

4/7

Docket No. 50-255

Consumers Power Company  
ATTN: Mr. David Bixel  
Nuclear Licensing  
Administrator  
212 West Michigan Avenue  
Jackson, Michigan 49201

Gentlemen:

The Commission has issued the enclosed Amendment No. 39 to Provisional Operating License No. DPR-20 for the Palisades Plant. This amendment consists of changes to the Technical Specifications in response to your requests dated February 21, 1978 and March 1, 1978.

This amendment changes the Palisades Technical Specifications relating to steam generator operating allowances and inspection requirements.

Copies of our Safety Evaluation and the Notice of Issuance also are enclosed.

Sincerely,

Dennis L. Ziemann, Chief  
Operating Reactors Branch #2  
Division of Operating Reactors

Enclosures:

1. Amendment No. 39 to License No. DPR-20
2. Safety Evaluation
3. Notice

cc w/enclosures:  
See next page

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Mr. William R. Rustem (2 cys.)  
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(w/cy. of CPC filings  
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230 South Dearborn Street  
Chicago, Illinois 60604

CONSUMERS POWER COMPANY

DOCKET NO. 50-255

PALISADES PLANT

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No.  
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 February 21, 1978, as supplemented by filing dated March 1, 1978, 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.

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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 License No. DPR-20 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. , 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

Victor Stello, Jr., Acting Assistant  
Director for Operating Reactors  
Division of Operating Reactors

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance:

ATTACHMENT TO LICENSE AMENDMENT NO.

PROVISIONAL OPERATING LICENSE NO. DPR-20

DOCKET NO. 50-255

Revise Appendix A as follows:

Remove the following pages and replace with identically numbered revised pages:

4-68a

4-68b

4-68c

Marginal lines indicate changed area.

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4.14.2 Inspection techniques, capable of detecting flaws in the presence of tube support plates, shall be used to inspect all accessible tube/tube support plate intersections where an ECT indication was present during the last inspection which was greater than or equal to 45% but cannot be interpreted in the current inspection due to the presence of dents.

In addition, the following shall apply for areas which could not be inspected due to dents in the last inspection. Additional intersections shall be selected for special examination to assure that all accessible previous ECT indications are inspected when their last recorded ECT reading plus the appropriate operating allowance from Table 4.14.1 exceeds the Maximum Allowable Degradation specified in Table 4.14.2. If such indications, regardless of accessibility, are not inspected, the repair criteria of 4.14.3 shall apply for sleeving or plugging.

4.14.3 When inspection reveals that the tube degradation plus an NRC-approved appropriate operating allowance (for future degradation) is greater than the maximum allowable degradation specified in Table 4.14.2, the tube shall be declared to be defective and tube plugging or sleeving shall be performed.

In determining that a defect exists at a given tube location, indications from several ECT's may be averaged during a given inspection, but such averaging shall be based on not less than three ECT's.

4.14.4 Operat allowances for future degradat are tabulated in Table 4.14.1.

4.14.5 Sleeves will be installed such that, considering the axial location tolerances, swaging does not take place in an area of known degradation. A base line ECT inspection of all newly installed sleeves shall be performed. In addition, all previously installed sleeves shall be inspected or plugged during subsequent steam generator tube inspections.

#### 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. The inspection program provides for verifying that the corrosion has been arrested for quickly identifying any additional corrosion or for identifying other problems.

The inspection program is also consistent with current industry practices and includes appropriate measures to identify additional degradation of the Palisades steam generators. The operating allowance will be and the repair criteria has been developed based on comparative results between steam generator inspections with consideration given to defect type, location, past corrosion rate observed, etc.

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 psi. Likewise, a sleeved tube can withstand the same differential pressure when the limits in Table 4.14.2 are observed. Combustion Engineering, Inc Report No

CEN-59(P) "Palisades Steam Generator Tube Repair - 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 ECT 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 4.14.1  
Operating Allowances

<u>Affected Tubes</u>	<u>ECT Indications Other Than Multiple ECT Indications</u>	<u>Multiple ECT Indications</u>
Tubes Inspected During 1978 ECT	6%	35%
Tubes Last Inspected During 1976 ECT	10%	*NA
Tubes Last Inspected During 1975 ECT	20%	*NA

\* Not Applicable



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. TO PROVISIONAL OPERATING LICENSE NO. DPR-20

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

Introduction

By letters dated February 21, and March 1, 1978, Consumers Power Company (the licensee) requested changes in the Technical Specifications appended to Provisional Operating License No. DPR-20 for operation of the Palisades Plant located in Van Buren County, Michigan. The proposed changes would revise the Palisades Technical Specifications relating to steam generator operating allowances and inspection requirements. The letters included the results of the Palisades Unit 1 steam generator inspection which was performed between January 15 and February 12, 1978. Based on the results of the inspection, the licensee has proposed operating allowances, which in conjunction with the minimum allowable tube wall thickness, will constitute a steam generator tube repair criteria.

Background

Amendment No. 33 to DPR-20 issued January 9, 1978, modified the augmented inservice inspection programs for the Palisades steam generators and allowed the sleeving of degraded steam generator tubes as an alternate to plugging. One requirement of the Amendment was the inspection of all unplugged tubes with an Eddy Current Test (ECT) indication of greater than or equal to 30% in either of two previous inspections. By selecting those tubes with an ECT indication of 30% or greater in either of the two previous inspections, the licensee would be inspecting tubes that are more likely to be approaching the maximum allowable degradation (64%). Plugging limits were determined by subtracting from the 64% maximum allowable degradation the appropriate operating allowances specified as a function of defect location and type in Section 4.14 of the Technical Specifications. The licensee was to propose new operating allowances to be applied to degraded tubes and sleeves based, in part, upon the inspection results obtained in the current refueling outage.

These allowances were to be reviewed by the NRC and, if acceptable, a Technical Specification change would be issued prior to the return to operation following the inspection. The licensee's letters of February 21 and March 1, 1978, reported the inspection results and proposed new operating allowances for determining the projected percent of degradation of both sleeved and unsleeved tubes until the next inservice inspection.

### Discussion

The January-February 1978 inspection included eddy current testing (ECT) of all tubes with indications of 30% or greater in previous inspections, a three percent random ECT sample, a sludge distribution evaluation, a denting evaluation, and an inspection of all tube sleeves which were installed in February 1976. Inspection of the tubes which had 30% or greater indications in previous inspections was conducted with a conventional circumferentially wound ECT probe. Results of this inspection showed essentially zero mean increase in degradation in these tubes since the previous inspection conducted during January and February of 1976. Additional inspections of all tubes which had indications of greater than 28% in the 1976 inspection or greater than 36% in the 1975 inspection, but could not be inspected using the conventional probe because the indication were obscured by dents during this inspection were conducted using a rotating absolute coil ECT probe. This probe allows evaluation of tube condition in dented regions of a tube where conventional ECT probes are ineffective. A total of 410 such intersections were inspected. The licensee did not inspect 600 intersections as required by the Palisades technical specifications because the size of the dented defects already examined was approaching the sensitivity of the inspection technique, the examination already performed indicated essentially a zero mean increase in dented defects, and increased personnel radiation exposure did not seem justifiable. The three percent random sample included two percent of the unplugged tubes on the inlet side (hot legs) and one percent of the unplugged cold leg tubes in both steam generators. This inspection revealed 14 tubes in steam generator A and 4 tubes in steam generator B with new eddy current indications greater than or equal to 20%, or with an increase in wall penetration greater than 10%.

The sludge distribution evaluation consisted of 25 KHz eddy current probing in 18 tubes in steam generator A and 21 tubes in steam generator B. The results of the sludge depth evaluation indicated small increases in sludge depths during the previous operating period.

Eddy current testing for denting included 1979 tubes in steam generator A and 1505 tubes in steam generator B. Out of these samples 942 tubes in steam generator A and 1140 tubes in steam generator B had indications of dents. The largest dent observed in either steam generator was 5.8 mils in magnitude and the mean increase in denting was calculated as less than 2 mils during the operating period of approximately 20 months.

Fourteen sleeves were installed in ten of the B steam generator tubes in February 1976. Examination of these tubes with the conventional circumferential ECT probe revealed no significant sleeve defects or degradation. Examination of the sleeves with a newly developed rotating axial wound coil ECT probe revealed several indications. Since this was the first evaluation of these sleeves with an axial coil probe, this was considered a baseline inspection. However, two tubes were plugged as a result of the inspection. One of the tubes was plugged because of an anomalous ECT indication extending throughout the lower expansion region of sufficient magnitude to mask any defect which might occur in the adjacent tube area. Similar ECT indications were observed in developmental sleeves due to minor blemishing by installation tools or sleeving manufacturing. A second tube was plugged because of a tight fit between the lower sleeve entry point and the new probe. Since the new probe was not available when the sleeves were installed the licensee was uncertain if the ECT indications and tight fit were present in these tubes at the time of installation.

The following table presents the proposed operating allowances as a percentage of original tube wall thickness.

<u>Affected Tubes</u>	<u>ECT Indications Other Than Multiple ECT Indications</u>	<u>Multiple ECT Indications</u>
Tube Inspected During 1978 ECT	6%	35%
Tubes Last Inspected During 1976 ECT	10%	*NA
Tubes Last Inspected During 1975 ECT	20%	*NA

\*Not Applicable

Regulatory Guide 1.121, Basis for Plugging Degraded PWR Steam Generator Tubes, states as a tube plugging criteria, that any tube indicating a defect depth greater than the maximum allowable defect minus an operating allowance should be plugged or repaired. Based on the results of this inspection and discussions with the NRC, the licensee has proposed operating allowances to be used in determining tube repair criteria. These allowances depend on the last inspection date of a tube and also on the type of ECT indication. Tubes with multiple ECT indications, which suggest more than one degraded area in a section of tube, were assigned greater operating allowances than tubes with single ECT indications. Regulatory Guide 1.121 requires consideration of an operating allowance in the form of an additional percentage of wall thickness to include a margin for error in eddy current testing to ensure that the maximum allowable defect depth is not exceeded during operation prior to the next inspection. Experience has shown that Eddy current testing overestimates flaw depth. Therefore application of the operating allowances in the table in conjunction with overestimates of flaw depth provides reasonable assurance that defect depths will not exceed the maximum allowable depths prior to the next cycle.

The allowances in the table will be effective until the next steam generator inspection required by the Technical Specifications to be conducted within 12 to 24 months of this inspection.

Implementation of the plugging criteria based on the above operating allowances resulted in the plugging of 9 tubes in steam generator A and 7 tubes in steam generator B and sleeving of 5 tubes in steam generator A and 3 tubes in steam generator B. The licensee also chose to sleeve additional 17 tubes which did not require repair according to the above criteria. All sleeves were subject to a baseline inspection before and after installation using both the circumferentially and axially wound probes.

#### Evaluation

We have reviewed the results of the licensee's steam generator inspection and the proposed operating allowances. It is our opinion that the licensee has conducted a sufficiently comprehensive inspection to determine the condition of the steam generators. Although the Palisades technical specification requirement of inspection of 600 tubes using the absolute coil ECT probe in dented areas was not fulfilled, the results of the inspection of 410 such intersections provided an adequate sample to assess degradation in these areas. Results of the inspection indicate essentially

zero mean increase in tube degradation during the last operating period of approximately 20 months. Sludge accumulation continued at a slow rate and the progression of denting was minor during the last operating period. Neither the minor increase in sludge depth or denting are evidence of excessively abnormal or unusual conditions in the steam generators. This performance is attributed to the licensee's careful attention to operating procedures including consideration of feedwater purity, early detection and correction of condenser leaks, and the fact that the steam generators when not operating were kept in wet layup with the tube bundle completely covered by water. Full flow condensate polishers and a feedwater recirculation line installed during this outage are expected to improve steam generator performance even farther during future operation.

The proposed operating allowances have been developed to account for statistical scatter in inspection data and also for uncertainties in the eddy current testing technique. The six percent operating allowance required for the next period of operation has been statistically derived based on the results of this and other eddy current examinations. Evaluation of field data and work done by consultants has indicated about a six percent standard deviation associated with normally distributed ECT data. The mean plus one standard deviation bounds 84 percent of the observed degradation rates. Additionally, the calibration techniques and characteristics of the ECT techniques cause an overestimation of flaw depths. Therefore, application of one standard deviation as an operating allowance in conjunction with the inherent conservatism of the ECT technique will provide adequate assurance that defect depths will not exceed the maximum allowable depth. In addition, a very conservative operating allowance has been applied to areas of tubes with multiple indications to ensure adequate margins in the event of coalescence of degraded locations. The operating allowances applied to tubes last inspected during 1975 or 1976 bound the degradation rates observed during the operating periods and are extremely conservative. We therefore conclude that the proposed operating allowances are acceptable.

#### Environmental Considerations

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental

impact and pursuant to 10 CFR Section 51.5(d)(4) that an environmental impact statement or negative declaration and environmental impact appraisal need not 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 in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date:

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-255

CONSUMERS POWER COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO PROVISIONAL  
OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No.     to Provisional Operating License No. DPR-20, issued to Consumers Power Company (the licensee), which revised Technical Specifications for operation of the Palisades Plant (the facility) located in Covert Township, Van Buren County, Michigan. The amendment is effective as of its date of issuance.

The amendment changes the Palisades Technical Specifications relating to steam generator operating allowances and inspection requirements.

The application for the amendment complies with the standards and requirements of the Atomic Energy act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Notice of Proposed Issuance of Amendment to Provisional Operating License in connection with this action was published in the FEDERAL REGISTER on November 30, 1977 (42 F.R. 60989). No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated February 21, 1978 as supplemented by filing dated March 1, 1978, (2) Amendment No.      to License No. DPR-20, (3) the Commission's related Safety Evaluation, and (4) Amendment No. 33 to License No. DPR-20, the related Safety Evaluation dated January 9, 1978 and the related application for amendment dated November 10, 1977, as supplemented by filings dated December 7 and 12, 1977. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Kalamazoo Public Library, 315 South Rose Street, Kalamazoo, Michigan 49006. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this      day of

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis L. Ziemann, Chief  
Operating Reactors Branch #2  
Division of Operating Reactors