Northern States Power Company

414 Nicollet Mall
Minneapolis, Minnesota 55401-1927
Telephone (612) 330-5500

January 29, 1990

Generic Letter 89-13

Director of Nuclear Reactor Regulation
U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Response to Generic Letter 89-13
Service Water System Problems
Affecting Safety-Related Equipment

Attached is our response to Generic Letter 89-13, "Service Water Problems Affecting Safety Related Equipment", for the Prairie Island Nuclear Generating Plant.

Please contact us if you have any questions related to our response.

Thomas M Parker
Manager
Nuclear Support Services

c: Regional Administrator, Region III
Senior Resident Inspector, NRC
NRR Project Manager, NRC
G Charnoff

Attachments: Affidavit
Generic Letter 89-13 Response

1/1

A065

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT DOCKET NO. 50-282
50-306

SERVICE WATER SYSTEM PROBLEMS
AFFECTING SAFETY-RELATED EQUIPMENT

Northern States Power Company, a Minnesota corporation, with this letter is submitting information requested by NRC Generic Letter 89-13.

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By _____
Thomas M Parker
Manager, Nuclear Support Services

On this 29 day of January 1990 before me a notary public in and for said County, personally appeared Thomas M Parker, Manager, Nuclear Support Services, 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.

_____

JUDY L. KLAPPERICK
NOTARY PUBLIC—MINNESOTA
ANOKA COUNTY
My Commission Expires Sept. 29, 1991

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

Response to Generic Letter 89-13
Service Water System Problems
Affecting Safety-Related Equipment

Prairie Island has in place many procedures for surveillance and control of the open cycle service water system. Many aspects of the program described in Generic Letter 89-13 exist yet need to be formalized and strengthened.

I. The "Recommended Program to Resolve Generic Issue 51" using Surveillance Technique A and Control Techniques B and C will be implemented with minor changes. Surveillance technique D is required only for freshwater plants that have not previously detected the presence of Asiatic clams. Asiatic clams have been previously detected at Prairie Island and the treatment program identified under Item B below will address their presence.

A. SURVEILLANCE TECHNIQUE A

Prairie Island has two different intake locations for the emergency cooling water pumps. The normal supply to the emergency pump bay is from the circulating water pump bay. Water is also supplied to the emergency bay via a 36" emergency intake pipe. This pipe, buried in the approach canal and intake canal bottom, directs water from the deepest part of the river to the emergency bay (See Figure 1).

The normal supply to the emergency bay is dewatered, inspected and cleaned each refueling outage for the respective unit. This work is controlled via the circulating water pump preventive maintenance procedures.

The emergency intake bay and intake pipe are flushed on a monthly basis via a standing surveillance procedure. A recent inspection by a scuba diver has proven this method to be very effective in lieu of dewatering and cleaning. Because the emergency intake bay and intake pipe are shared by both units it is not possible to dewater the complete emergency cooling water bay due to safety concerns and Technical Specification limitations.

A procedure will be developed to periodically inspect the emergency intake crib located in the river. The initial inspection was performed in the Fall of 1989. Since this inspection demonstrated that the monthly backwash has been effective, the frequency of these inspections will be set at 5 years.

Implementation of the surveillance program as defined above will aid in reducing incidence of flow blockage as a result of biofouling.

B. CONTROL TECHNIQUE B

Prairie Island has recently embarked on a project to determine the extent of biofouling and corrosion occurring on the interior pipe surfaces of the service water system. It is also the intent of this study to assess the performance of the current chlorination program on biofouling and related corrosion in the service water system.

The methods used in the project are:

1. Obtain relevant samples of pipe sections for chemical and microbial analysis of the deposit as well as energy dispersive X-ray analysis, and scanning electron micrograph (SEM) analysis of the pipe surface.

2. Obtain replicate water samples as it enters and exists the system for chemical and microbial analyses.

Preliminary results show the following:

The total amount of deposit accumulated per unit area was relatively high on the removed pipe sections from the Prairie Island distribution system. The larger the pipe diameter, the higher the total amount of deposit accumulated. Generally, the larger pipe experiences a large flux of materials (e.g., nutrients, particles, etc) and, thus, will accumulate more deposit. The deposits consist primarily of inorganic material (approximately 90%). The most prominent elements in the deposit are Fe, Mn, and in some cases, Ca. the deposition of Fe and Mn appears to be related to the activity of filamentous and other metal-oxidizing and metal-depositing bacteria based on electron microscopic evidence. The chlorine treatment may also influence the Fe and Mn deposited. Fe and Mn depositing/oxidizing bacteria were present in all deposit and water samples from Prairie Island. The deposit fraction of Fe and Mn consistently changes with distance from the chlorine injection point. Mn content in the deposit increases with distance from the chorine injection while Fe content decreases. These trends appear to be related to the redox chemistry of the chlorine-Mn and chlorine-Fe reactions.

Under-deposit corrosion is evident in virtually all samples. However, the wall thickness has not gone below the minimum wall thickness criteria. Deep pitting is observed under tubercles consisting primarily of Fe. The Fe tubercles also contain filamentous microorganisms, probably fe-oxidizing or fe-depositing bacteria. Broad shallow "gouges" (as compared to the Fe tubercles) are observed under manganese-rich deposits. These deposits contain high concentrations of bacteria. Fe

and Mn concentration decrease in the water as it flows through the system. However, the Fe (98%) and Mn (0.2%) in the carbon steel alloy may also provide the source for Fe and Mn in the deposits. In any case, the localized corrosion can partially be attributed to the acidic metal (Fe and Mn) chloride formation in the area of attack.

Biological activity in the deposits, particularly aerobic bacteria (Pseudomonas), is present. Anaerobic bacteria numbers, especially Sulfate Reducing bacteria, were very low. Thus, the service water undoubtedly presents a strong oxidizing environment for the pipe surfaces in the system which would enhance Fe and Mn.

The effectiveness of the chlorination program is continuing to be studied. This study will be completed by December 31, 1990. Alternate biocides may be considered. Any changes to the existing program will require state pollution control agency approval.

C. CONTROL TECHNIQUE C

Redundant and infrequently used service water lines on the auxiliary feedwater system and the safeguards diesel generators are periodically flushed. This flushing has proven effective to reduce fouling potentials. Modifications are being performed on the auxiliary feedwater system to reduce the time period the auxiliary feedwater pumps are out of service for flushing.

Service water loops that are in lay-up are presently not treated prior to lay-up. Recommendations during lay-up will come under the same state stipulations as B above. A schedule for a lay-up program will be provided when B is resolved.

II. The safety related heat exchangers cooled by service water are listed in Table 1. Each of the heat exchangers, with the exception of the containment fan coil units, is cleaned regularly via a preventive maintenance procedure. The containment fan coil units have a continuous high flow thorough them and therefore are not cleaned. In addition to regular cleaning, the component cooling heat exchangers are flushed at monthly intervals. To assure heat exchanger tube integrity and lack of degradation eddy current testing is used on some of the heat exchangers. These practices provide reasonable assurance that the heat exchangers will perform satisfactorily under design basis conditions.

To further augment Prairie Island's program a heat exchanger performance testing program will be implemented. Each of the safety related heat exchangers will be disassembled and cleaned to the extent possible. After the cleaning, baseline data will be obtained to establish a foundation for future periodic monitoring.

A periodic retest program will be implemented as suggested in the Generic Letter. Smaller heat exchangers such as the diesel generator lube oil cooler will be inspected and cleaned as scheduled by the preventive maintenance program in lieu of testing for degraded performance. The other safety related heat exchangers will be placed in the periodic retest program.

Different methods of performance monitoring are still being studied. Once the appropriate methods are selected and the required equipment obtained performance monitoring surveillance procedures will be written and scheduled. The initial frequency for the periodic retest program will be at least once per fuel cycle. After three tests the data will be evaluated to determine the best monitoring frequency. Should any of the retests or trends show degraded conditions appropriate corrective actions will be taken. The results of the retest program may impact the preventive maintenance program. Heat exchanger preventive maintenance procedures and schedules will be revised as directed by this testing.

III. The service water piping at Prairie Island is primarily carbon steel. There are no protective coatings in the service water piping.

Accessible areas of interior surfaces will be inspected and the results documented. If excessive accumulations are found the piping will be cleaned. Methods are being developed to mechanically clean interior surfaces of piping.

An erosion-corrosion pipe thinning study similar to the program used on high energy secondary system piping will be implemented. Sample ultrasonic thickness measurements will be taken to assure piping integrity. The service water piping system was designed with large corrosion allowances in the pipe wall thickness. This design margin may allow less frequent inspections for wall loss. After the initial inspections, scheduled for the Winter, 1990 Unit 1 outage and Fall, 1990 Unit 2 outage, inspection frequencies and subsequent schedules will be developed and implemented.

IV. The service water system and the component cooling water system have recently been walked down for the close out of NRC IEB 79-14 and for a service water system Piping & Instrumentation Diagrams upgrade. These walkdowns have proven that these systems are in compliance with the established design. A recent study of the service water system for potential upgrades further supports this conclusion.

In response to the generic letter Prairie Island will perform a single failure analysis to verify the service water system's and the component cooling water system's ability to perform the required safety functions in the event of a failure of a single active component. Furthermore, a review of the QA/Design classification, as depicted on flow diagrams and in the plant technical database, to verify that all safety related components are of the proper classification for both pressure boundary and functional operability and that they are powered by the appropriate safeguards power source will be performed. These analyses will be performed within the schedule stipulated in the generic letter.

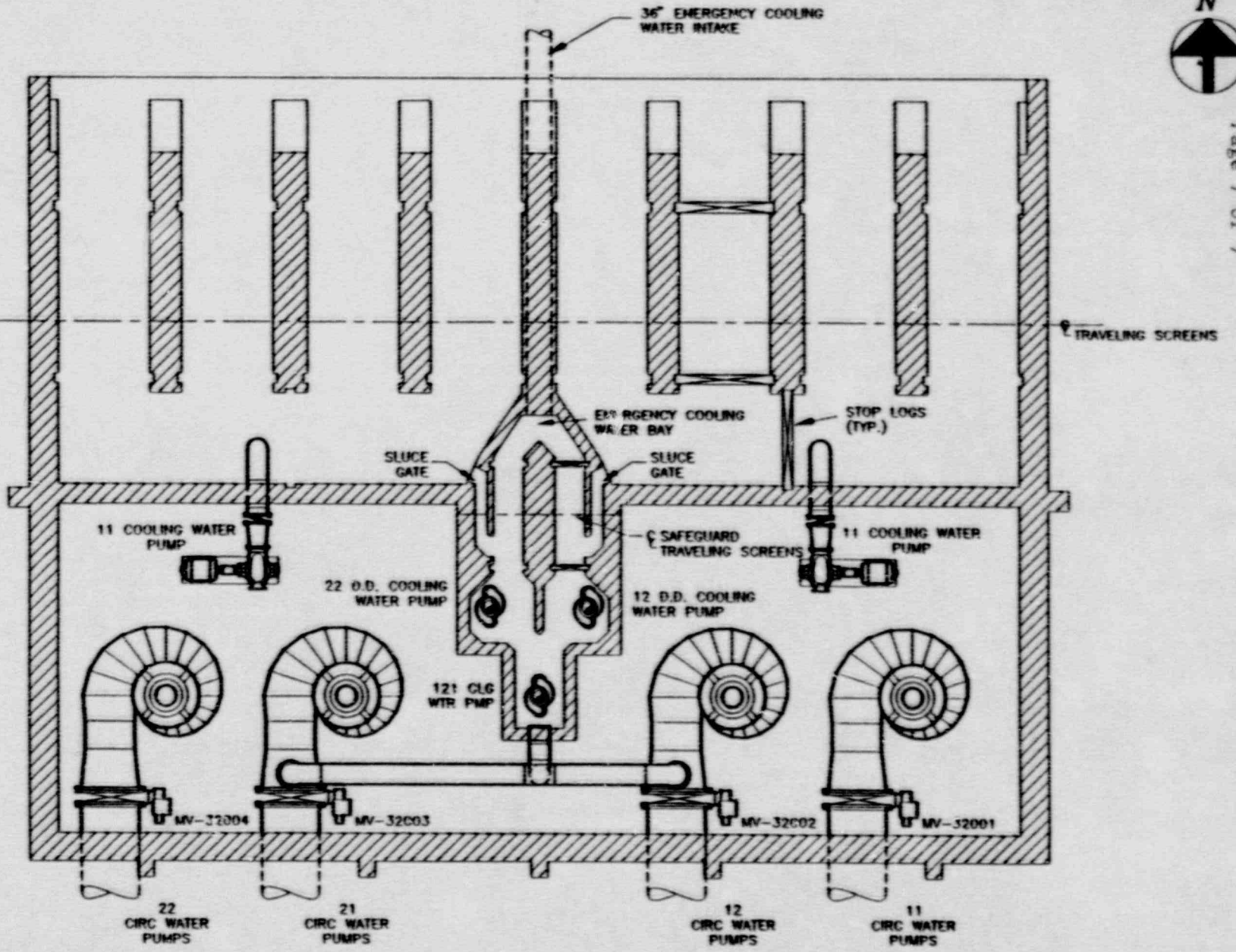
V. Maintenance practices, operating and emergency procedures and training involving the service water system and the component cooling eater system are in the process of being reviewed and updated. Training is being provided to operations, maintenance and the engineering and technical staff to reinforce the importance of the ultimate heat sink.

Reviews and any identified updates of maintenance practices, operating and emergency procedures and training plans will be completed as stipulated in the generic letter. Training on the service water system and component cooling water system will be completed during the 1990 calendar year.

TABLE 1

SAFETY RELATED HEAT EXCHANGERS COOLED BY SERVICE WATER

UNIT 1	UNIT 2
11 Containment Fan Coil Unit	21 Containment Fan Coil Unit
12 Containment Fan Coil Unit	22 Containment Fan Coil Unit
13 Containment Fan Coil Unit	23 Containment Fan Coil Unit
14 Containment Fan Coil Unit Motor	24 Containment Fan Coil Unit
11 Containment Fan Coil Unit Motor Cooler	21 Containment Fan Coil Unit Motor Cooler
12 Containment Fan Coil Unit Motor Cooler	22 Containment Fan Coil Unit Motor Cooler
13 Containment Fan Coil Unit Motor Cooler	23 Containment Fan Coil Unit Motor Cooler
14 Containment Fan Coil Unit Motor Cooler	24 Containment Fan Coil Unit Motor Cooler
12 Diesel Driven Cooling Water Pump Jacket Cooler	22 Diesel Driven Cooling Water Pump Jacket Cooler
12 Diesel Driven Cooling Water Pump Gear Oil Cooler	22 Diesel Driven Cooling Water Pump Gear Oil Cooler
D-1 Emergency Diesel Generator	21 Component Cooling Heat Exchanger
D-2 Emergency Diesel Generator	22 Component Cooling Heat Exchanger
121 Safeguards Chiller	
122 Safeguards Chiller	
11 Component Cooling Heat Exchanger	
12 Component Cooling Heat Exchanger	



PRAIRIE ISLAND TRAINING CENTER RED WING, MINNESOTA	SCREENHOUSE COOLING WATER SUPPLY	DRAWN BY: M. PEKARIK REVIEWED BY:	REVISION: 1 DATE: 2/1/89	FIGURE 1