

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Docket No. 50-282  
50-306

REQUEST FOR AMENDMENT TO  
OPERATING LICENSE NO. DPR-42 & DPR-60

(License Amendment Request Dated October 30, 1979)

Northern States Power Company, a Minnesota corporation, requests authorization for changes to the Environmental Technical Specifications (Appendix B) as shown on the attachments labeled Exhibits A, B and C. Exhibit A describes the proposed changes along with reasons for the change. Exhibit B is a set of Technical Specification pages incorporating the proposed changes. Exhibit C is supporting information.

This request contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By *L. J. Wachter*  
L J Wachter  
Vice President, Power Production  
& System Operation

On this 30th day of October, 1979, before me a notary public in and for said County, personally appeared L J Wachter, Vice President, Power Production and System Operation, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof and that to the best of his knowledge, information and belief, the statements made in it are true and that it is not interposed for delay.

*Jeanne M. Hacker*



1276 151

7911060308

EXHIBIT A

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
DOCKET NUMBERS 50-282 and 50-306

LICENSE AMENDMENT REQUEST DATED OCTOBER 30, 1979

---

PROPOSED CHANGE TO ENVIRONMENTAL TECHNICAL SPECIFICATIONS APPENDIX B  
OF OPERATING LICENSE DPR-42 and DPR-60

Pursuant to 10CFR50.59, the holders of Operating License DPR-42 and DPR-60 hereby propose the following change to the Appendix B Technical Specifications:

Specification B-2.4.1 Chlorine

PROPOSED CHANGE

Change the requirements to allow special chlorination programs according to the attached Exhibit B.

REASON FOR CHANGE

Growth of detrimental organisms in the plant circulating water system must be controlled by special chlorination programs.

ENVIRONMENTAL EVALUATION

See Exhibit C

EXHIBIT B

LICENSE AMENDMENT REQUEST DATED OCTOBER 30, 1979

Exhibit B, attached, consists of a revised page B-6 of the Appendix B Technical Specifications incorporating the proposed change.

Specification: The cooling water system shall be chlorinated for not more than a total of 2 hours per day. During chlorination periods, the total residual chlorine concentration at the outfall of the circulating water system shall not exceed 0.05 ppm. If chlorine treatment of the cooling water system is 30 minutes or less per day, the total residual chlorine concentration at the outfall shall not exceed 0.1 ppm. Corrective action will be taken if the protection condition is exceeded. If chlorination of other systems is necessary, the same standards apply.\*

Basis: The circulating water system condensers are cleaned mechanically. Normally only the cooling water system is chlorinated. The protection conditions of this specification will provide protection of the aquatic biota in the receiving waters.

#### 2.4.2 Corrosion Inhibitors and pH Control Agents

Objective: To avoid a significant deterioration in the river's water quality, by limiting the discharge of certain chemicals from the plant.

Specification: The amount of certain chemicals discharged to the river shall not exceed the following cumulative annual amounts as follows:

ammonia	3,300 lb/yr.
hydrazine	2,800 lb/yr.
morpholine-	700 lb/yr.
cyclohexylamine	

These chemicals are discharged at the outfall. No other corrosion inhibitors shall be discharged. While remaining within the above annual limits, daily blowdown discharge may vary as operations require, but under no conditions exceed a maximum of 30 pounds per day of ammonia at the outfall, with proportionately lower amounts of the other chemicals specified above. If the stated daily or annual protection conditions are exceeded, corrective action will be taken.

Basis: The only release of corrosion-inhibitor chemicals in plant operation is from the all volatile water chemistry treatment (AVT) required for the steam-generator secondary water treatment system. During normal full power operation, the steam generator blowdown flow is normally maintained at 120 gpm (total for both units).

\*Special chlorination programs for the circulating water system, similar to that described in Exhibit C of the License Amendment Request dated October 30, 1979, are permissible up to twice in each calendar year.



NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

October 25, 1979

T K Scherkenbach, Chief  
Compliance and Enforcement Section  
Division of Water Quality  
Minnesota Pollution Control Agency  
Roseville, Minnesota 55113

ATTENTION: D L KRIENS

PRAIRIE ISLAND NUCLEAR GENERATING PLANT  
Chlorination Plan to Treat Circulating Water

As you are aware, the parasitic amoeba, Naeqglaria fowleri has been identified in samples taken from the Prairie Island Plant Circulating Water System. NSP became aware of the existence of N. fowleri on September 25, 1979. The Minnesota Department of Health was notified of the presence of the amoeba on September 25. A meeting was held with MDH on September 26. The consensus of Health Department personnel was that the existence of the amoeba did not present a public health threat, nor was there any past record of health problems in Minnesota related to this organism. However, the amoeba's presence does present an occupational health concern. As a precaution, on September 26, plant personnel were instructed to wear rubber gloves when touching plant circulating or cooling water and wear respirators when working in the area of the cooling tower.

Subsequently, the Minnesota Department of Natural Resources and the Minnesota Pollution Control Agency were advised of the presence of the organism and a plan to treat the circulating water system to destroy the organism was developed. The purpose of this letter is to provide specific details of our proposed treatment and secure MPCA approval for an alteration in the mode of operation and the addition of chemicals to the Prairie Island Circulating Water System.



# NORTHERN STATES POWER COMPANY

Page 2

P I Chlorination Plan

MPCA - Oct 25, 1979

Literature references and recommendations by Dr Richard Tyndall of the University of Tennessee indicate that exposure to chlorine at a concentration of 2 mg/l (measured as free chlorine) for a period of six hours should be effective to destroy both the amoeba and its encysted form. In summary, our treatment plan consists of two phases: Phase One will occur during helper cycle operation and will be limited to chlorination of the cooling towers with subsequent dechlorination prior to discharge; Phase Two will occur during closed cycle operation with chlorination of the circulating water system for six hours at 2 mg/l free chlorine with dechlorination prior to discharge. This two-phased treatment procedure has been selected to prevent large amounts of biological material from entering the plant intake water systems. Since the amount of material which may be removed from the cooling towers due to chlorination is unknown, it is desirable to avoid its introduction to the intake. To aid in the effectiveness of chlorination, a biodispersant will also be utilized. The product chosen, Nalco 7348, is presently being used in the cooling water system at Prairie Island with approval of the MPCA. Once the plant returns to normal operation, followup sampling for N. fowleri will confirm the effectiveness of the treatment. Our present schedule calls for initiation of the treatment program on Wednesday, October 31, 1979.

## DETAILS OF TREATMENT PROCEDURE:

### A) Phase One - Helper Cycle

#### 1. Operational Parameters

- Unit 1 on line
- Unit 2 on line
- Discharge gates open
- Recycle gates closed
- All cooling towers in service with maximum practical number of fans on

1276 156

# NORTHERN STATES POWER COMPANY

Page 3

P I Chlorination Plan

MPCA - Oct 25, 1979

The transition from present (normal) operation to helper cycle requires a gradual reduction in recirculation canal temperature to prevent cold shock to resident fish. For temperatures between 40° F and 60° F, a 5° F drop per 24 hours is allowed. Thus, for the anticipated  $\Delta T$  of about 15° F, three days will be required to reach helper cycle operation.

## 2. Fish Removal

Since chlorine at concentrations of 2 mg/l (free) are likely to be lethal to fish, attempts will be made to remove fish from the cooling tower return canal prior to commencement of chlorination. NSP biologists will coordinate their efforts in this regard with MDNR personnel. We are presently planning to add copper sulfate at a concentration of 0.3 mg/l. Fish in the canal will sense the copper sulfate and actively seek areas free from the chemical. Thus it is felt they will leave the canal via the discharge structure. The application of copper sulfate will be conducted in conjunction with MDNR personnel.

## 3. Chlorination

- Chlorination chemical: liquid sodium hypochlorite (15% sodium hypochlorite)
- Chlorination injection point: Cooling tower pump bay
- Chlorination injection method: pumped from truck tanker at known pumping rates
- Biodispersant: Nalco 7348
- Biodispersant injection point: cooling tower pump bay
- Biodispersant injection method: pumped from 55 gallon drums at known pumping rates

1276 157

# NORTHERN STATES POWER COMPANY

Page 4

P I Chlorination Plan

MPCA - Oct 25, 1979

The volume of water in the cooling towers and cooling tower return canal is about 21.5 million gallons. At a flow of 600,000 gallons per minute, the time through the system is 36 minutes. Thus, chlorination during Phase One will have a contact time of 36 minutes. Recent Lab tests of Mississippi River water indicate a 36 minute chlorine demand of 5.5 mg/l. To maintain 2 mg/l free chlorine, a dose of 7.5 mg/l will be required. However, the tests were not able to determine the additional chlorine demand of the circulating water system due to the presence of slime in the cooling towers, sediment in the canals, etc. Thus, the dose of chlorine required will be greater than 7.5 mg/l. Monitoring of the free chlorine concentration in the system will dictate what additional chlorine will be required.

## 4. Monitoring

- Sample point location

- 1) Cooling tower pump discharge - Sample Point 1
- 2) Cooling tower return canal - Sample Point 2
- 3) Discharge canal - Sample Point 3

- Chlorine Measurement Test Methods

- 1) Iodometric titration utilizing amperometric end point
- 2) DPD colorimetric

- Monitoring Frequency

- 1) Grab samples from Points 1 and 2 will be taken at 30 minute intervals
- 2) Grab samples from Point 3 will be taken at 30 minute intervals.

1276 158



Page 5  
P I Chlorination Plan  
MPCA - Oct 25, 1979

Sample Point 1 was selected to provide information on the maximum chlorine concentration in the system. This point is located immediately downstream from the chlorine application point, yet upstream of the cooling towers where the greatest chlorine demand is expected. Sample Point 2 is located at the cooling tower return canal at a point downstream of the discharge from the last cooling tower. Point 3 is the normal discharge canal sample Point. Point 2 will dictate additional requirements to add chlorine and also provide information to determine the amount of dechlorination required.

Both amperometric titration and DPD colorimetric procedures will be utilized. The monitoring frequency indicated above will be the minimum amount of monitoring. Additional testing at these and other points is likely.

#### 5. Dechlorination

- Dechlorination chemical: Liquid sodium sulfite
- Dechlorination injection point: cooling tower return canal
- Dechlorination injection method: pumped from truck tanker at known pumping rates

The dechlorination will commence with the start of chlorination. Sodium sulfite will be added on stoichiometric basis with the total chlorine residual. The dechlorination will continue at a rate proportionate to the chlorine concentration at Sample Point 2. Concurrent analysis for chlorine at Point 3 will indicate the effectiveness of dechlorination.

# NORTHERN STATES POWER COMPANY

Page 6  
P I Chlorination Plan  
MPCA - Oct 25, 1979

## 6. Cessation of Phase One

The purpose of Phase One treatment is to prevent large amounts of biological material sluffed off the cooling towers from entering the plant intake systems. Since it is impossible to predict the amount of material the chlorination will remove, the length of time for Phase One cannot be stated in advance. It is anticipated that three to four hours should be sufficient.

### B) Phase Two - Closed Cycle

#### 1. Operational Parameters

- Unit 1 - on line at reduced load
- Unit 2 - on line at reduced load
- Discharge gate open to allow approximately 25 cfs discharge
- Recycle gates open
- All cooling towers in service with maximum practical number of fans on

The same transition period is required to bring the system back to closed cycle operation as that required for a change to helper cycle to prevent cold shock of fish. Thus, about three days will be required after Phase One to begin Phase Two treatment.

During Phase Two, a single discharge gate will be opened to allow a discharge of approximately 25 cfs to prevent water from passing under the skimmer wall at the plant intake canal.

Page 7  
P I Chlorination Plan  
MPCA - Oct 25, 1979

## 2. Fish Removal

Since fish may be residing in the recirculation canal, attempts will be made to remove them prior to the start of Phase Two. Options available are electro-shocking or seining with subsequent reintroduction of fish outside the circulating water system or the application of a fish dispersant (0.3 mg/l  $\text{CuSO}_4$ ). The latter option will be conducted in conjunction with MDNR personnel.

## 3. Chlorination

The chlorination and biodispersant chemicals and injection points are the same as for Phase One. The intent of Phase Two is to operate the circulating water system closed cycle, chlorinate to 2 mg/l free chlorine and hold that concentration for six hours. Lab tests of the six-hour chlorine demand of the recirculation canal water indicate a dose of 13 mg/l to maintain 2 mg/l free. The lab tests utilized to determine chlorine demand were not able to determine the additional demand of the entire circulating water system due to the presence of slime in the cooling towers, sediment in the canals, etc. Thus, the total amount of chlorine required will doubtlessly be greater than 13 mg/l. Monitoring of the free chlorine concentration in the system will dictate what additional chlorine will be required to maintain a 2 mg/l concentration for the six-hour period.

## 4. Monitoring

### ● Sample point location

- 1) Cooling tower pump discharge - Sample Point 1
- 2) Discharge Canal - Sample Point 3
- 3) Inlet to condenser - Sample Point 4
- 4) Recirculation canal - Sample Point 5

# NORTHERN STATES POWER COMPANY

Page 8

P I Chlorination Plan

MPCA - Oct 25, 1979

## ● Chlorine Measurement Test Methods

- 1) Iodometric titration utilizing amperometric end point
- 2) DPD colorimetric

## ● Monitoring Frequency

- 1) Grab samples from Points 1 and 3 will be taken at 30 minute intervals during the chlorination treatment
- 2) Grab samples from Point 4 will be taken at 30 minute intervals
- 3) Grab samples from Point 5 will be taken periodically

Sample Point 1 was selected to provide information on the maximum chlorine concentration in the system. Sample Point 4 is located at the inlet to the condensers and will provide information at the "end of the loop" where the chlorine concentration is expected to be the least. Thus, Point 4 will dictate additional requirements to add chlorine to maintain 2 mg/l free. Random samples from the recirculation canal (Point 5) will be used to assess completeness of mixing and provide further information on chlorine concentration in the system. Sample Point 3 will indicate the effectiveness of dechlorination.

As in Phase One, both amperometric titration and DPD colorimetric procedures will be utilized. The monitoring frequency indicated above will be the minimum amount of monitoring. Additional testing at these and other points is likely.

Page 9

P I Chlorination Plan

MPCA - Oct 25, 1979

5. Dechlorination

- Dechlorination chemical: liquid sodium sulfite
- Dechlorination injection point: cooling tower pump bay
- Dechlorination injection method: pumped from truck tanker at known pumping rates

The dechlorination will commence after the circulating water system has been exposed to 2 mg/l free chlorine for six hours. Based on the amount of chlorine added and the concentration of chlorine in the system, a calculation prior to dechlorination will provide the amount of sodium sulfite to add. The dechlorination will continue until chlorine concentrations in the system are less than the detection limit ( $<0.05$  mg/l) as measured by amperometric titration.

6. Monitoring during dechlorination

The same monitoring points and test methods will be used as in the chlorination phase.

7. Discharge of dechlorinated water

Once sample analyses show total chlorine residual concentrations less than detection at sample Points 1, 4, and 5, the discharge gates will be opened and the plant will return to its normal operating mode. Grab samples will be taken from the discharge canal during discharge at 15 minute intervals for 90 minutes.



8. Environmental Assessment

Since there is a potential for fish mortality during this treatment, an impingement survey will be conducted. Additionally, any impacts associated with the chlorinated cooling tower drift will be assessed.

9. Sampling for Naeglaria fowleri

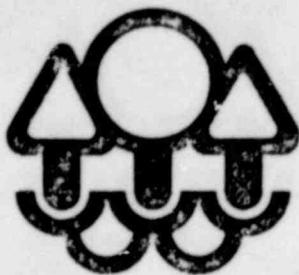
After completion of the treatment procedure, samples will be collected and checked for N. fowleri.



R D CLOUGH, ASSISTANT ADMINISTRATOR  
Special Projects

jp

cc: Howard Krosch, MDNR  
Russell Frazier, MN Health Department



## Minnesota Pollution Control Agency

OCT 29 1979

R. D. Clough, Assistant Administrator  
Special Projects  
Regulatory Compliance and Services  
Northern States Power Company  
414 Nicollet Mall  
Minneapolis, Minnesota 55401

Re: NSP - Prairie Island Nuclear Generating Plant  
Chlorination Plan for Circulating Water Treatment

Dear Mr. Clough:

We have received and reviewed the proposal for chlorination of the cooling water system to eliminate the parasitic amoeba at the Prairie Island Plant. It is our understanding that the chlorination program would proceed under two phases. Phase I consists of chlorination of the cooling towers under helper mode cooling operation with subsequent dechlorination prior to discharge. Phase II consists of chlorination of the total circulating water system under closed cycle cooling operation with minimum blowdown and subsequent dechlorination prior to discharge.

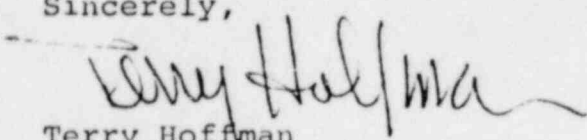
In order to prevent cold shock fish mortality a gradual transition from the present operation to helper cycle is proposed. Initiation of this transition is proposed to begin Sunday, October 28, 1979, with full helper cycle beginning Wednesday, October 31, 1979, during which Phase I chlorination/dechlorination commences. Previous to chlorination, copper sulfate will be added under recommendation from the Minnesota Department of Natural Resources, in order to aid removal of any fish residing in the cooling tower return canal. It is also our understanding that fish removal by some means will be undertaken to remove fish from the recirculation canal previous to Phase II chlorination.

Mr. R. D. Clough  
Page Two

Minnesota Pollution Control Agency staff approve of this plan for chlorination/dechlorination as described in your letter of October 26, 1979, which details the proposed plan. However, we are concerned about requirements for future chlorination. We believe it is important to comprehensively evaluate the success of the chlorination program to obtain substantial data for future use should the amoeba problem reoccur. Therefore, we are requesting that a report be submitted to this office within six weeks after the chlorination program concludes. This report should include all chlorine monitoring data and monitoring for the presence of the amoeba after chlorination.

Should you have any questions regarding this approval please contact Don Kriens of my staff at 612-296-7363.

Sincerely,



Terry Hoffman  
Executive Director

TH/dc

cc: Howard Korsch, Department of Natural Resources  
Russell Frazier, Department of Health

1276.166