

January 29, 1993

Docket No. 50-255

Mr. Gerald B. Slade
Plant General Manager
Palisades Plant
Consumers Power Company
27780 Blue Star Memorial Highway
Covert, Michigan 49043

Dear Mr. Slade:

SUBJECT: PALISADES PLANT - AMENDMENT NO. 155 TO FACILITY OPERATING LICENSE
NO. DPR-20 (TAC NO. M85511)

The Commission has issued the enclosed Amendment No. 155 to Facility Operating License No. DPR-20 for the Palisades Plant. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated January 19, 1993.

The amendment changes the surveillance interval in TS Table 4.2.2, Item 2, for testing two control rod drive mechanisms, CRD-20 and CRD-31, from "Every Two Weeks" to once in March 1993. This amendment is in followup to the granting of a temporary waiver of compliance (TWOC) on January 14, 1993, as described in NRC letter of January 15, 1993.

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

Sincerely,

Original signed by

Armando Masciantonio, Project Manager
Project Directorate III-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 155 DPR-20
2. Safety Evaluation

cc w/enclosures:
See next page

as changed on clipped pages

OFFICE	LA:PD31	PM:PD31 <i>rom</i>	SRXB	OGC <i>ATF</i>	D:PD31 <i>lm</i>
NAME	MShuttleworth	AMasciantonio:	RJones	JHull	LMarsh
DATE	<i>1/28/93</i>	<i>1/28/93</i>	<i>1/28/93</i>	<i>1/29/93</i>	<i>1/29/93</i>

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

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

Sincerely,

A handwritten signature in cursive script, appearing to read "A.S. Masciantonio".

Armando Masciantonio, Project Manager
Project Directorate III-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 155 DPR-20
2. Safety Evaluation

cc w/enclosures:
See next page

Mr. Gerald B. Slade
Consumers Power Company

Palisades Plant

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Covert, Michigan 49043

DATED: January 29, 1993

AMENDMENT NO. 155 TO FACILITY OPERATING LICENSE NO. DPR-20-PALISADES

Docket File

NRC & Local PDRs

PDIII-1 Reading

Palisades Plant File

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cc: Plant Service list

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

CONSUMERS POWER COMPANY

DOCKET NO. 50-255

PALISADES PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 155
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 19, 1993, 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;
 - 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 the license amendment and Paragraph 2.C.(2) of Facility Operating License No. DPR-20 is hereby amended to read as follows:

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Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 155, and the Environmental Protection Plan contained in Appendix B are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION



Ledyard B. Marsh, Director
Project Directorate III-1
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 29, 1993

ATTACHMENT TO LICENSE AMENDMENT NO. 155

FACILITY OPERATING LICENSE NO. DPR-20

DOCKET NO. 50-255

Revise Appendix A Technical Specifications by removing the page identified below and inserting the attached page. The revised page is identified by amendment number and contains vertical lines indicating the areas of change.

REMOVE

4-15

INSERT

4-15

Table 4.2.2

Minimum Frequencies for Equipment Tests

	<u>Test</u>	<u>Frequency</u>	<u>FSAR Section Reference</u>
1.	Control Rods	Drop Times of All Full-Length Rods	Each Refueling Shutdown 7.4.1.3
2.	Control Rods	Partial Movement of All Rods (Minimum of 6 In)	Every Two Weeks* 7.4.1.3
3.	Pressurizer Safety Valves	Set Point	One Each Refueling Shutdown 7.3.7
4.	Main Steam Safety Valves	Set Point	Five Each Refueling Shutdown 4.3.4
5.	Refueling System Interlocks	Functioning	Prior to Refueling Operations 9.11.3
6.	Service Water System Valve Actuation (SIS-CHP)	Functioning	Each Refueling Operation 9.1.2
7.	Primary System Leakage	Evaluate	Daily 4 Amend 15, Ques 4.3.7
8.	Diesel Fuel Supply	Fuel Inventory	Daily 8.4.1

* During the remainder of cycle 10, CRD-20 and CRD-31 will be tested once in March 1993 in lieu of testing once every two weeks.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 155 TO FACILITY OPERATING LICENSE NO. DPR-20

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated January 19, 1993, the Consumers Power Company (the licensee or CPCo) requested an amendment to the Technical Specifications (TS) appended to Facility Operating License No. DPR-20 for the Palisades Plant. The proposed amendment changes the surveillance interval for testing two control rod drive mechanisms, CRD-20 and CRD-31, to once, in March 1993, until the end of Cycle 10, in lieu of "Every Two Weeks."

2.0 DISCUSSION AND EVALUATION

Background

The Control Rod Drive Mechanisms (CRDMs) at Palisades are of the Rack and Pinion Drive type. These drives have a drive package containing a drive motor, position indication equipment, and a releasing clutch, which is outside the Primary Coolant System (PCS) boundary, and a drive shaft, right angle gear set, pinion gear, and rack within the PCS boundary. The drive package is connected to the drive shaft through a mechanical seal, which forms the PCS pressure boundary. Leakage through the mechanical seal enters a cavity which is vented to a collection header, and which is sealed at the top by a vapor seal. Each mechanical seal is provided with a thermocouple to measure the temperature of its leakoff. The leakoff from all 45 CRDMs is collected in a common header and routed to the containment sump.

Two CRDMs are exhibiting signs of above normal seal leakage. Operating history has shown a trend that exercising a CRDM, as required by TS Table 4.2.2, Item 2, often causes seal leakage to increase. One CRDM, CRD-20, has been declared inoperable which allows omitting the exercising of that mechanism. Technical Specifications do not allow continued operation with more than one control rod inoperable, so testing of the second CRDM exhibiting leakage has continued.

The CRDM provides two safety functions. With the exception of the motor's ability to move the control rod with the rod rundown signal, the required biweekly surveillance testing does not verify either of these safety functions. The safety functions are:

First, a reactor trip signal de-energizes the clutch and allows the control rod to drop by gravity into the core; this is the only CRDM safety function assumed in the safety analyses.

Second, when a reactor trip signal is generated, a "rod rundown" signal energizes all full length CRDM motors to drive their rods in case they should not trip freely into the core. The rod rundown signal is terminated when that rod nears full insertion. The clutch is designed to allow the motor to apply a torque to the drive shaft, in the "IN" direction, even when the clutch is released. Functioning of the rod rundown feature is not assumed in the safety analyses.

A reduced testing frequency would have no significant effect on the assurance that the CRDM will function properly and would reduce the probability of leakage increasing to the point where a plant shutdown is required.

Proposed Changes

Repeated testing of a leaking seal can result in shortened seal life and increased CRDM seal leak rate, which can lead to forced shutdown due to excessive PCS leakage. The proposed amendment changes the frequency for control rod exercising in Table 4.2.2, Item 2, with a footnote which would read "During the remainder of cycle 10, CRD-20 and CRD-31 will be tested once in March 1993 in lieu of testing once every two weeks." Cycle 10 is scheduled to end on June 4, 1993.

Evaluation

The licensee has provided an analysis to demonstrate that CRDM seal leakage does not increase the likelihood of an untrippable control rod. In order to do so, leakage would have to cause the clutch to fail to release, or cause mechanical binding of the driveshaft between the lower clutch face and mechanical seal, because all components above the lower clutch face are disengaged from the drives shaft upon a trip, and normally wetted components inside the PCS boundary will not be mechanically bound by leakage effects.

Clutch: In order to hinder trippability, the lower section must either fail to disengage or else jam between the shaft and some stationary component. Plausible failure modes cause the clutch to disengage (thus causing a rod trip), not remain engaged. Original clutches employed a splined sleeve which was prone to binding, but current clutches use a spring bellows and jaw faces which do not depend upon sliding action. When electrical power is removed, the upper face springs away from the lower one, an action which is not prone to mechanical jamming. Even if the vapor seal failed, leakage would not prevent rotation of a disengaged lower clutch element.

Bearings: There are three sets of ball bearings between the clutch and vapor seal. To prevent a rod trip, one or more of these sets would have to bind sufficiently to resist dropping of a weight in excess of 200 pounds, or else degrade badly enough to allow gross driveshaft

misalignment. The vapor seal protects the bearings from a corrosive atmosphere, and leakage limitations reduce the likelihood of vapor seal failure. Leakage limitations are not changed by the proposed amendment. In the past, even bearings filled with boric acid have performed properly. There is no reason to believe that any currently installed bearings have been exposed to steam or boric acid.

Vapor seal: This is an elastomeric cup seal with a metal backing ring. The steam impingement washer protects it from erosion, and the vapor seal in turn protects drive components above from leakage. Operating temperature depends upon seal leakoff pressure as long as flashing occurs in the leakoff cavity. The collection header is unpressurized. The elastomer is designed for high temperature operation, and there is no metal-to-metal contact between stationary and rotating parts. If the vapor seal were to fail, it would not itself prevent shaft rotation.

Steam Impingement Washer: This thin stainless washer fits loosely around the driveshaft immediately below the vapor seal, at the top of the seal leakoff cavity. It cannot bind between the shaft and housing while remaining around the shaft, and plausible leaks will not break it.

Seal Assembly: The rotating element is inside the PCS boundary, so leakage will not corrode or bind small internal parts. There is ample clearance between the stationary assembly and driveshaft. Shear forces will prevent binding at the seal boundary itself, as seal contact area is very small and materials were selected for low friction operation. Leak-induced temperature increase can degrade the three static O-rings, but this will not prevent rotation.

Driveshaft: One end of the driveshaft is inside the PCS boundary, so component material was selected to withstand PCS effects. Driveshaft upper end alignment is maintained by the lower clutch shaft which rides in three sets of ball bearings above the vapor seal. The drive shaft lower end bearings are within the PCS boundary.

The licensee has concluded, therefore, considering the system design and acceptable performance of the refueling outage trip test, that the control rods are trippable and, therefore, can meet their functional requirements.

The NRC staff has reviewed the licensee's analysis and concludes that the control rods can meet their functional requirements.

To provide additional assurance that the CRDM seal leakage will not increase the likelihood of an untrippable control rod, the licensee has stated that reactor shutdown is procedurally required when leakage is confirmed to be a CRDM seal failure in excess of two gallons per minute. This leak rate is well within the leakoff header flow capacity, so the limitation effectively protects vapor seal integrity.

Without a change to the TS, biweekly testing of operable CRDMs with leaking seals must continue. The resulting accelerated seal degradation resulting from biweekly testing would force a shutdown within a matter of weeks due to excessive PCS leakage. With reduced surveillance testing of CRD-20 and CRD-31, the expected rate of seal degradation will be reduced and may facilitate continued operation until the next scheduled refueling outage.

The licensee has provided evidence that CRDM seal leakage within procedural allowance will not cause an untrippable control rod, therefore, the required safety function is not affected. In addition, CPCo is preparing a TS change request to revise the test frequency for all control rod drives from biweekly to quarterly. The licensee committed to filing that TS change request following resolution of CPCo comments and receipt of a final report from Combustion Engineering. That TS change, if granted, will supersede the amendment granted herein.

Based on the above, the staff has determined that an emergency amendment should be granted.

3.0 EMERGENCY CIRCUMSTANCES

In accordance with 10 CFR 50.91(a)(5), the licensee has provided justification that it could not make timely application and that emergency circumstances do exist. As already discussed and as addressed in the licensee's amendment request of January 19, 1993, the licensee determined that continued biweekly surveillance testing of CRD-20 and CRD-31 could aggravate the leakage rate and lead to a forced shutdown. An increase in seal leakage was indicated after CRD-31 was tested on December 29, 1992. Thus, the NRC staff does not believe that the licensee has abused the emergency provisions in this instance. Accordingly, the Commission has determined that there are emergency circumstances warranting prompt approval, by the Commission, of an amendment to the facility Technical Specifications.

4.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility, in accordance with the amendment, would not:

- (1) Involve a significant increase in the probability or consequences of any accident previously evaluated; or
- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
- (3) Involve a significant reduction a margin of safety.

The amendment has been evaluated against the above criteria of 10 CFR 50.92. It does not involve a significant hazards consideration because the change would not:

Criterion 1

The proposed TS change does not alter any plant systems, instrument settings, or operating methods. Its only potential effects would be to reduce expected CRDM seal leakage and to reduce the assurance, normally provided by biweekly testing, that a CRDM has not become mechanically bound to the point where it cannot be moved by its motor. Mechanical binding of a CRDM is not classed as an "accident."

Therefore, operation of the facility in accordance with the proposed change to the TS would not involve a significant increase in the probability of an accident previously evaluated.

The intent of the biweekly control rod exercise surveillance tests is to detect controls rods that are stuck and demonstrate that control rods can move freely over a small range of movement (minimum of six inches). The current Palisades surveillance frequency of every two weeks was apparently based on engineering judgment. Operating experience has demonstrated that this surveillance is not a principal method for detecting stuck control rods. The ability to trip the control rods, i.e., the operability of the rods, is not affected by decreasing the surveillance frequency. Operability (trippability) of the rods is demonstrated by the refueling outage surveillance test. Further evidence of operability has been demonstrated during the current cycle in the five reactor trips that have occurred in which all control rods including CRD-20 (which has evidenced leakage since April 1992) have tripped. Reactivity control, therefore, through control rod tripping or through boration is not affected by this change in the surveillance frequency.

The FSAR reactivity events consider that the most reactive control rod remains fully withdrawn from the core during a reactor trip. Because the trippability of the control rods are not degraded by this surveillance frequency change, the consequences of these reactivity events have not been increased.

The control rod rundown feature, which is not required to mitigate an accident, will also not be degraded by the change in surveillance frequency. Control rod indication would not be affected by the change. Additionally, the mechanical or electrical reliability of the control rods would not be degraded by the change in frequency of the surveillance for the leaking control rods. Therefore, combined with the ability of the control rods to remain trippable (operable), the probability of occurrence of an accident previously evaluated has not been significantly increased.

The effect of CRDM seal leakage on CRDM components has been reviewed to determine if trippability of the control rods is affected. That review of the components (described above) leads to the conclusion that seal leakage will not affect the trippability of the control rods.

Therefore, operation of the facility in accordance with the proposed change to the TS would not involve a significant increase in the consequences of an accident previously evaluated.

Criterion 2

The proposed change in surveillance frequency for the leaking control rods would not alter the equipment design or operation. Therefore, operation of the facility in accordance with the proposed change to the TS would not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3

Review of control rod events at Palisades and Fort Calhoun (the only other plant with Palisades-style CRDMs) back to 1971 has shown no instances in which biweekly testing detected untrippable rods. Fort Calhoun data was obtained from NPRDs and was not verified with OPPD. Inability to drive rods via the rod rundown feature was discovered in some cases, generally caused by brake, drive motor, or relay contactor failure. Such occurrences could have prevented control rod rundown capability, but since affected components were all above the clutches the ability to trip the control rod was not affected. The review also indicated that there were 33 instances of untrippable or sticking control rods (of which 22 were attributable to three common failure modes which have been resolved). Of these, 4 were discovered prior to initial criticality, 29 during tests other than biweekly exercising, 2 during scrams, and 2 by failure to withdraw during startup, but none by biweekly testing (some of the occurrences fit in multiple categories). There were 2 other events in which trippability was not ascertainable from records reviewed, but neither occurred during biweekly testing.

Biweekly testing of the control rods over the 20 years of Palisades operating history has not detected any instance where control rods have not been trippable. The control rods were demonstrated trippable (operable) by the control rod drop timing test during the last refueling outage and by their successful operation during the five reactor trips since refueling. Therefore, even with the presumed most reactive rod being stuck during an FSAR reactivity event, there is not a reduction in the margin of safety with respect to limiting reactivity additions during any of these FSAR events. Accordingly, the Commission has determined that the amendment involves no significant hazards consideration.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State Official was notified of the proposed issuance of the amendment. The Michigan State Official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and a change to the surveillance requirement. The staff has 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 made a final no significant hazards consideration finding with respect to this amendment. Accordingly, the 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 the amendment.

7.0 CONCLUSION

The staff has 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: A. Masciantonio

Date: January 29, 1993