

APR 24 1975

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Docket No. 50-255

Consumers Power Company
ATTN: Mr. R. C. Youngdahl
Senior Vice President
212 West Michigan Avenue
Jackson, Michigan 49201

Gentlemen:

The Commission has issued the enclosed Amendment No. 14 to Provisional Operating License No. DPR-20 for the Palisades Plant. This amendment includes Change No. 18 to the Technical Specifications, and is in response to your request dated January 14, 1975, as corrected by your letter of January 21, 1975.

This amendment makes changes in the surveillance program for the tendons in the containment building post-tensioning system.

Copies of the related Safety Evaluation and the Federal Register Notice are also enclosed.

Sincerely,

Original signed by:
Robert A. Purple

Robert A. Purple, Chief
Operating Reactors Branch #1
Division of Reactor Licensing

Enclosures:

1. Amendment No. 14
2. Safety Evaluation
3. Federal Register Notice

cc w/enclosures:
See next page

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| OFFICE | RL:ORB#1 <i>CMTrammell</i> | TR:SEB <i>LCShao</i> | OELD <i>[Signature]</i> | RL:ORB#1 <i>[Signature]</i> | |
| SURNAME | CMTrammell:dc | LCShao | | RAPurple | |
| DATE | 4/3/75 | 4/8/75 | 4/17/75 | 4/24/75 | |

April 24, 1975

cc w/enclosures:

M. I. Miller, Esquire
Isham, Lincoln & Beale
Suite 4200
One First National Plaza
Chicago, Illinois 60670

J. L. Bacon, Esquire
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Paul A. Perry, Secretary
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Kalamazoo Public Library
315 South Rose Street
Kalamazoo, Michigan 49006

Mr. Jerry Sarno
Township Supervisor
Covert County
Route 1, Box 10
Van Buren County, Michigan 49043

cc w/enclosures & incoming:
Mr. John D. Beck (2 cys)
Division of Intergovernmental
Relations
Executive Office of the Governor
Lewis Cass Building, 2nd Floor
Lansing, Michigan 48913

Mr. Gary Williams
Environmental Protection Agency
Federal Activities Branch
One North Wacker Drive, Room 822
Chicago, Illinois 60606

Myron M. Cherry, Esquire
Suite 4501
One IBM Plaza
Chicago, Illinois 60611

CONSUMERS POWER COMPANY

DOCKET NO. 50-255

PALISADES PLANT

AMENDMENT TO PROVISIONAL OPERATING LICENSE

Amendment No. 14
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 January 14, 1975, as corrected January 21, 1975, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended, 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; and
 - 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.
2. Accordingly, the license is amended by a change 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:

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"B. Technical Specifications

The Technical Specifications contained in Appendices A, B, and C, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 18."

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

FOR THE NUCLEAR REGULATORY COMMISSION

APR 24 1975 Original signed by:
Robert A. Purple

Robert A. Purple, Chief
Operating Reactors Branch #1
Division of Reactor Licensing

Attachment:
Change No. 18 to Technical
Specifications

Date of Issuance: APR 24 1975

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ATTACHMENT TO LICENSE AMENDMENT NO. 14
CHANGE NO. 18 TO THE TECHNICAL SPECIFICATIONS
PROVISIONAL OPERATING LICENSE NO. DPR-20
DOCKET NO. 50-255

Revise Appendix A as follows:

Remove pages 4-29, 4-30, and 4-36 and insert identically numbered pages.

Add new pages 4-29a, 4-29b, and 4-29c.

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CONTAINMENT TESTS (Contd)

(3) Visual inspection shall be made for excessive leakage from components of the system. Any significant leakage shall be measured by collection and weighing or by another equivalent method.

b. Acceptance Criterion

The maximum allowable leakage from the recirculation heat removal systems' components (which include valve stems, flanges and pump seals) shall not exceed one-half gallon per minute under the normal hydrostatic head from the SIRW tank (approximately 44 psig).

c. Corrective Action

Repairs shall be made as required to maintain leakage within the acceptance criterion of 4.5.3.b.

d. Test Frequency

Tests of the recirculation heat removal system shall be conducted at intervals not to exceed twelve months.

4.5.4 Surveillance for Prestressing System

a. Tendon inspection shall be accomplished in accordance with the following schedule:

1. One year after initial structural integrity test.
2. Three years after initial structural integrity test.
3. Five years after initial structural integrity test.
4. At five-year intervals thereafter for the life of the plant.

b. Surveillance tendons for the one-year inspection shall be the nine designated surveillance tendons plus V-104 and V-200. In addition, 15 vertical tendons shall be tested for lift-off forces only.

c. For the three-year inspection, the surveillance tendons shall consist of the 11 tendons inspected during the one-year test plus an additional 10 vertical tendons to be tested for lift-off force only. The additional 10 tendons shall be selected from tendons other than those tendons tested for lift-off force during the one-year inspection.

4.5 CONTAINMENT TESTS (contd)

- d. For the five-year inspection, the tendons shall be selected on a random basis from the following groups:
1. Two dome tendons from each of the three dome tendon groups.
 2. Five vertical tendons located approximately 72° apart.
 3. Three hoop tendons from each 120° sector of the containment wall plus one randomly selected hoop tendon.
- e. After the third inspection (five years after initial test), unless the results of testing performed under 4.5.4.d indicate that there are significant problems with prestressing members in the containment, the surveillance tendons shall be randomly selected from the following groups:
1. One dome tendon from each of the three dome tendon groups.
 2. Three vertical tendons located approximately 120° apart.
 3. One hoop tendon from each 120° sector of the containment wall.

For each inspection following the second, the tendons shall be selected on a random basis except that those tendons whose routing has been modified to clear penetrations shall be excluded from the sample.

- f. During each tendon inspection, the following field testing shall be performed:
1. Lift-off readings shall be taken for each of the surveillance tendons. The lift-off test will include a maximum test lift-off force greater than the maximum in-service prestressing force and an unloading cycle going to essentially complete detensioning of the tendon to identify broken or damaged wires.
 2. While the tendon is in the detensioned state, each wire in the tendon will be checked for continuity.

4.5 CONTAINMENT TESTS (Contd)

3. Three wires, one from each of a vertical, a hoop and a dome tendon will be removed and identified for inspection. At each successive surveillance, the wires will be selected from different tendons. Each of the inspection wires removed will be visually inspected for evidence of corrosion or other deleterious effects and samples taken for laboratory testing.
4. The sheathing filler shall be inspected visually for color and coverage and samples shall be obtained for laboratory testing.
5. Tendon anchorage hardware such as bearing plates, stressing washers, shims and buttonheads shall be visually inspected for evidence of corrosion or other deleterious effects.
6. After lift-off test and inspection, the tendons will be retensioned to the unit stress measured at the initial lift-off test and then checked by a final lift-off reading.
- g. Following the field testing of Paragraph 4.5.4.f, the following laboratory testing shall be done:
 1. Three tensile test specimens shall be cut from each of the three inspection wires removed (one specimen from near each end and one from the middle) plus one additional specimen shown by the field visual inspection to have the greatest amount of corrosion of all of the wires removed. Each of the wire samples shall be tested for ultimate strength.
 2. The sheathing filler samples shall be laboratory tested to detect any significant change in corrosion resistant properties of the filler.

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4.5 CONTAINMENT TESTS (Contd)

h. Acceptance criteria shall be as follows:

1. The measure of the lift-off force per tendon shall not be more than 815 kips per tendon nor less than 584 kips per tendon for dome tendons, or 615 kips per tendon for hoop and vertical tendons.

If one sample tendon fails to meet these criteria, an adjacent tendon on each side of that tendon shall also be tested. If both of these tendons meet the criteria, then the inspection program shall proceed considering the single deficiency as unique and acceptable. However, if either adjacent tendon fails to meet the criteria or if more than one tendon out of the original sample population failed to meet the criteria, the Commission shall be notified in accordance with Paragraph 4.5.4.i.

2. Inspection wires shall indicate no significant loss of section by corrosion or pitting.
 3. Tensile test specimens cut from inspection wires shall be tested for ultimate strength. Failure at less than 11.78 kips of any one of the test samples requires the Commission be notified in accordance with Paragraph 4.5.4.i.
 4. Tendon anchorage hardware shall be free of significant corrosion, pitting, cracks or other deleterious effects.
- i. If any element of the prestressing system fails to meet the acceptance criteria of Paragraph 4.5.4.h, the reporting provision of 6.6 shall apply except that the initial report may be made within 14 days of the completion of the surveillance requirements of this specification and the final report within 90 days of completion of testing.

18

4.5 CONTAINMENT TESTS (Contd)

18

4.5.5 End Anchorage Concrete Surveillance

- a. Specific locations for surveillance will be chosen from the combined information from the design calculations; the as-built end anchorage concrete and prestressing records; observations of the end anchorage concrete during and after prestressing; and the results of strain and deformation measurements made during prestressing and the initial structural test.
- b. The inspection intervals will be approximately one-half year and one year after the initial structural test and shall be chosen such that the inspection occurs during the warmest and coldest part of the year following the initial structural test.
- c. The inspections made shall include:
 - (1) Visual inspection of the end anchorage concrete exterior surfaces.
 - (2) A determination of the temperatures of the liner plate area or containment interior surface in locations nearest to the end anchorage concrete under surveillance.
 - (3) Measurement of concrete temperatures at specific end anchorage concrete surfaces being inspected.
 - (4) The mapping of the predominant visible concrete crack patterns.

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4.5 CONTAINMENT TESTS (Contd)

water to the containment sump inventory can be readily accommodated via the charging pumps from either the SIRW tank or the concentrated boric acid storage tanks.

In case of failure to meet the acceptance criteria for leakage from the shutdown cooling system or the penetrations, it may be possible to effect repairs within a short time. If so, it is considered unnecessary and unjustified to shut down the reactor. The times allowed for repairs are consistent with the times developed for other engineered safety feature components.

A reduction in prestressing force and changes in physical conditions are expected for the prestressing system. Allowances have been made in the reactor building design for the reduction and changes. The inspection results for each tendon inspected shall be recorded on the forms provided for that purpose and comparison will be made with previous test results and the initial quality control records.

Force-time records will be established and maintained for each of the tendon groups, dome, hoop and vertical. If the force measured for a tendon is less than the lower bound curve of the force-time graph, two adjacent tendons will be tested. If either of the adjacent or more than one of the original sample population falls below the lower bound of the force-time graph, an investigation will be conducted before the next scheduled surveillance. The investigation shall be made to determine whether the rate of force reduction is indeed occurring for other tendons. If the rate of reduction is confirmed, the investigation shall be extended so as to identify the cause of the rate of force reduction. The extension of the investigation shall determine the needed changes in the surveillance inspection schedule and the criteria and initial planning for corrective action.

If the force measured for a tendon at any time exceeds the upper bound curve of the band on the force-time graph, an investigation shall be made to determine the cause.

If the comparison of corrosion conditions, including chemical tests of the corrosion protection material, indicate a larger than expected change in the conditions from the time of installation or last surveillance inspection, an investigation shall be made to detect and correct the causes. (6, 7)

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 14 TO LICENSE NO. DPR-20

(CHANGE NO. 18 TO TECHNICAL SPECIFICATIONS)

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

Introduction

The containment structure for the Palisades Plant, which houses the reactor coolant system, consists of a post-tensioned reinforced concrete cylinder and shallow-domed roof connected to and supported by a massive reinforced concrete foundation slab. The post-tensioning system consists of groups of tendons tensioned after construction of the containment which, with other structural features, provide the necessary strength. The dome has a three-way posttensioning system; the cylinder is prestressed vertically and in three 120-degree horizontal hoop segments anchored to six buttresses. Each tendon contains 90 $\frac{1}{4}$ -inch wires. Corrosion protection for the tendons is provided by completely filling the tendon conduits with a grease-like material.

A surveillance program is necessary for the post-tensioning system to detect material deterioration or force reduction in the tendons since they provide the primary membrane integrity for the containment structure.

Discussion

By letter dated April 29, 1974, Consumers Power Company (the licensee) transmitted a report containing the results of the containment tendon surveillance conducted three years after the initial structural test, as required by the Technical Specifications. This report indicated that the tendon system was generally performing satisfactorily, but one problem concerning tendon tension measurement was unresolved. The tension on the tendons selected for surveillance is measured by using a hydraulic jack to stretch the tendon. When the shims became loose, the "lift-off" force is measured and compared to previous values. The



present Technical Specifications require that these "lift-off" forces be plotted to establish a force-time trend line which must not intersect either the upper or lower bound limit when extrapolated to 40 years. Because of variations in the "lift-off" forces caused by measurement technique, the extrapolations formed by the trend line has not been found by the licensee to be a practical acceptance criterion.

Following the submittal of this report, Regulatory Guide 1.35, "Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures" (June 1974), was issued. Prompted by the guidance contained in this document and the problems experienced with the trend line concept, the licensee requested by letter dated January 14, 1975 (and corrected by letter dated January 21, 1975), a change to the Technical Specifications for the tendon surveillance program.

Evaluation

This amendment request proposes a surveillance program for the containment building tendons that is consistent with Regulatory Guide 1.35. Since the containment building for Palisades was the first to be constructed using a three-directional prestressing tendon system, the present (original) Technical Specifications were developed prior to the issue of Regulatory Guide 1.35 and without benefit of any lengthy experience with such tendon systems.

The proposed change would increase the present tendon surveillance as follows:

- a. The inspection frequency would be increased by conducting the next (third) inspection in the fifth year as opposed to the eighth year following the initial structural test; subsequent inspections would be conducted every five years thereafter in accordance with Regulatory Guide 1.35.
- b. The number of tendons to be examined in the third inspection would be increased to twenty-one and selected at random from specified tendon types and areas in accordance with Regulatory Guide 1.35. The current Technical Specifications require the same nine tendons be examined at each inspection.

These changes would provide increased assurance that the tendon system is performing as designed or provide more rapid detection of any deterioration that might occur and are acceptable.

Other differences between the current and proposed Technical Specifications involve the acceptance criterion for measured tendon "lift-off" forces. As previously discussed, the current Technical Specifications require the plotting and extrapolation of these measured forces to forty years, thus forming a force-time trend line. However, Regulatory Guide 1.35 recommends, and the proposed change would require, that the measured "lift-off" force fall between the specified upper and lower bounds without the extrapolation of the data points. Considering that (a) the

licensee has not found the trend line concept to be of practical value because of data scatter, (b) the proposed Technical Specification would require a report to us in the event of unacceptable results, (c) the licensee would inspect more tendons than currently required at the next inspection, and (d) the inspection interval would be reduced for the next inspection, this proposal does not represent a major change from their present Technical Specifications since the inspection program would disclose tendons with tension beyond acceptance limits at short-term intervals (5 years) regardless of what a long-term (plant lifetime) extrapolation would predict. We, therefore, find this proposed change acceptable.

Another difference between the proposed and current Technical Specification involves the removal of wires from the tendons for testing. The current Technical Specifications require the removal of a minimum of nine wires (one from each tendon inspected). The proposed Technical Specification would require that three wires be removed - one from the dome, hoop, and vertical members. Three tensile tests for each wire (for a total of nine) plus a tensile test on the section showing the greatest corrosion, would be conducted. The current Technical Specifications do not specify the number of tests to be conducted on the nine wires. The removal of three wires from each of the tendon types combined with ten tensile tests is consistent with Regulatory Guide 1.35 and is acceptable.

Based on the above considerations, the proposed modified surveillance of the containment post-tensioning system represents an improved program that is consistent with current regulatory requirements. In addition, it represents an increase in surveillance effort and at the same time solves a problem the licensee has experienced with respect to force-time trend line extrapolation.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the change does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the change does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) 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: APR 24 1975

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-255

CONSUMERS POWER COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO PROVISIONAL
OPERATING LICENSE

Notice is hereby given that the U.S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 14 to Provisional Operating License No. DPR-20 issued to Consumers Power Company which revised Technical Specifications for operation of the Palisades Plant located in Covert Township, Van Buren County, Michigan. The amendment is effective as of its date of issuance.

This amendment makes changes in the surveillance program for the tendons in the containment building post-tensioning system consistent with Regulatory Guide 1.35, "Inservice Inspection of UngROUTED Tendons in Prestressed Concrete Containment Structures". The effect of this change is to increase the number of tendons to be examined at the third inspection from nine to twenty-one; cause the third inspection to be conducted five years rather than eight years after the initial structural test; and eliminate the requirement to extrapolate measured tendon tension to forty years, since this procedure has not been found to be of practical value. The revised procedure requires that measured tendon tension fall between established upper and lower acceptance limits, which is consistent with Regulatory Guide 1.35.

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. Prior public notice of this amendment is not required since the amendment does not involve a significant hazards consideration.

For further details with respect to this action, see (1) the application for amendment dated January 14, 1975, as corrected January 21, 1975, (2) Amendment No. 14 to License No. DPR-20, with Change No. 18, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, NW., Washington, D.C., and at the Kalamazoo Public Library, 315 South Rose Street, Kalamazoo, Michigan.

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 Reactor Licensing.

Dated at Bethesda, Maryland, this APR 24 1975

FOR THE NUCLEAR REGULATORY COMMISSION

Original signed by:
Robert A. Purple

Robert A. Purple, Chief
Operating Reactors Branch #1
Division of Reactor Licensing