



**Consumers
Power**
POWERING
MICHIGAN'S PROGRESS

Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

G B Slade
General Manager

May 13, 1991

Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

**DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
NOTIFICATION OF PROPOSED CHANGE TO THE NATIONAL POLLUTANT DISCHARGE
ELIMINATION SYSTEM (NPDES) PERMIT**

The Palisades Environmental Protection Plan, Appendix B to the Facility Operating License, Section 3.2, requires that the NRC be notified of proposed changes to the plant's National Pollutant Discharge Elimination System (NPDES) Permit. Attached is a copy of the requested revision which we have submitted to the State of Michigan.


Gerald B Slade
General Manager

CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

Attachment

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ATTACHMENT

Consumers Power Company
Palisades Plant
Docket 50-255

Notification of Proposed Change
to the National Pollutant Discharge
Elimination System (NPDES) Permit

May 13, 1991

April 30, 1991

21EP10.1
DCC 950*70*20*02*03

Mr Paul D Zugger, Chief
Surface Water Quality Division
Michigan Dept of Natural Resources
PO Box 30028
Lansing, MI 48909

PALISADES PLANT - NPDES PERMIT NO. MI 0001457
BORON SHORT-TERM WASTE CHARACTERIZATION STUDY

The Schedule of Compliance under Part IC2a of the Company's Palisades NPDES Permit requires that "on or before May 1, 1991, the permittee shall submit and receive approval of a monitoring, sampling and analysis plan" for a Short Term Waste Characterization Study (STWCS) for Boron as required under Part IA4 of the Permit. In light of more recent data on Boron discharges from the plant (see attached discussion), the Company believes that the permit requirement for the STWCS is no longer necessary. Accordingly, the Company requests that the STWCS requirement be deleted from the permit. In the alternative that the STWCS requirement is not removed, the currently required study plan under Part IC2a of the permit is also included in the attached discussion for Staff consideration.

The last open item regarding boron releases to the lake is the maximum, total discharge level of boron to be evaluated. At no time would the plant's release of boron to the Lake be expected to exceed 0.5 mg/l boron. This issue is also further addressed in the attached discussion.

Should you have any questions or wish to discuss this matter further, please let me know as soon as possible.

Ronald L Fobes

Ronald L Fobes
Senior Environmental Advisor

CC FMorley, DNR-Plainwell
SHeaton, GLEAS, DNR-Lansing
GBoersen, Permits, DNR-Lansing

BCC KFBieszke, T-251
AACalloway, Palisades
DDHice, Palisades (W/O Attach)
JLKuemmin, Palisades

RMRice, Palisades (W/O Attach)
GBSlade, Palisades (W/O Attach)
PLStaley, M-1025
ATUDrys, M-1023

PALISADES PLANT
BORON DISCHARGES

Discussion

I. Request to Delete the Requirement for a Short-term Waste Characterization Study (STWCS) for Boron from the Palisades NPDES Permit

Based on recent 1989 boron monitoring data, which is summarized in the attached table, the Company is requesting that the STWCS requirement for boron be deleted from the Palisades NPDES Permit. It is the Company's understanding that elemental boron is not particularly harmful in the aquatic environment. Moreover, the discharge concentrations of boron for normally occurring releases are expected to be very low; i.e. not expected to exceed 0.025 ppm boron to the lake. On a very rare basis (once per year or less frequently as a worst case scenario), a single release could be expected to be no greater than 0.5 ppm boron to the lake. The following discussion summarizes the reason for boron use at the plant, its historical use and its current and future use following the recent replacement of the plant's steam generators.

The Palisades Plant began adding Boron to the old steam generators in early 1988 to help prolong the operating life of the generators. Boron has been found to effectively intervene in the corrosion process found in the crevices of the steam generators. The addition of boron to the old steam generators enabled the plant to continue operating until plans could be finalized for the replacement of those generators. Between September 1990 and February 1991, the Palisades Plant was retrofitted with two new steam generators at an approximate cost of 100 million dollars. The plant is very concerned with assuring the operating longevity of these new steam generators. Accordingly, boron has been added to the new generators to slow the corrosion process in the generator crevices. The normal operating boron concentration in the new generators will be maintained in a range between 5 and 10 ppm. In the past, the plant would periodically condition the old steam generators prior to start-up with a boron soak. Boron conditioning of the new steam generators may occur at some time in the future. If and when boron conditioning may be required for the new generators, the boron concentration during the soak period would be approximately 50 ppm boron. This conditioning is not part of the normal operating mode, but may occur periodically (once per year or less frequently) to aid in prolonging the life of the steam generators. During a soak period, however, plant operating conditions may change such that the plant would have to be immediately shut down. Under these conditions, it would be necessary to immediately blowdown the boron from the steam generators directly to the plant's mixing basin. Since this process must be completed rapidly, it would result in boron concentrations to the lake not to exceed 0.5 ppm. This would represent the worst case scenario of boron release to the lake via the mixing basin. This situation has never occurred to date, but the possibility of it occurring must be addressed.

Other sources of boron are also listed in the attached table. These boron sources result from the batch releasing of various tanks; i.e., Condenser Hotwell, Evaporator Distillate Tanks (T-90 and T-91), Condensate Storage Tank (T-2) and Radwaste (laundry Wastes). The Laundry Waste component of the radwaste, however, is no longer generated at Palisades. The laundry equipment was removed from service. Laundry is contracted to an outside vendor. The other tanks are periodically batched throughout the year as needed. The frequency of these releases are shown in the attachment and range from 1 to 8 times per year. The Turbine Building Sump has a daily flow of about 12,000 gallons. The source of boron to the Turbine Sump is from the steam generators which supply borated water to other secondary systems which may then drain to the Turbine Sump (i.e. leaks from blowdown pumps, flash tanks T-29 A and B, etc).

II. Boron Short-Term Waste Characterization Study (STWCS) - Alternative Study Plan

If the Company's preferred option of deleting the requirement for the Boron STWCS from the Plant's NPDES Permit as discussed under Part I of this discussion is not forthcoming, then the Company proposes to comply with the boron study requirements as follows:

Part IC2a of the Compliance Schedule of the Palisades NPDES Permit requires that the permittee submit and receive approval of a monitoring, sampling and analysis plan for the STWCS required for boron under Part IA4 of the Permit. The Company has two concerns with the study requirements as stated under Part IA4. The first is the Desired Analytical Detection Level of 50 ppb for boron. The second is the requirement that "as a condition of this permit, the permittee shall monitor the discharge from Outfall 001..."

The plant can readily and reliably analyze for boron to a detection level of 1 ppm using the ASTM Mannitol Titration Method. Analysis to a detection level of 50 ppb is not readily available and would require the purchase of additional instrumentation. Unfortunately, in light of the 1989 monitoring data presented in the attached table, even if the Desired Detection Level of 50 ppb was achieved, the discharge levels of boron to the lake would be below this detection limit. Calculated boron discharge levels to the lake during 1989 ranged from 5 to 25 ppb.

Secondly, the requirement to monitor at Outfall 001 (mixing basin discharge to the lake) is not appropriate. Any water quality parameter (including boron) measured at 001 will have already commingled with the 40,000 gpm dilution flow into the mixing basin. As a result of this dilution, boron concentrations monitored at 001 would be below the Desired Detection Level of 50 ppb.

Alternative Study Plan

If, after Staff's evaluation of this submittal, a study plan is still required, then the Company would propose to carry out the objectives of the boron study in the following manner:

In accordance with the Sampling Frequency specified under Part IA4, boron releases would be monitored for a period of one month per quarter from July 1, 1991 to July 1, 1992. NOTE: The time period of 11/1/90 to 11/1/92 found on page 7 of 16 is in error. The correct time period is found under Part IC2 b&c of the Compliance Schedule on page 11 of 16. The plant will monitor boron levels at their source with the ASTM Mannitol Titration Method with a detection level of 1 ppm. This level of detection is appropriate and reliable for the source concentrations of boron (see attached table). Because the dilution stream flows can be measured, the final discharge level of boron to the lake will then be calculated in the same manner as was done in collecting the boron monitoring data which is presented in the attached table.

III. Maximum Boron Discharge Concentration to Lake

The maximum boron discharge concentration to the lake at any one time would be no greater than 0.5 ppm as shown under Item 8 in the attached table. This would be a rare event occurring perhaps only once a year or at an even lesser frequency.

Historically, the Company first requested DNR's concurrence with a discharge concentration of boron to the lake not to exceed 0.5 mg/l in an August 4, 1988 letter to the Plainwell District DNR. An August 25, 1988 letter from Plainwell District DNR approved plant discharges of boron up to 0.5 mg/l. On August 31, 1988 Plainwell District DNR conducted an NPDES Compliance Evaluation Inspection (CEI) at the plant. During this CEI, further discussions were held regarding the various sources of boron releases at the plant. As a result of the boron discussions during the CEI, Plainwell District DNR issued a follow-up letter on September 16, 1988. This letter indicated that there had been misunderstandings regarding the Company's August 4, 1988 request and advised "Therefore, our earlier review and approval is not valid. A new review must be done to consider the total amount of boron in the discharge." Copies of these referenced correspondences are attached.

As a result of these developments, the Boron Short-Term Waste Characterization Study requirements were included under Parts IA4 and IC2 of the Plant's current NPDES Permit reissued August 10, 1990. In the time since this issue was first raised in mid-1988, the Plant has since monitored and developed new data on boron releases from the Plant during 1989. This data is summarized in the attached table. The Company believes this data to be sufficient for Staff's evaluation and a determination that a boron discharge concentration not to exceed 0.5 mg/l to the lake is acceptable.

PALISADES PLANT

CHARACTERIZATION OF BORON DISCHARGES

BASED ON 1989 SAMPLING DATA

Potential Boron Sources	NPDES Outfall	Individual Waste Stream Characterization					Combined Plant Disc to Lake		
		Disc Frequency (During 1989)	Disc Flow Rate to Mixing Basin (gpm)	Disc Vol per Release (gal)	Boron Measured Conc ^t (ppm)	Boron Mass Loading (lbs)	Mixing Basin Dilution Flow (gpm)	Boron Conct to Lake (ppm)	
1. Condenser Hotwell	00A	7/Year	450	36,000	1.0	0.30	40,000	0.005	
2. Radwaste (Laundry Waste Component*)	00D	0	--	--	--	--	--	--	
3. Condensate Storage Tank No. T-2	001	1/Year	150	62,500	4.5	2.34	40,000	0.023	
4. Evaporator Distillate Tank T-91	001	8/Year	125	50,375	3.5	1.47	40,000	0.018	
5. Evaporator Distillate Tank T-90	001	0 1/Year (if used)	-- 125 (if used)	-- 50,375 (if used)	-- 3.5 (if used)	-- 1.47 (if used)	-- 40,000 (if used)	-- 0.018 (if used)	
6. Turbine Bldg Sump	00F	Daily	8.3	12,000	5.0	0.50	40,000	0.025	
7. Steam Generator Blowdown (During Normal Operations)	001	(Rare-has never occurred to date)	120 (if used)	20,000 (if used)	10.0 (if used)	1.67 (if used)	40,000 (if used)	0.030 (if used)	
8. Steam Generator Blowdown (During Boron Soak)	001	(Rare-has never occurred to date)	120 (if used)	20,000 (if used)	50.0 (if used)	8.34 (if used)	40,000 (if used)	<0.500 (if used)	

*Laundry Waste Component - Laundering is no longer performed at the plant at this time; laundry equipment has been removed; laundry is currently done by outside vendor.

August 4, 1988

21EP10.1
950*70*20*02*03

Mr Fred Morley
District Surface Water Quality Supervisor
Michigan Department of Natural Resources
PO Box 355
621 N 10th Street
Plainwell, MI 49080

RE: PALISADES PLANT - BORIC ACID ADDITION TO THE STEAM GENERATOR

In response to the Company's previous request of January 20, 1988, Mr John Vollmer's letter of January 30, 1988 and follow up letter of clarification on February 25, 1988 provided DNR approval for the use and discharge of boron from the plant's steam generators (boilers). Based on the plant's operating experience under this authorization, it has become apparent that the Company must now request approval for an increased discharge level of boron to better accommodate plant operations during short-term power transients, ie during plant start up or shut down conditions. The Company, therefore requests MDNR concurrence/authorization for the release of boron from the plant's steam generators not to exceed 0.5 mg/l. A more detailed discussion of the Company's request is attached for your review and analysis.

A plant refueling outage is scheduled near the end of August, 1988. When the plant comes off line for this outage (a power transient), the level of boron released to the lake will need to be greater than that previously authorized. Accordingly, MDNR concurrence in this matter is requested by no later than August 26 1988. Your assistance and support of a timely determination in this matter is greatly appreciated.

Please contact me immediately should you have any questions regarding this request or need to schedule a meeting.

R L Fobes

Ronald L Fobes
Senior Environmental Advisor

CC GBoerson, MDNR-Lansing
(Surface Water Permits)
JGrant, MDNR-Lansing
(Great Lakes Environmental
Assessment Section)

PALISADES PLANT
DISCUSSION OF BORIC ACID ADDITION TO THE STEAM GENERATORS

Introduction

A comprehensive discussion of boron usage in the plant's steam generators was presented in the Company's previous January 20, 1988 submittal. Accordingly, that information will not be repeated here. New information, however, is discussed.

Since the addition of Boric Acid to the secondary system was approved Plant operating experience during 1988, indicates that, while the authorized release of up to 0.02 mg/l boron is achievable and appropriate for 95% of the time, during short term power transients plant operations require the discharge of boron at a higher level. The increased discharge level of boron is necessary to avoid extensive and costly delays in the start-up and shutdown of the unit. A discussion of the various modes of operation involving Boric Acid use during such power transients follows:

I. Start Up Of Plant

During start-up of the plant, Boric Acid is added to the steam generators (boiler) to achieve a concentration in the circulating steam generator coolant of 50 mg/l of Boron (290 mg/l Boric Acid). This concentration is held for 96 hours while the plant operates at 30% reactor power. Following this "soak period", and prior to escalating power to 100%, the steam generators are blowdown to the mixing basin under maximum blowdown to reduce the Boron concentration to 5-10 mg/l (30-60 mg/l Boric Acid) for full power operation. Preferable blowdown rates would be up to about 40,000 lbs/hour from each generator or 80,000 lbs/hr total. Under the currently authorized Boron release concentration of 0.02 mg/l, the blowdown rates to the mixing basin are constrained to only 6,000 to 7,000 lbs/hr per generator or 12,000-14,000 lbs/hr total. The preferable short term blowdown rate would result in the release of about 4 lbs/hr of Boron to the lake. With the mixing basin outfall flow volume of about 30 million lbs/hr (60,000 gpm) with cooling towers in operation, the actual outfall concentration to the lake would be about 0.13 mg/l Boron (0.8 mg/l Boric Acid).

II Trip Of Plant During Start Up Soak Period

To maintain a 50 mg/l residual level of Boron in the steam generators during the start up soak period, it is necessary to add 150-250 lbs of Boric Acid to each generator to meet "Hide Out" demand. ("Hide Out" is a phenomenon where a chemical additive such as Boron, plates out in crevices in the boiling region of the steam generators. When the steam generators are shut down, the majority of this "Hide-Out" material is redissolved in the boiler water resulting in increased concentrations of the chemical, Boron.)

Should the plant trip (unexpectedly shut down) during this time frame, the generator Boron concentration would increase to about 250 mg/l (maximum) due to this "Hide-Out" return. Steam generator blowdown under these circumstances would result in an outfall concentration to the lake of about 0.3 mg/l Boron.

III Shutdown Of Plant From 100% Power

During normal full power operating conditions, about 17-35 lbs of Boric Acid is maintained in each generator to provide a residual concentration of 5 - 10 mg/l Boron. This represents about 3-4 times the calculated "required" amount due to "Hide Out" document as discussed above. When the plant is shutdown, the majority of this "Hide Out" material is redissolved in the boiler water resulting in an increased concentration of 15-30 mg/l of Boron in the generators. Blowdown of the generators at a rate of 20,000 lb/hr from each generator combined with the mixing basin outfall flow volume of 75,000 gpm (increased flow due to cooling tower shut down) would result in a release concentration to the lake of 0.016-0.032 mg/l Boron.

Summary

Under the following, very conservative assumptions:

1. During normal operating conditions, assume 30 gpm makeup to steam generators and a corresponding blowdown from the steam generators of 30 gpm at 5 mg/l Boron to the mixing basin;
2. Assume two shut downs from 100% power and two corresponding full startup cycles (including soak periods) per month.

It is estimated that over a month's time about 200 lbs of Boron at an average concentration of 0.01 mg/l would be released to the lake.

From the preceding discussion it is now clear that the minimum Boron discharge level necessary to efficiently operate the plant (ie to support maximum steam generator blowdown during short term power transients) is 0.3 mg/l. However, based on the very limited operating experience with boron addition to the steam generators, no experience with blowdown from the generators during a plant shutdown situation, and potential variables that may be unforeseen at this time, the Company believes it reasonable to request authorization for boron releases from the steam generators to the lake at a level not to exceed 0.5 mg/l. This requested authorization is outside of boron release levels from any other plant discharges which were previously evaluated by Staff as part of the recent NPDES permit reissuance process.