

May 19, 1995

Mr. Kurt M. Haas  
Plant Safety and Licensing Director  
Palisades Plant  
27780 Blue Star Memorial Highway  
Covert, MI 49043

SUBJECT: PALISADES PLANT - ISSUANCE OF AMENDMENT RE: IODINE REMOVAL SYSTEM  
TECHNICAL SPECIFICATIONS (TAC NO. M91222)

Dear Mr. Haas:

The Commission has issued the enclosed Amendment No. 165 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 December 29, 1994, as supplemented February 2 and May 4, 1995.

The amendment supports replacement of the existing iodine removal system with baskets of trisodium phosphate (TSP). The iodine removal system TS has been revised to reflect the change to the system, including defining system operability, applicability, and associated action statements. The required surveillance has also been revised to require verification of the quantity and quality of TSP in the baskets each 18 months.

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

Marsha Gamberoni, Project Manager  
Project Directorate III-1  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosures: 1. Amendment No. 165 to DPR-20  
2. Safety Evaluation

cc w/encls: See next page

FILENAME: G:\WPDOCS\PALISADE\PAL91222.AMD

OFFICE	LA:PD31	PM:PD31	OGC	(A)D:PD31
NAME	CJamerson	MGamberoni	OGC	CCarpenter
DATE	5/16/95	5/16/95	5/17/95	5/19/95

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Consumers Power Company

Palisades Plant

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DATED: May 19, 1995

AMENDMENT NO. 165 TO FACILITY OPERATING LICENSE NO. DPR-20-PALISADES

**Docket File**

PUBLIC

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

CONSUMERS POWER COMPANY

DOCKET NO. 50-255

PALISADES PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 165  
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 December 29, 1994, as supplemented February 2 and May 4, 1995, 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. 165, 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 with full implementation no later than startup from the 1995 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

*Marsha Gamberoni*

Marsha Gamberoni, Project Manager  
Project Directorate III-1  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: May 19, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 165

FACILITY 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 amendment number and contain vertical lines indicating the areas of change.

REMOVE

3-79

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4-13

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INSERT

3-79

3-79a

3-79b

4-13

4-15a

3.18 Deleted

3.19 IODINE REMOVAL SYSTEM

Specification

The Trisodium Phosphate (TSP) baskets shall be OPERABLE, containing  $\geq 8,300$  pounds and  $\leq 11,000$  pounds of active TSP.

Applicability

Specification 3.19 is applicable when the PCS is  $\geq 300^\circ\text{F}$ .

Action

3.19.1 With TSP not within limits, restore TSP to within limits within 72 hours.

3.19.2 If the action required by 3.19.1 is not met and the associated completion time has expired:

- a) The reactor shall be placed in HOT SHUTDOWN within 12 hours, and
- b) The reactor shall be placed in a condition where the affected equipment is not required, within 48 hours.

### 3.19 IODINE REMOVAL SYSTEM

#### 3.19 Basis Iodine Removal System Trisodium Phosphate (TSP) Baskets

TSP is placed in baskets on the floor at 590 ft. elevation in the containment building to ensure that iodine, which may be dissolved in the recirculated reactor cooling water following a loss of coolant accident (LOCA), remains in solution and that a neutral pH is maintained. Recirculation of the water for core cooling and containment spray provides mixing to achieve a uniform neutral solution pH. TSP also helps inhibit stress corrosion cracking (SCC) of austenitic stainless steel components in containment during the recirculation phase following an accident.

Fuel that is damaged during a LOCA will release iodine in several chemical forms to the reactor coolant and to the containment atmosphere. A portion of the iodine in the containment atmosphere is washed to the sump by containment sprays. The SIRWT water is borated for reactivity control. This borated water, if left untreated, would cause the sump solution to be acidic. In a low pH (acidic) solution, dissolved iodine will be converted to a volatile form. The volatile iodine will evolve out of solution into the containment atmosphere, significantly increasing the levels of airborne iodine. The increased levels of airborne iodine in containment contribute to the radiological releases and increase the consequences from the accident due to containment atmosphere leakage.

After a LOCA, the components of the safety injection and containment spray systems will be exposed to high temperature borated water. Prolonged exposure to hot untreated sump water combined with stresses imposed on the components can cause SCC. The rate of SCC is a function of stress, oxygen and chloride concentrations, pH, temperature, and alloy composition of the components. High temperatures and low pH, which would be present after a LOCA, tend to promote SCC. This can lead to the failure of necessary safety systems or components.

Adjusting the pH of the recirculation solution to levels above 7.0 prevents a significant fraction of the dissolved iodine from converting to a volatile form. The higher pH thus decreases the level of airborne iodine in containment and reduces the radiological consequences from containment atmosphere leakage following a LOCA. Maintaining the solution pH above 7.0 also reduces the occurrence of SCC of austenitic stainless steel components in containment. Reducing SCC reduces the probability of failure of components.

The hydrated form of TSP contains molecules of water attached to each molecule of TSP. That form of TSP is used because of the high humidity which might occur in the containment building during normal operation. Since the TSP is hydrated, it is less likely to absorb large additional amounts of water than anhydrous (without water) TSP and will undergo less physical and chemical change.

### 3.19 IODINE REMOVAL SYSTEM

#### Basis Iodine Removal System TSP Baskets (continued)

The quantity of TSP placed in containment is designed to adjust the pH of the sump water to be between 7.0 and 8.0. The pH needs to remain  $< 8.0$  to remain within the assumptions of the analysis for post-LOCA Hydrogen concentration in the containment. That analysis concludes that hydrogen generation will not exceed the limits of Regulatory Guide 1.7.

Weight limits: The minimum acceptable amount of TSP is that weight which will ensure a sump solution  $\text{pH} \geq 7.0$  after a LOCA, with the maximum amount of water at the minimum initial pH possible in the containment sump; a maximum acceptable amount of TSP is that weight which could cause a sump solution  $\text{pH}$  of  $\leq 8.0$  with a minimum amount of water at a maximum initial pH.

The TSP is stored in wire mesh baskets placed inside the containment at the 590 ft. elevation. Any quantity between 8,300 and 11,000 lb. of TSP will result in a pH in the desired range.

#### Basis Applicability 3.19

TSP baskets support operation of the Safety Injection System, The Containment Spray System, and the SIRWT. Therefore, the TSP baskets are required to be OPERABLE when the PCS is greater than 300°F.

#### Basis Action Statements 3.19

The listed Action is required to be completed within the specified time if the conditions of the specification are not met. If, prior to expiration of the specified completion time, the required conditions are restored, completion of the Action is not required. Each specified completion time starts at the time it is discovered that the Action statement is applicable.

Action 3.19.1 - TSP not within limit - If it is discovered that the TSP in the containment building is not within limits, action must be taken to restore the TSP to within limits. The Completion Time of 72 hours is allowed for restoring the TSP within limits, where possible, because 72 hours is the same time allowed for restoration of other ECCS components.

Action 3.19.2 - Required action AND associated completion time not met - If the required action cannot be met within the associated completion time, the plant must be placed in a condition where the inoperable equipment is not required. Twelve hours are allowed to bring the plant to HOT SHUTDOWN, and 48 hours to reach conditions where the affected equipment is not required, to avoid unusual plant transients. Both the 12 and the 48 hour time periods start when it is discovered that Action 3.19.2 is applicable.

Table 4.2.2 (continued)Minimum Frequencies for Equipment Tests

## 12. Iodine Removal System

Verify the Iodine Removal System TSP baskets are OPERABLE by the following surveillance:

- a. Verify the TSP baskets contain between 8,300 and 11,000 pounds of TSP each 18 months.
- b. Verify that a sample from the TSP baskets provides adequate pH adjustment of borated water each 18 months.

## 13. Containment Purge and Ventilation Isolation Valves

The Containment Purge and Ventilation Isolation Valves shall be determined closed:

- a. At least once per 24 hours by checking the valve position indicator in the control room.
- b. At least once every 6 months by performing a leak rate test between the valves.

## 14. Shutdown Cooling

To meet the shutdown cooling requirements of Section 3.1.9:

- a. The required reactor coolant pump(s), if not in operation should be determined to be OPERABLE once per 7 days by verifying correct breaker alignments and indicated power availability.
- b. The required steam generator(s) shall be determined OPERABLE by verifying the secondary water level to be  $\geq$ -84% at least once per 12 hours.
- c. At least one coolant loop or train shall be verified to be in operation and circulating reactor coolant at least once per 12 hours.

## 15. Main Feedwater Isolation

- a. Verify that the Main Feedwater Regulating valve and the associated bypass valve close on an actual or simulated Containment High Pressure (CHP) signal once each 18 months.
- b. Verify that the Main Feedwater Regulating valve and the associated bypass valve close on an actual or simulated Steam Generator Low Pressure (SGLP) signal once each 18 months.

Basis - Table 4.2.2 Item 12 - Trisodium Phosphate (TSP) Tests

Item 12a, TSP quantity verification

Verification of the quantity of TSP in the baskets ensures that neither leakage nor other water sources in the containment reduce the basket content below the required minimum. This requirement ensures that there is an adequate quantity of TSP to adjust the pH of the post LOCA sump solution to a value between 7.0 and 8.0.

Item 12.b - TSP quality verification

Periodic testing is performed to ensure the solubility and buffering ability of the TSP after exposure to the containment environment. Satisfactory completion of this test assures that the TSP in the baskets is "active" as required by Specification 3.19.

Adequate solubility is verified by submerging a representative sample of TSP from one of the baskets in containment in un-agitated borated water heated to a temperature representing post-LOCA conditions; the TSP must completely dissolve within a 4 hour period. The test time of 4 hours is specified to allow time for the dissolved TSP to naturally diffuse through the un-agitated test solution. Agitation of the test solution during the solubility verification is prohibited, since an adequate standard for the agitation intensity (other than no agitation) cannot be specified. The flow and turbulence in the containment sump during recirculation would significantly decrease the time required for the TSP to dissolve.

Adequate buffering capability is verified by a measured pH of the sample solution, following the solubility verification, between 7 and 8. The sample is cooled and thoroughly mixed prior to measuring pH.

The quantity of the TSP sample, and quantity and boron concentration of the water are chosen to be representative of post-LOCA conditions.



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 165 TO FACILITY OPERATING LICENSE NO. DPR-20

CONSUMERS POWER COMPANY

PALISADES PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated December 29, 1994, as supplemented February 2 and May 4, 1995, the Consumers Power Company (CPC, the licensee) requested an amendment to the Technical Specifications (TS) appended to Facility Operating License No. DPR-20 for the Palisades Plant. The proposed amendment would revise the iodine removal system TS to reflect the change to the system -- specifically, defining system operability, applicability, and associated action statements. The existing iodine removal system would be replaced with baskets of trisodium phosphate (TSP). The required surveillance has also been revised. The supplemental submittals provided clarifying information within the scope of the initial application and did not affect the staff's initial proposed no significant hazards consideration finding.

2.0 EVALUATION

The amendment, upon approval, will allow CPC to use TSP as the means of controlling the pH of the containment sump during post-accident conditions. TS 3.19, "Iodine Removal System," currently requires that sump pH be controlled by means of sodium hydroxide (NaOH) injection via the iodine removal system. The existing iodine removal system was not part of the original design, but was later added as a modification to the plant. In this case, NaOH injection is needed to maintain the water in the containment sump at a neutral or basic pH, in order to prevent re-evolution of elemental iodine into the containment atmosphere during the postulated accident conditions. The licensee now proposes to maintain the sump pH between 7.0 and 8.0 with TSP. The TSP will be contained in baskets that will be located in the lower region of the containment.

On September 9, 1993, the staff issued License Amendment 158 to the Palisades' TS (Reference 1) which allowed the licensee to remove the hydrazine storage tank from the plant design. The staff's safety evaluation (SE) accompanying the September 9, 1993, license amendment provides a description of the Palisades iodine removal system and the safety significance of maintaining the containment sump pH above 7.0.

TS 3.19, "Iodine Removal System," requires that 4200 gallons of NaOH be available for addition to the containment sump during power operation or periods when the temperature of the primary coolant system (PCS) is above

300°F. The licensee now proposes to use TSP as the method of controlling the pH of the containment sump during postulated design basis accidents (DBAs). The new TS limiting condition for operation (LCO) will require the licensee to maintain between 8,300-11,000 pounds of TSP in the baskets located in the bottom of the containment compartment. This is comparable to the amounts of TSP that have been approved for another domestic nuclear facility (Reference 2). Dissolution of the TSP from the baskets into the containment sump is designed to take place by a passive process once initiation of the containment spray system actuates during the (postulated) DBA.

The licensee used a computer code to calculate the masses of TSP that would be needed to maintain the containment sump pH above 7.0 during post-accident conditions. The computer code analyzed the reaction (titration) of boric acid and TSP. The licensee performed the computer code analyses ("computer runs") with different input parameters (pH inputs of 7.0, 7.2, 7.4 and 7.6; temperature inputs ranging from 50°F - 300°F; and a constant concentration of boric acid). The licensee concluded that the results of the "computer runs" were acceptable when the charge balance error resultant for each "computer run" was zero. The licensee performed a deterministic pH calculation in order to benchmark the computer code analyses. The values of TSP obtained in the licensee's deterministic calculation were in reasonable agreement with the results of the licensee's computer code analyses.

The staff checked the validity of the licensee's pH calculation and computer code results using the Figure 3-1, "Adjustment of Boric Acid Solution pH with TSP," in WCAP-10974, "Spray Additive Tank Deletion Analysis for the San Onofre Nuclear Generating Station Units 2 and 3," issued December 1985 (Reference 3). The staff has determined that the masses of TSP generated from the Figure 3-1 were in reasonable agreement with the masses of TSP listed in the licensee's deterministic calculation and computer code results. Therefore, the staff concludes that the licensee's pH calculation and computer code analyses are acceptable.

10 CFR Part 100 gives the requirements for "Reactor Site Criteria" at domestic nuclear power generating facilities. 10 CFR 100.10 and 100.11 require licensees to evaluate their sites in terms of radioactive releases to the environment during postulated DBAs. 10 CFR 100.11 requires licensees to define offsite exclusion areas and low population zones where the offsite dose to any individual located on the zone boundaries would be limited to maximum values of 25 rem total radiation dose to the individual's whole body and 300 rem total radioactive iodine dose to the individual's thyroid gland.

On May 4, 1995, CPC submitted supplemental information to the staff regarding the proposed TS amendment. This information provided the licensee's basis for stating that the proposed amendment would not alter important plant parameters which are essential inputs for the current Palisades 10 CFR Part 100 analysis. The staff has reviewed the submittal of May 4, 1995, and has determined that the proposed amendment will not change the iodine removal constants or decontamination factors that are used in the licensee's maximum hypothetical accident (MHA) analysis (the analysis used to determine compliance with 10 CFR Part 100 offsite dose requirements). The staff concludes that approval of the

proposed TS amendment will not preclude the licensee from meeting the requirements of 10 CFR Part 100.

The staff reviewed the proposed changes with respect to environmental qualification of electric equipment. The licensee stated that the TSP baskets will maintain the sump solution in the same pH range as with NaOH, therefore, chemical resistance of electrical equipment is unaffected. Accident radiation doses do not increase. The staff reviewed the replacement of the NaOH system for sump pH control with the passive TSP system and agrees with the licensee that qualification of electric equipment is not affected by this change.

The staff has reviewed the licensee's request for amending TS 3.19 regarding the iodine removal system and has determined that the licensee's basis for changing the chemical additive in the iodine removal system from NaOH to TSP is acceptable.

### 3.0 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.

### 4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 changes surveillance requirements. 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 previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (60 FR 6299). 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.

### 5.0 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.

6.0 REFERENCES

1. U. S. Nuclear Regulatory Commission, Amendment No. 158 to Facility Operating License No. DPR-20, Palisades Nuclear Power Station, Docket No. 50-255 (TAC No. M83825), September 9, 1993.
2. U. S. Nuclear Regulatory Commission, Amendment No. 96 to Facility Operating License No. NPF-30, Callaway Nuclear Power Plant, Docket No. 50-483, March 30, 1995.
3. McInerney, J.J., Westinghouse Electric Corporation, WCAP-10974, "Spray Additive Tank Deletion Analysis for the San Onofre Nuclear Generating Station Units 2 and 3," December 1985. [Proprietary Information - Not publicly available.]
4. McInerney, J.J., Westinghouse Electric Corporation, WCAP-10975, "Spray Additive Tank Deletion Analysis for the San Onofre Nuclear Generating Station Units 2 and 3," December 1985. [Non-Proprietary Information]

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Date: May 19, 1995