.4

These sections include only minor changes of an editorial nature which the staff finds to be acceptable.

Proposed Technical Specification Section 4.14.4.5

Sleeve repairs are currently permitted by the Palisades Technical Specifications. At the staff's request, the licensee has proposed a new requirement that future sleeve repair methods be submitted for NRC approval prior to their implementation. Such approval has consistently been required by the staff for all sleeving programs implemented at other plants.

Proposed Technical Specification Section 4.14.5

The staff finds that the requirements in this section are unchanged from current requirements.

Proposed Technical Specification Section 4.14.1 (General)

The current Technical Specifications contain general requirements concerning eddy current test techniques which must be utilized such as, for example, use of a conventional bobbin probe. Technical Specifications for other plants typically do not include such requirements. The licensee is proposing to revise the "Bases" section in the Technical Specifications to discuss its current practices pertaining to inspection methods, and to delete existing requirements pertaining to inspection methods. The staff finds that the inspection methods described in the proposed "Bases" section are consistent with the existing requirements. The staff finds this approach to be acceptable.

Based on the foregoing evaluation, the staff concludes that the proposed Technical Specification changes upgrade and enhance existing requirements pertaining to inservice inspection of steam generator tubes. On this basis, the staff finds the proposed changes to be acceptable. This includes the one-time exemption requested by the licensee from requirements to inspect the steam generator sleeves during the steam generator inspection commencing in December 1987.

The staff notes, however, that even with the proposed changes, the steam generator inspection requirements in the Palisades Technical Specifications are less stringent in certain areas (particularly in the area of supplementary sampling requirements) than is the case for the industry as a whole. This does not pose any immediate concern since corrosion activity at Palisades has been relatively inactive since the 1970s. Given the current condition of the Palisades steam generators, the staff believes the Technical Specification requirements (including the proposed changes) are adequate from the standpoint of minimizing the potential for steam generator tube ruptures and for identifying any significant change in the condition of the steam generators. Should there be a significant change in the future regarding the condition of the steam generators, the need for further upgrades to steam generator inspection programs and/or Technical Specifications can be considered at that time.

ENVIRONMENTAL CONSIDERATION

This amendment involves changes in inspection or surveillance requirements. We have determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

CONCLUSION

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: March 24, 1988

Principal Contributor:
Emmett Murphy