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OGC-MKaufman
RO (3)
DSkovholt
VMoore-ASDLWR
RVollmer, L
PCollins, L
MJinks
LKintner

Docket No. 50-282

APR 2 1974

Change No. 2
License No. DPR-42

Northern States Power Company
ATTN: Mr. A. V. Dienhart
Vice President - Engineering
414 Nicollet Avenue
Minneapolis, Minnesota 55401

Gentlemen:

Environmental Technical Specifications for the Prairie Island Nuclear Generating Plant Units 1 and 2 were issued as Appendix B to License No. DPR-42 on August 9, 1973. These Technical Specifications have been reviewed by the AEC and by Northern States Power Company with consideration of operating experience and for clarification. As agreed in discussions between your staff and our staff the attached changes have been made. The changes were numerous enough so that issuing corrected pages was not practical. Consequently, a complete new Appendix B Environmental Technical Specification is issued. Enclosed is a list of the changed sections and the purpose of each change.

The changes in the Technical Specifications do not involve a change in environmental impact and there is reasonable assurance that the health and safety of the public will not be endangered.

Sincerely,

Original signed by
Voss A. Moore

Voss A. Moore, Assistant Director
for Light Water Reactors Group 2
Directorate of Licensing

Enclosures:
1. Changes to Appendix B - Environmental Technical Specifications
2. Revised Appendix B

cc: Listed on page 2

OFFICE	L:EP-2	L:EP-2	L:ADEP	L:PM	L:LWR-2	L:ADLWR
SURNAME	MGrotenhuis:dvw	GDicker	DMuller	LKintner	KKniel	VMoore
DATE	3/21/74	3/28/74	3/28/74	4/1/74	4/1/74	4/1/74

APR 8 1974

cc:
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DATE➤						

APR 2 1974

CHANGES TO APPENDIX B

ENVIRONMENTAL TECHNICAL SPECIFICATIONS FOR LICENSE NO. DRP-42

Page	Section	Comment
B-1	B	reworded for clarification
	D	reworded for clarification
	E	reworded for clarification
	G	"significant" event renamed "environmental" event consistent corrections were made throughout the Tech Specs
	H	abnormal occurrence was deleted. consistent corrections were made throughout the tech specs
	I	reworded for clarification
	J	reworded for clarification
B-2	2.1	specifications reworded for clarification
B-2	2.2.1	specifications reworded for clarification
B-3	2.2.2	basis rewritten for clarification
B-4	2.2.3	basis reworded for clarification
	2.3	specifications items 2 and 4 reworded to include a requirement for 24-hour notice
B-5	2.3	basis reworded for clarification
	2.4.1	specification reworded for clarification
	2.4.1	basis reworded for clarification
B-6	2.4.2	specification reworded for clarification

B-7	2.4.2	paragraph 3 of basis reworded for clarification
	2.4.3	objective reworded for clarification
	2.4.3	specification reworded for clarification
	2.4.4	specification reworded for clarification
B-8	3.1	specification reworded for clarification
	3.1	basis reworded for clarification
B-9	3.2.1	specification reworded for clarification
B-10	3.2.2	sentence added for clarification of basis
B-11	3.2.3	old basis added to specification, new basis written
B-11	3.3	specification revised to include measurement
	3.4.1	objective reworded for clarification
	3.4.1	specification rewritten for clarification
B-12	3.4.1	basis rewritten for clarification
	3.4.2	specification reworded for clarification
	3.4.2	basis reworded for clarification
B-13	3.4.3	specification rewritten for clarification
	3.4.4	specification reworded for clarification
	3.4.4	basis reworded for clarification
B-15	4.1.1 A	section 3a paragraph 1 of basis deleted
B-16	4.1.1 A	section 3b of basis updated to include three additional locations
B-17	4.1.1 A	sentence added to section 3c of basis to permit interruptions of sampling during adverse weather conditions

APR 2 1974

B-18		4.1.1	B	specification reworded for clarification
B-20		4.1.2		basis reworded for clarification
B-22		4.2.3		specification updated
		4.2.3		last sentence of basis deleted because of redundancy
		4.2.4		last sentence of basis deleted because of redundancy
B-23		4.2.5		last sentence of specification deleted because of redundancy
B-24		5.1.2	C	deleted because of redundancy
		5.1.2	D	changed to C and rewritten to include the delineation responsibility for the audit function
		5.2		updated
B-25		5.3.1		updated
		5.3.2		updated
B-26		5.4.1	B	updated
		5.4.2	A	updated
		5.4.2	B	deleted for consistency
		5.4.2	C	deleted for consistency
		5.4.2	D	changed to B
		5.4.2	B.1	added sentence to require evaluation of environmental impact of any changes
		5.4.2	B.3	updated
B-30	figure	4.1.1-2		updated by adding three new locations.

Change No.2
License No. DPR-42
April 2, 1974

APPENDIX B

TO

OPERATING LICENSE DPR-42

ENVIRONMENTAL

TECHNICAL SPECIFICATIONS AND BASES

FOR

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

UNITS 1 AND 2

NORTHERN STATES POWER COMPANY

DOCKET NOS. 50-282 AND 50-306

APPENDIX B

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

1.0 DEFINITIONS

A. Onsite: Any area included within NSP owned property that is continguous with the plant structure.

B. Offsite: All properties or areas not considered onsite by the above definition.

C. Discharge Canal: That portion of Truttman's Slough starting at the outfall and extending East and Southeast to the temperature sensors located at Barney's Point (Figure 3.1.2-1).

D. Point of Discharge: Downstream end of the discharge canal.

E. Outfall: The shoreline location where effluent water flows into Truttman's Slough as indicated on Figure 3.1.2-1.

F. Ambient River Water Temperature: The temperature of the river water flowing into the plant intake unaffected by heat discharged from the plant.

G. Environmental Event: Exceeding a protection condition.

H. Protection Conditions: The quantitative specifications as found in Section TS B-2.0.

I. Closed Cycle Operation: The circulating water system's normal operating mode in which cooled water is returned from the plant's cooling towers to the plant's intake by way of the recirculation canal. During this operating mode, cooling towers will be operating.

J. Open Cycle Operation: The circulating water system's contingency operating mode in which water from the river is pumped through the condensers and discharged directly to the river, bypassing the cooling towers.

K. Week: A calendar period commencing on Sunday and extending through the following Saturday.

L. Month: Each of the twelve calendar periods designated as January, February, March, April, May, June, July, August, September, October, November, or December.

M. Year: The calendar period commencing on January 1 and extending through December 31.

2.0 PROTECTION CONDITIONS

2.1 Closed Cycle Operation

Objective: To minimize the impact on the aquatic biota by limiting the water appropriation and the heat release to the river.

Specification: The plant cooling water system will be operated in the closed cycle mode to the maximum extent practicable. Appropriation of river water is restricted to makeup for evaporative losses and a maximum daily average blowdown of 150 cfs. Operation of the plant in the open cycle mode (i.e., maximum daily average blowdown in excess of 150 cfs) will be considered an environmental event.

Operation in the open cycle mode under adverse cooling tower operating conditions is permitted if such operation is required in order for NSP to meet its power demand. Operation in the open cycle mode is permitted for those test programs described in section four of these specifications. Protection conditions unique to the open cylce mode are applicable, without exception, during such periods of adverse cooling tower operating conditions or testing.

Basis: The plant is provided with cooling towers with sufficient capacity to dissipate a major fraction of the heat rejected in the condensers. Operation in this closed cycle mode greatly reduces entrainment of aquatic biota compared to open cycle. Most of the heat is discharged directly to the air rather than to the river as an intermediary. Consequently, the impact on the aquatic biota in the receiving water is also substantially less.

2.2 Thermal

2.2.1 Maximum Discharge Temperature

Objective: Limit the maximum temperature of the discharge water to protect the indigenous aquatic biota.

Specification: The running 24-hour averaged cooling water temperature shall not exceed the ambient river water temperature by more than 5°F at the point of discharge to the river for river temperatures greater than 45°F, but in no case shall the effluent temperature exceed 90"F for the running 24-hour average at the point of discharge to the

river. During periods of cold weather when the running 24-hour average ambient river water temperature is less than 45°F, the running 24-hour average discharge temperature shall not exceed 50°F at the point of discharge to the river. Corrective action will be initiated if the protection condition is exceeded for more than one hour, unless such action jeopardizes Northern States Power Company's ability to meet the demand on its system either internally or by purchase.

Basis: The maximum discharge temperatures developed for the protective condition are consistent with the thermal basis used for the environmental impact analysis as found in the Final Environmental Statement published May 1973 by the USAEC, Directorate of Licensing.

2.2.2 Rate of Temperature Change

Objective: To limit the rate of temperature decrease for the protection of fish in the discharge canal during scheduled reductions in power in the months of October through April.

Specification: During the months of October through April, the rate of temperature decrease shall not exceed 5°F per hour at the outfall. If the rate of temperature decrease should exceed the protection condition, corrective action will be taken promptly to lower the rate of temperature reduction. This specification does not apply to emergency reactor shutdown procedures.

Basis: Average river water temperature data indicate that ambient water temperatures below the lower tolerance limit for the indigenous fish in Mississippi River Pool #3 occur only during the period of late October thru late March. During the rest of the year, the temperatures will be in the range where the fish may acclimate readily to ambient temperatures without detrimental effect. Furthermore, under normal closed cycle operation, the thermal discharge will be limited, thus providing a small area of affected water, further reducing the possibility of cold shock.

2.2.3 Maximum Change in Temperature (ΔT) Across the Condenser

Objective: To reduce possible entrainment loss by limiting the ΔT across the common inlet and outlet of the condensers during open cycle operation.

Specification: During open cycle operation, the ΔT across the condenser shall not exceed 35°F for more than 48 hours.

Basis: The plant will operate in the closed cycle mode as outlined in TS B-2.1. The overall environmental effect of thermal shock due to high condenser temperatures is relatively low since a smaller amount of water is appropriated from the river during closed cycle operations. The probability of open cycle operation is greater during the winter months. At this time the density of entrained organisms is relatively low. This protection condition will provide a reasonable period of time for the repair of a defective pump.

2.3 Fish Impingement

Objective: To limit the reduction in fish population in the water near the plant by restricting the number of fish trapped in the intake structure.

Specification: The fish of all sizes trapped on the intake screen shall not exceed the following limits:

1. A weekly total of seven times the daily angler possession limit set forth in the Minnesota's Department of Natural Resources (MDNR) Annual Fishing Laws for any species having such a limit.

2. If the daily number, averaged over one week, of any of these protected species exceeds twice the possession limit for that species it shall be considered an environmental event. If this event recurs within the succeeding three weeks the Director of the Regional Regulatory Operations Office shall be notified within 24 hours by telephone and telegraph (copy to the Director of Licensing) and live fish rescue and return to the river shall be initiated.

3. The total of all other species of trapped fish, excluding carp and gizzard shad, shall not exceed 700 fish per week.

4. If the number of these other species, excluding carp and gizzard shad, exceeds twice the weekly limit, it shall be considered an environmental event. If this event recurs

within the succeeding three weeks, the Director of the Regional Regulatory Operations Office shall be notified within 24 hours by telephone and telegraph (copy to the Director of Licensing) and live fish rescue shall be initiated.

Corrective action, based on results obtained in the monitoring program described in Section 4.1.1.B.1, reduction in intake velocity, and/or modifications to the circulating water system, shall be undertaken in a manner approved by the MDNR and the AEC.

Basis: The calculated velocity of 0.3 fps for the intake river water beneath the skimmer wall during the normal, closed-cycle mode of operation should be sufficiently low to avoid excessive fish entrainment in the forebay. The corresponding velocity of 0.9 fps through the trash rack should be low enough that all but the smaller fish are able to avoid impingement. Further reduction is possible through use of a bubbler system deterrent (or alternate method) which will be investigated as part of the Monitoring and Ecological Studies Program. However, velocities beneath the skimmer wall during contingency operation in the open cycle mode will be a factor of seven higher. Also, effects on entrainment of fish within the forebay, and subsequent impingement losses, may be excessive during changes from the closed-cycle to the open-cycle cooling mode. The magnitude of entrainment and impingement losses, for all operating conditions, will vary with seasonal characteristics including those associated directly with river flowrate.

The intake velocities beneath the skimmer wall, in the forebay, and at the intake structure trash racks are determined by the plant design and the pool level. The maximum velocity beneath the skimmer wall occurs at full power in the open cycle mode. However, within the design, some latitude for variation of operating procedures is possible. Therefore, in lieu of a protection condition for fish in terms of intake velocity limitations that may be inordinately complex to account for seasonal variabilities, the protection condition is based on the number and species of fish impinged.

2.4 Chemical

2.4.1 Chlorine

Objective: Limit the amount of total residual chlorine at the outfall for protection of the biota.

Specification: The service water system will 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 service 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 elements is necessary, the same standards apply.

Basis: The circulating water system condensers are cleaned mechanically. Normally only the service 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

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

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

orthophosphate	11,000 lb/yr.
hydrazine	2,800 lb/yr.
morpholine-cyclohexylamine	700 lb/yr.

These chemicals are discharged to the circulating water systems. 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 an average of 100 pounds per day of orthophosphate at the outfall, with proportionately lower amounts of the other chemicals specified above. If the stated daily or annual limits are exceeded, corrective action will be taken.

Basis: The only release of corrosion-inhibitor chemicals in plant operation is that required for the steam-generator system. During normal full plant operation, the steam

generator blowdown stream is continuous at 20 gpm (total for both units), with a phosphate content of 80 ppm maximum, hydrazine 20 ppm maximum, and morpholine-cyclohexylamine 5 ppm (approximately).

Chemical additions, concentrations, and releases of the steam-generator system are well-controlled in the plant. The steam-generator blowdown as described is diluted by the circulating-water flow at the outfall and is further diluted in the river. Maximum releases at the stated normal operating condition are: phosphate 20 lb/day, hydrazine 5 lb/day, and morpholine-cyclohexylamine 1.3 lb/day. Annual release limits are set at 50% higher than these daily normal maximum values, to allow for plant variations. For emergency conditions, such as condenser-tube leaks, temporary, short-term releases at higher levels corresponding to a maximum phosphate release rate of 100 pounds per day at the outfall are allowed.

The release of 100 pounds of orthophosphate per day is equivalent to an incremental increase of about 0.12 ppm at the outfall for closed cycle operation with the maximum daily average allowable circulating water system blowdown of 150 cfs. This is about one quarter of the average observed phosphorus concentration in the river. This blowdown is diluted by at least a factor of 30 in mixing with the total river flow. For the stated limits, hydrazine and morpholine are released at such low concentration levels that no effects on the biota are expected.

Controlled discharge of chemicals from the steam generator system within the above limits will provide protection of the river environment and compliance with river quality standards.

2.4.3 pH

Objective: Limit the pH value of water at the discharge pipe of the neutralizing tank.

Specification: The pH value at the discharge pipe of the neutralizing tank shall be no less than 6.5 nor greater than 8.5. Corrective action will be taken if the protection condition is exceeded.

Basis: A range in pH of 6.5 - 8.5 provides adequate protection of the resident aquatic biota.

2.4.4 Other Chemicals

Objective: To limit the discharge of chemicals (other than those specified in 2.4.2), to insure protection of the river ecosystem.

Specification: These chemicals are collected in the neutralizing tank of the plant and are discharged via the circulating water system. Except for trace amounts, the chemicals are those resulting from the regeneration of the demineralizer (used to purify well water for plant make-up requirements). The waste stream consists of a water solution of calcium, magnesium, bicarbonate, chloride, and silicate, all of which were naturally present in well water, and sodium sulfate, which is added during processing. The cumulative annual discharge of chemicals from the neutralizing tank shall not exceed a total 500 tons/yr. Within the annual limits, the daily discharge rate may vary, not to exceed a daily total of 4800 lb/day.

Basis: These chemical releases are required for plant operation, principally for water supply and for pH control of plant effluents. Discharges from the neutralizing tank system are well controlled in the plant. The releases from the neutralizing tank are diluted in the circulating water system and further diluted in the river. The expected normal release requirements are about 40% of the stated annual limit and about 25% of the stated daily limit.

The release rate of 4800 pounds of these chemicals per day corresponds to an incremental increase in the total dissolved solids of about 6 ppm at the outfall for closed cycle operation with the maximum allowed blowdown. This is small compared to the average observed values of 254 ppm for the river water.

Controlled discharge of chemicals from the neutralizing tank within the above limits will provide protection of the river biota.

3.0 MONITORING REQUIREMENTS

3.1 Closed Cycle Cooling

Objective: To monitor circumstances leading to open cycle operation and to monitor blowdown.

Specifications: Cooling towers shall be operated so as to minimize formation of ice during cold weather operation. The settings of the discharge gates shall be limited so that the daily average blowdown will not exceed 150 cfs. Operation of the plant in an open cycle mode will be considered an environmental event.

Basis: The operation of the cooling towers is flexible in regard to selection of number of cells and direction of air flow. The temperature of the water circulated through cooling towers is adjustable over a significant range without violating other protective conditions. Thus operator judgement and experience will provide guidance for operation of the towers in a manner which serves to minimize icing.

The positions of the discharge flow gates will be calibrated prior to plant operations in order to establish the limiting positions for the maximum daily average blowdown rate.

3.2 Thermal

3.2.1 Maximum Discharge Temperature

Objective: To monitor the intake and discharge temperatures and the corresponding ΔT's to assure that the discharge temperature protection conditions are not exceeded.

Specification: The ambient river water temperature will be measured by a minimum of two temperature sensors located upstream of the skimmer wall (Figure 3.1.2-1). The discharge temperature will be measured by a minimum of two temperature sensors located at the end of the discharge canal. The locations of the sensors and functioning of the temperature monitoring system will be established and verified annually thereafter to assure that monitoring results represent trustworthy average flowrate-temperature and temperature differences, for operation modes and river flows and temperatures.

Basis: The ambient intake temperatures are measured by eight resistance temperature detectors (RTD's) connected to the plant computer. Four RTD's are mounted at each sampling location as shown in Figure 3.1.2-1. The RTD's are spaced two (2) feet apart from elevation 672.5 to 666.5 on each sampling pile assembly. Each RTD is scanned every five minutes by the computer. A five-minute average of the eight RTD's is calculated. Every hour, the average of these calculations is computed for an hourly average ambient river water temperature. If the computer is down, the two bottommost RTD's on the north pile assembly print-out on a recorder. If the computer is down for more than a one-hour period, the recorder for the two RTD's will be read once each hour. These two readings will be used to calculate the hourly average ambient river water temperature.

The discharge temperature is measured at the end of the discharge canal by a group of five (5) sampling locations spaced equal distances apart. Each sampling location consists of four RTD's spaced from just beneath the surface to the bottom, regardless of river elevation. All 20 RTD's are connected to the plant computer. Each RTD is individually weighted for flow. Every five (5) minutes, each RTD is scanned by the computer. The 20 weighted readings are averaged. The 5-minute average is used to calculate the hourly average discharge temperature. The two uppermost RTD's at the center discharge sample location are connected to a recorder in the control room. If the computer is down for more than a one-hour period, the recorder for these two RTD's will be read once every hour. The hourly average discharge temperature will be calculated using these two temperatures.

The hourly average rise in discharge temperature above ambient river temperature is calculated by subtracting the ambient river temperature from the discharge temperature. An upper alarm limit of 5°F and an approach alarm of 4°F are established for this value. The calculated hourly rise in discharge temperature above ambient river temperature is used to calculate a 24 hour running average rise in discharge temperature above ambient river temperature. The 24-hour running average rise in discharge temperature above ambient river temperature will be printed out hourly and is used to determine compliance with specification TS B-2.1.2.

The 90°F limit is calculated each hour from the averaged 5-minute scan readings of the flow weighted discharge temperature readings. This calculated average has an upper alarm limit of 90°F and a lower alarm limit of 50°F.

The computer program automatically filters out data from malfunctioning RTD's. The RTD's are accurate to within 0.5°F.

3.2.2 Rate of Temperature Change

Objective: To measure the rate of temperature drop at the outfall during the months of October through April.

Specification: The rate of temperature change at the outfall will be measured during normal plant power decreases of 15% or greater for wintertime operation. This specification does not apply to emergency reactor shutdown or testing conditions.

Basis: Decreases in plant power levels of 15% or less are not expected to cause any appreciable effect on the fish resident in the discharge canal. However, sudden decreases of larger magnitude may induce cold shock.

3.2.3 Maximum Change in Temperature (ΔT) Across the Condenser.

Objective: To monitor the ΔT across the condenser to insure that the ΔT does not exceed the protection condition specification.

Specification: The ΔT across the condenser will be monitored once per day during open cycle operation. The temperature sensors should be accurate to ±0.5°F. During the open cycle operation the change in temperature across the condenser will be calculated at least once in every 24-hour period by the plant computer. If the computer is not functioning for more than a 24-hour period, the ΔT will be calculated by the plant's staff.

Basis: Automatically monitoring the change in temperature across the condenser by the plant computer, with the plant staff acting as a backup system when the computer is inoperable, will provide sufficient information to make the needed adjustments, if any, to assure that the temperature change does not exceed the protection condition.

3.3 Fish Impingement

Objective: To determine the daily average over a week of the number and species of fish of all sizes caught on the traveling screens of the intake structure.

Specification: The contents of the traveling screen trash basket will be removed at least once per week and all fish so collected will be counted and identified.

Basis: The determination of the species and number of the fish actually trapped and removed will provide the basis for establishing compliance with the protection limit.

3.4 Chemical

3.4.1 Chlorine

Objective: To ensure that the amount of residual chlorine discharged does not exceed protection condition 2.4.1 by monitoring the amount of total residual chlorine discharge at the outfall.

Specification: The chlorine injection feed rate will be regulated and a limit on the rate set so that the total residual chlorine discharged at the outfall does not exceed the protection conditions. Once each month, during a chlorination cycle, a sample will be taken at the outfall and analyzed for total residual chlorine.

Basis: During normal power operation, the service water system will be chlorinated to control marine growth in the system. Curves for chlorine concentrations will be developed as functions of chlorine feed rates and concentration at the outfall. After these curves are developed, a test will be conducted to ensure that the total residual chlorine concentration at the outfall does not exceed 0.05 ppm. The test will consist of analyzing samples taken at the outfall five minutes after the start of chlorine injection and again at ten and fifteen minutes after the start. If the total residual chlorine concentration at the outfall in any of these samples is found to be greater than 0.05 ppm, the feed rate will be reduced until with repetition of this procedure the concentration is less than or equal to 0.05 ppm. Once the feed rates in relation to

the blowdown rates have been verified to produce total residual chlorine concentrations less than or equal to 0.05 ppm, it will not be necessary to sample the discharge water during every chlorination cycle as long as the chlorine feed rate relative to the blowdown rate remains less than or equal to the maximum verified feed rate. A monthly sampling sequence for analysis of the discharge water will be conducted during a chlorine injection cycle to verify that the protection condition specification is not exceeded. All analyses will be made by the appropriate sampling technique and analytic methods as outlined in the most recent edition of "Standard Methods for the Examination of Water and Wastewater," published by the American Public Health Association.

Since the main condensers will be cleaned mechanically, chlorination will be limited to the service water system. Measurements of the total quantity and discharge rate will provide sufficient information to determine that the concentration of chlorine discharged at the outfall each day is within the protection condition.

If the chlorine treatment time is shortened to 30 minutes, the levels will be compared with the 0.1 ppm limit rather than the 0.05 ppm limit.

3.4.2 Corrosion Inhibitors

Objective: To determine, control, and limit the quantity of corrosion-inhibitor chemicals discharged at the outfall.

Specification: The amount of corrosion-inhibitor chemicals discharged will be measured once per week and reported as a daily average for the week during all plant operations, on the basis of measured additions to, and discharges from, the steam-generator system.

Basis: The steam-generator system is carefully controlled with respect to corrosion inhibitors and blowdown. Control of releases of phosphate and other chemicals is required for protection of the environment and to comply with river quality standards.

3.4.3 pH

Objective: To measure the level of pH at the outfall to show compliance with protection conditions TS B-2.3.3.

Specification: The pH contents of the neutralizing tank shall be determined for each batch and brought within the protection limit prior to discharge.

Basis: Monitoring of these values will determine compliance with the protection condition.

3.4.4 Other Chemicals

Objective: To identify, quantify, and limit the amount and rate of chemicals discharged from the neutralizing tank.

Specification: The amount of chemicals discharged will be determined weekly during all plant operations, and reported as an average daily quantity.

Basis: Discharges from the neutralizing tank are to be carefully controlled in the plant. Control of these discharges is required for protection of the environment and for compliance with river water quality standards.

4.0 ENVIRONMENTAL SURVEILLANCE AND SPECIAL STUDIES

4.1 Biological

4.1.1 Aquatic

A. General Ecological Survey

Objective: To evaluate the impact of the facility on the biotic environment.

Specification:

1. Investigate any changes in the biota that may occur when comparing preoperational data to operational data and control stations to experimental stations.

2. Identify any change in the ecosystem induced by operation of the plant.

3. Evaluate the significance of induced changes, if any, on the sustenance of a healthy ecosystem as determined in preoperational studies or as defined by State or Federal regulatory standards.

Basis: A general ecological survey was initiated two years prior to plant operation. Reports of preoperational data have been published in the 1970 and 1971 Prairie Island Annual Environmental Monitoring and Ecological Studies Program Reports.

1. The program may be modified as necessary to accommodate sampling requirement changes. This program will be reviewed and evaluated after 24 months from the beginning of commercial operation of Unit 2. At that time, changes in the program may be made to reflect the results obtained by that time. After 60 months of data have been obtained from the beginning of commercial operation of Unit 2, some of the special studies in Section TS B-4.1.1 may be eliminated if the results of those studies are conclusive and in favor of the environment.

2. These changes and results will be presented in the Annual Environmental Monitoring and Ecological Studies Program Report for the facility.

3. These studies are performed as follows.

   The program for aquatic ecological studies of the Mississippi River in the vicinity of the Prairie Island Nuclear Generating Plant is designed to establish ecological characteristics before plant operation begins. These preoperational data will be compared with operational data to determine if the plant has significantly altered the aquatic ecosystem. This study began two years prior to plant operation and will continue until the specific effects of the plant can be determined and the data show a stabilized aquatic environment. The program is funded entirely by NSP.

   The studies are organized to investigate the aquatic biota and the physical and chemical composition of the environment. Species are identified and their population and size are determined. The food habits and reproductive cycles of the dominant species are studied whenever possible. Due to the seasonal

fluctuations of these factors, the sampling programs are carried out on a scheduled year-round basis. It should be noted that this program is designed to remain flexible, so that changes can be made immediately if required. Factors to be studied are:

Biotic Communities

- Phytoplankton
- Periphyton
- Zooplankton
- Benthic Invertebrates
- Fish
- Aquatic Plants

Physical and Chemical Water Parameters

- Dissolved Oxygen
- Temperature
- pH
- Conductivity
- Turbidity
- Velocity
- Dissolved Solids
- Suspended Solids
- Alkalinity
- Ortho-phosphate
- Total-phosphate
- Nitrate Nitrogen
- Nitrite Nitrogen
- Ammonia Nigrogen

Basic Procedure for the studies is:

a. Phytoplankton

Seventeen sampling stations are located in the area from two miles upstream of the intake canal to about four miles downstream of the discharge canal (Figure 4.1.1-1). These locations cover the varied habitat areas present in the river. The primary objective of the phytoplankton sampling is to monitor the surface phytoplankton. Samples are collected every two weeks during the ice-free season. Winter collections are made unless unsafe ice conditions exist.

b. Periphyton

Periphyton sampling is made at seven locations upstream and downstream of the Prairie Island facility.

Sampling locations are shown in Figure 4.1.1-2. The samples are analyzed every two weeks. Data on chlorophyll content and abundance are determined from the samples. Ice conditions may restrict sampling during the winter months.

c. Zooplankton Study

Monthly samples are collected at each station (Figure 4.1.1-3) during the spring, summer, and fall, by drawing a five-gallon-sub-surface sample and filtering through a plankton net. Additional samples are collected in the active periods of the year at locations XI, X2, X3, Y1 and Y2. The samples are taken to the laboratory, where they are indentified and counted for qualitative and quantitative analysis.

d. Benthic Macroinvertebrate Study

Quarterly samples of the bottom substrate and associated organisms are taken from each station (Figure 4.1.1-3) with a Petersen dredge during spring, summer and fall.

Artificial substrates are suspended at each station (Figure 4.1.1-3). These are removed monthly for enumeration and identification of organisms. Some stations are not sampled in the winter when unsafe ice conditions prevail.

Qualitative invertebrate sampling is conducted once every two months on the shoreline areas indicated in Figure 4.1.1-4 during the open water portion of the year.

e. Physical and Chemical Water Quality Parameters

The water quality study includes the physical and chemical parameters of water which might affect the aquatic life. The chemical factors studied and their frequency of measurement is as follows:

Parameter	Frequency
Dissolved Oxygen	Every two weeks
Temperature	Every two weeks
pH	Every two weeks
Conductivity	Every two weeks
Turbidity	Every two weeks
Velocity	Monthly
Dissolved Solids	Monthly
Suspended Solids	Monthly
Alkalinity	Monthly
Ortho-phosphate	Monthly
Total-phosphate	Monthly
Nitrate Nitrogen	Monthly
Nitrite Nitrogen	Monthly
Ammonia Nitrogen	Monthly

Samples are drawn from the sub-surface, middle and bottom at each station (Figure 4.1.1-3). Sampling may be temporarily interrupted if conditions compromise personnel safety during adverse weather conditions.

f. Fish

Electro-fishing, trapnetting, gill netting, and seining are the dominant methods used in the fish study. The fishes collected are measured and weighed to determine the length-weight relationship and condition factor. Some scales are removed from captured fish for age and growth studies. A creel census of the fishery in the area was started by MDNR at NSP request prior to plant operation and will continue as part of the operational survey.

g. Aquatic Plants

Submerged aquatic plants are not common in the study area and no extensive study is presently being conducted. Areas with aquatic plant growth such as Sturgeon Lake and the downstream backwater wildlife refuge are surveyed qualitatively to determine species present and their estimated bed area.

B. Impingement of Fish, and Entrainment of Phytoplankton and Zooplankton

Objective: To determine the daily and seasonal variations in species, weight, size and numbers of all life stages of fish entrapped, to identify and count any other impinged vertebrates and macro-invertebrates, and to record the species and quantity of plankton entrained and lost due to the operation of the plant.

Specification: Entrainment and impingement studies will be continued on a scheduled basis for two years after the beginning of commercial operation of Unit 2 of the plant. The progress and results of these studies will be included in the Annual Environmental Monitoring and Ecological Studies Program Report.

Data collected during plant operation will be compared with appropriate control station data, thereby providing information to help determine the effect of the plant upon the impinged and entrained biota, and the impact, if any, on their respective populations in the Mississippi River system.

Basis:

1. Fish impingement

a. Presently the plant is designed to collect all impinged fishes in the circulating water trash basket. Alternate methods of handling these fishes are currently being examined. However, in lieu of any modifications, the procedure used in demonstrating compliance with the protection limit (Sections 2.3 and 3.3) will provide useful information. All fishes collected on the trash racks and in the basket will be counted,

identified, and measured to determine average daily and seasonal trends among fishes. An effort will be made to identify the cause of death or reason for capture (either plant-induced or natural).

b. Minnesota Department of Natural Resources personnel are carrying out a fish population study in the Mississippi River adjacent to the facility. Prior to normal power operation, a bubbler system located in front of the skimmer wall will be tested. During normal plant operation, its effectiveness will be studied. A report on its success will be made in the Annual Environmental Monitoring and Ecological Studies Program Report. If it is not effective in keeping fish from the intake canal, other alternate methods will be investigated.

2. Entrainment of Other Vertebrates and Macro-invertebrates

If aquatic or semi-aquatic vertebrates (such as salamanders, frogs and snakes) or macro-invertebrates (such as aquatic insects and clams) are impinged, they also will be identified, counted and reported.

3. Phytoplankton Entrainment

Phytoplankton entrainment through the plant will be assessed. Representative samples of the intake and discharge waters will be collected. The studies will be taken at least three times during each of the four seasons and more frequently (hourly, daily, or weekly, whichever is most appropriate), in spring, summer and fall during algal blooms. Productivity values and species identification for intake and discharge samples will be used for the comparative evaluation.

4. Zooplankton Entrainment

Zooplankton entrainment, including organisms up to 3/8 in. in width, through the plant will be assessed. Representative samples of the intake and discharge waters will be collected. The studies will be run at least three times during each of the four seasons, and more frequently in the warmer months if possible, particularly during times of fish spawning or if abnormally large numbers of zooplankton (e.g. greater

than those found in an equivalent volume of river water from the main channel) are entrained. The percentage mortality of the organisms in the intake will be compared to that of similar organisms in the discharge within 10 to 30 minutes after collection. Species identification and counts will be utilized in examining intake and discharge samples, as well as any macroinvertebrates which might be impinged by the screens.

4.1.2 Terrestrial

Objective: See TS B-4.1.1.A objectives.

Specification: See TS B-4.1.1.A specifications.

Basis: The terrestrial ecological studies program is designed to identify the flora and fauna within a 1.5 mile radius of the plant. Data will be related to plant effluents, particularly the cooling tower plume.

Vegetation is being studied in the following habitat types; prairie, sand hill or sand terraces, oak openings, wet lowlands, and conifer plantations. Qualitative and quantitative data are gathered. The size and composition of terrestrial vegetation, insects, mammals and birds in the habitats listed previously are being determined.

Location of a sampling area may be changed during the study if the habitat is altered by factors not associated with the plant (i.e. the dredging, lumbering, or farming of an area now being studied.

Reports of the terrestrial ecological studies are made annually in the Annual Environmental Monitoring and Ecological Studies Program Report.

4.2 Physical

4.2.1 Thermal Plume Mapping

Objective: To delineate the dimensional configuration of the heated water plume as it flows from the outfall down the discharge canal, into the river and down to Lock and Dam No. 3.

Specification: Study the specific area of the river influenced by the heated water as it flows into Truttman's slough and the river. These temperature surveys will be made for each operational mode under the various climatic and river flow rate conditions that prevail during the year. Selected isotherms in the range from ambient to the discharge temperature will be plotted. These surveys will continue until the 3-dimensional pattern of the heated water is determined for both circulating water system operating modes and over a range of flow rates and ambient temperature.

Basis: Sample transects will be established across the river from just upstream of the plant intake to downstream of Lock and Dam No. 3. At least 5 sampling points spaced equally along each transect will be used. Temperatures will be taken at one-foot intervals from the surface to the bottom. Instrumentation will be accurate to within 0.5°F.

4.2.2 Dredging

Objective: To determine the effect of maintenance dredging on the aquatic environment.

Specification: A study of the effects on the water quality and aquatic biota will be made during dredging operations. The study will include an estimate of the benthic macroinvertebrate community and measurement of water quality parameters.

Basis: Any maintenance dredging work in the approach and/or discharge canals will conform to applicable Federal, State, or local regulations at the time of dredging.

4.2.3 Cooling Tower Fog and Icing

Objective: To determine the area of influence that the cooling tower plume has on the onsite and offsite areas.

Specification: A study will be performed to characterize the dimensions of the cooling tower plume and extent and density of ice.

Basis: Visual observations confirmed by photographs will be taken of the cooling tower plumes. Fog visiometers are located at three locations surrounding the plant. One is

located at the meteorological tower, the second at Lock & Dam #3, the third adjacent to U. S. Highway 61 near the plant road intersection.

4.2.4 Noise

Objective: To determine the sound levels in the onsite and offsite environment.

Specification: To study the noise impact of the operation of the Prairie Island Plant on the onsite and offsite environment.

Basis: A sound survey was completed in 1972 to quantify the construction noise levels. A survey will be completed during plant operation (both units) to quantify the operational sound levels. If these operational levels are acceptable to the AEC, the surveys will be terminated.

4.2.5 Erosion

Objective: To determine 1) the amount of erosion on the slopes adjacent to the river and the plant's circulating water system canals, and 2) the amount of erosion and deposition within and adjacent to dredged river approaches leading to and from the plant's circulating system canals.

Specification: Twice per year the onsite property will be surveyed for areas of erosion, and once per year the dredged offsite channel bottoms and boundaries will be sounded for significant contour changes, for comparison with topographical data of prior years. Onsite surveys will include photographs of the areas inspected, and, if significant erosion is apparent, the area will be regraded and covered with sufficient vegetation, rip-rap, or construction substrate (i.e., asphalt, gravel) to prevent further erosion. Correction of offsite plant-related problems, if evident, will be made after consulting with the applicable Federal, State and local authorities.

Basis: Erosion control is a fundamental environmental consideration. Of concern is the harm to all aquatic biota caused by movement and suspension of river bed materials, and by periodic dredging.

5.0 ADMINISTRATIVE

5.1 Organization, Review and Audit

5.1.1 Organization

A. The Plant Manager has the onsite responsibility for the operation of the facility and to assure that the plant operating limits in the Appendix B protection conditions are not exceeded. During periods when the Plant Manager is unavailable he will delegate this responsibility to other qualified supervisory personnel.

B. The Radiation Protection Supervisor in the plant organization has responsibility for the onsite chemical measurements related to plant releases at discharge to the environment.

C. The Supervising Scientist of the Engineering Vice Presidential Staff Department has the general office responsibility for the initiation and execution of the environmental surveillance and special studies which have been described in this appendix to the operating license. The Supervising Scientist has the responsibility for directing the sampling programs and assignments for special environmental studies by independent consultants.

5.1.2 Review and Audit

A. The Plant Manager will have the responsibility for providing the appropriate review of those plant operations covered under Appendix B protection conditions.

B. The Supervising Scientist shall have the responsibility of providing for appropriate review of the results of the environmental surveillance and special studies programs detailed in Appendix B.

C. The Engineering Vice Presidential staff will conduct periodic audits of the following areas by comparing:

1. Conformance of plant operations with the appropriate Appendix B protection conditions and monitoring requirements.

2. Conformance of the environmental surveillance and special studies programs with the appropriate Appendix B protective conditions.

5.2 Action to be taken in the event of an environmental event

An environmental event as defined in TS B-1.0.G shall be reported to the General Superintendent of Nuclear Power Plant Operation and the Director of Engineering Vice Presidential Staff, or their designated alternates in their absence. The environmental event shall be reviewed by the appropriate individuals referenced in TS B-5.1.1. Reporting to the AEC shall be in accordance with section TS B-5.4.2.A.

5.3 Operating Procedures

5.3.1 Preparation of Procedures

Written procedures for the conduct of operations, monitoring, surveillance, and special studies covered in Appendix B Technical Specifications shall be prepared and approved prior to commercial operation by the responsible individuals as referenced in TS B-5.1.1. The following is a list of the major areas requiring procedures:

1. Control of release of chemicals in the circulating water discharge.

2. Control of the flow of discharge waters to remain within the allowable rate of change, discharge, temperatures, and velocities.

3. Sampling methods, frequencies and locations.

4. Calibration procedures and accuracies for various instruments used in measuring and analyzing the samples which are required by these specifications.

5.3.2 Procedure Review

A. All procedures required by these Technical Specifications shall be reviewed and approved prior to their implementation by a supervisor designated by the Plant Manager or Supervising Scientist in accordance with the division of responsibility provided for in TS B-5.1.1.

B. Temporary changes in procedures which do not change the intent of the original procedure may be made provided such temporary changes are approved by a member of the management staff for the responsible group and an individual with technical knowledge in the area covered by the procedure. Such changes should be documented and subsequently reviewed in accordance with TS B-5.3.2.A.

5.4 Reporting Requirement

5.4.1 Routine Reports

A. An Annual Environmental Monitoring and Ecological Studies Program Report covering the year's operations and surveillance monitoring shall be submitted by July 1 of the subsequent year.

B. A Semi-Annual Environmental Studies Report covering the previous six month's surveillance monitoring shall be submitted within 60 days after January 1 and July 1 of each year. This report will include a summary description of all environmental events, a summary of data from section TS B-3.0, and a summary of surveys completed within sections TS B-4.1.1.B and TS B-4.2.

5.4.2 Non-Routine Reports

A. Environmental Event Reports

Notification shall be made within 30 days by a written report to the Director of the Regional Regulatory Operations Office (copy to the Director of Licensing), upon the occurrence of an environmental event as defined in TS B-1.0.G. The report shall describe the event, analyze and evaluate the environmental impact, determine the cause, and outline corrective measures taken or planned to prevent repetitions of the event. In the case of a repetition of the occurrence of an environmental event described in TSB-2.3 within the succeeding three weeks, the Director of the Regional Regulation Operations Office shall be notified within 24 hours by telephone and telegraph (copy to the Director of Licensing).

B. Changes to the Plant or Procedures

1. A written report shall be submitted to the Director of Licensing (copy to the Director of the Regional Regulatory Operations Office) in the event of changes in the plant or procedures which may increase the

environmental impact as evaluated in the Final Environmental Statement. This report shall include an evaluation of the environmental impact, if any, which would result from the changes.

2. Minor changes may be made in the monitoring and sampling procedures and analytical techniques referenced in this Technical Specification when weather or other conditions affect sample availability or the use of specified techniques. These changes shall be noted in the Annual Environmental Monitoring and Ecological Studies Program Report.

3. Changes or additions made at the request of Federal, State, or local authorities to permits or certificates for the protection of the environment shall be reported as referenced in TS B-5.4.2.B.1. This report shall include an evaluation of the environmental impact, if any, which would result from the change.

4. Requests for changes to Appendix B Environmental Technical Specifications shall be submitted to the Director of Licensing. An evaluation of the environmental impact, if any, which would result from such a change in procedure shall be included.

C. If harmful effects or evidence of irreversible damage are detected during the course of the monitoring program specified in TS 3.0 and 4.0 above, the Applicant will provide an analysis of the problem and a proposed course of action to alleviate the problem.

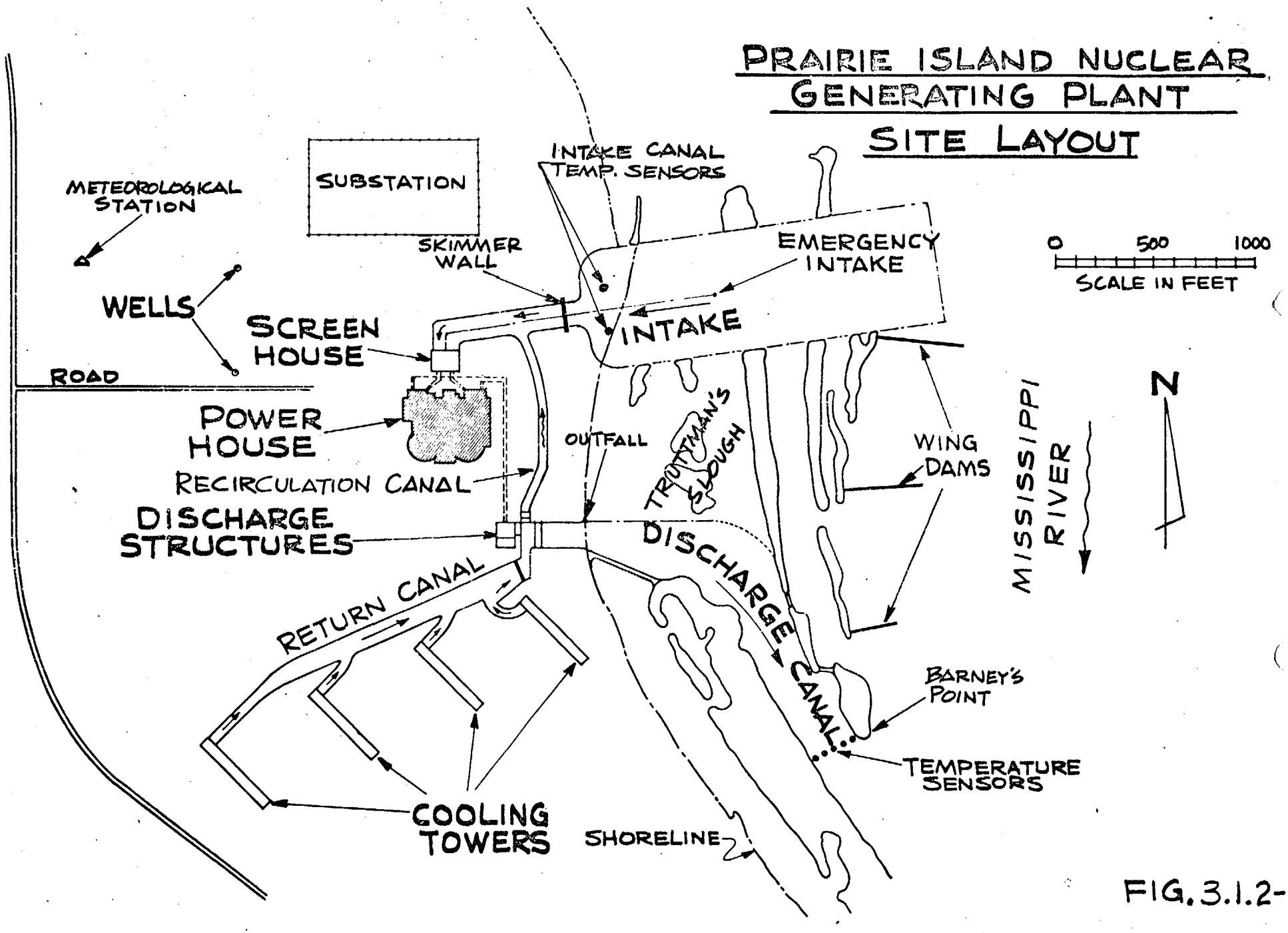
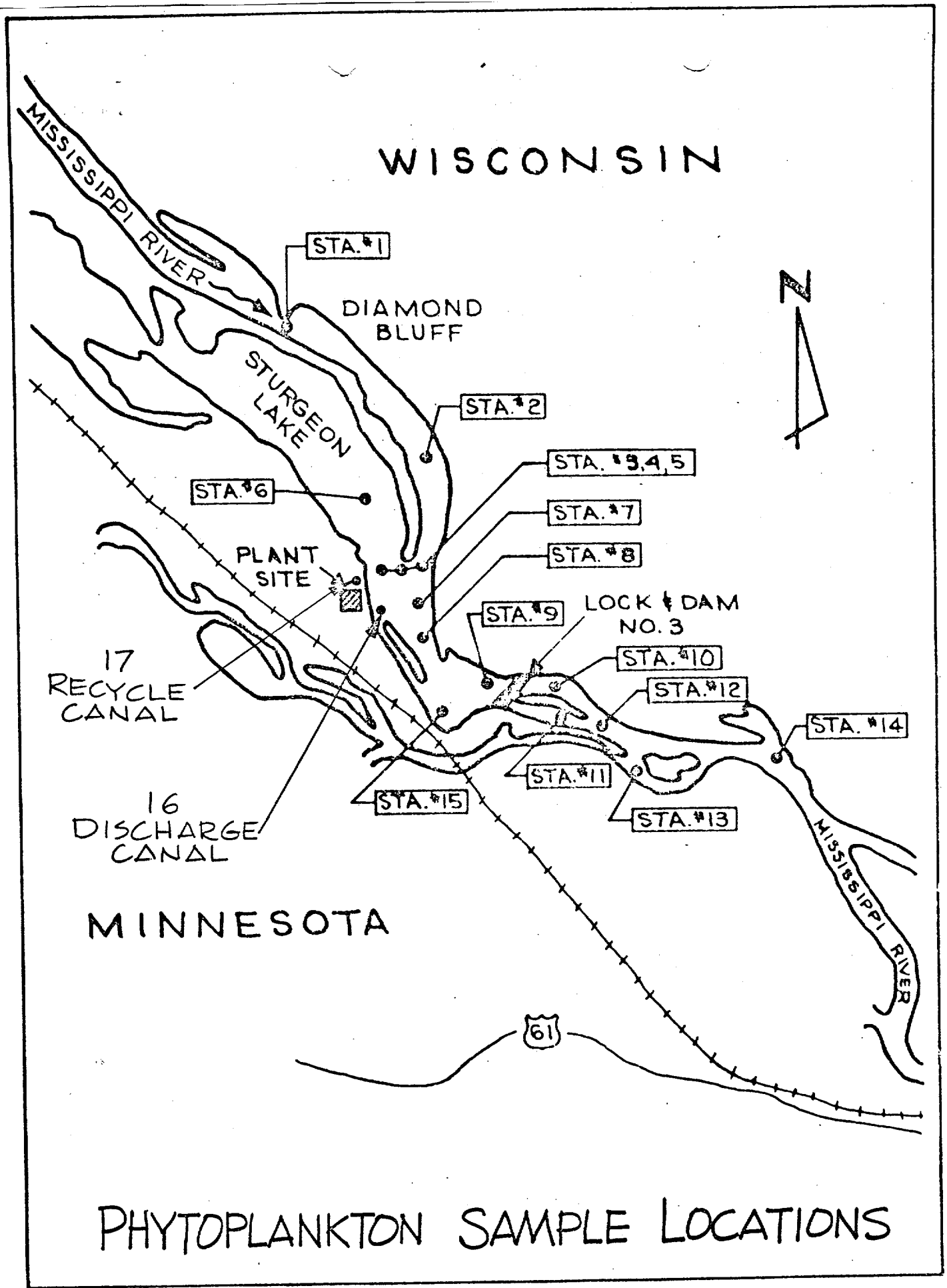
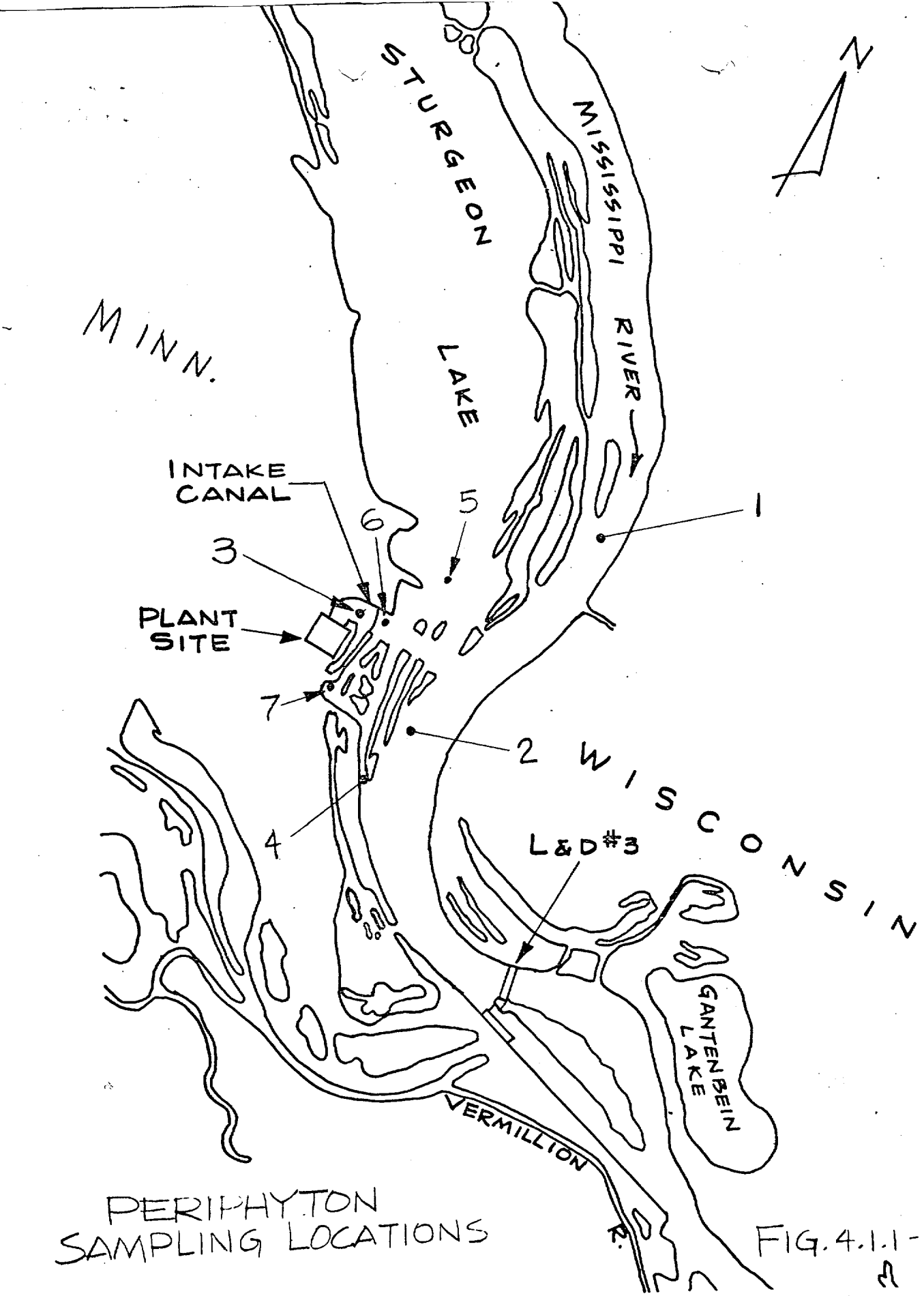

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
SITE LAYOUT
METEOROLOGICAL STATION
SUBSTATION
INTAKE CANAL TEMP. SENSORS
SKIMMER WALL
EMERGENCY INTAKE
0 500 1000
SCALE IN FEET
WELLS
SCREEN HOUSE
INTAKE
ROAD
POWER HOUSE
OUTFALL
TRUTTMAN'S SLOUGH
WING DAMS
MISSISSIPPI RIVER
N
RECIRCULATION CANAL
DISCHARGE STRUCTURES
DISCHARGE CANAL
RETURN CANAL
BARNEY'S POINT
TEMPERATURE SENSORS
COOLING TOWERS
SHORELINE

FIG. 3.1.2-1



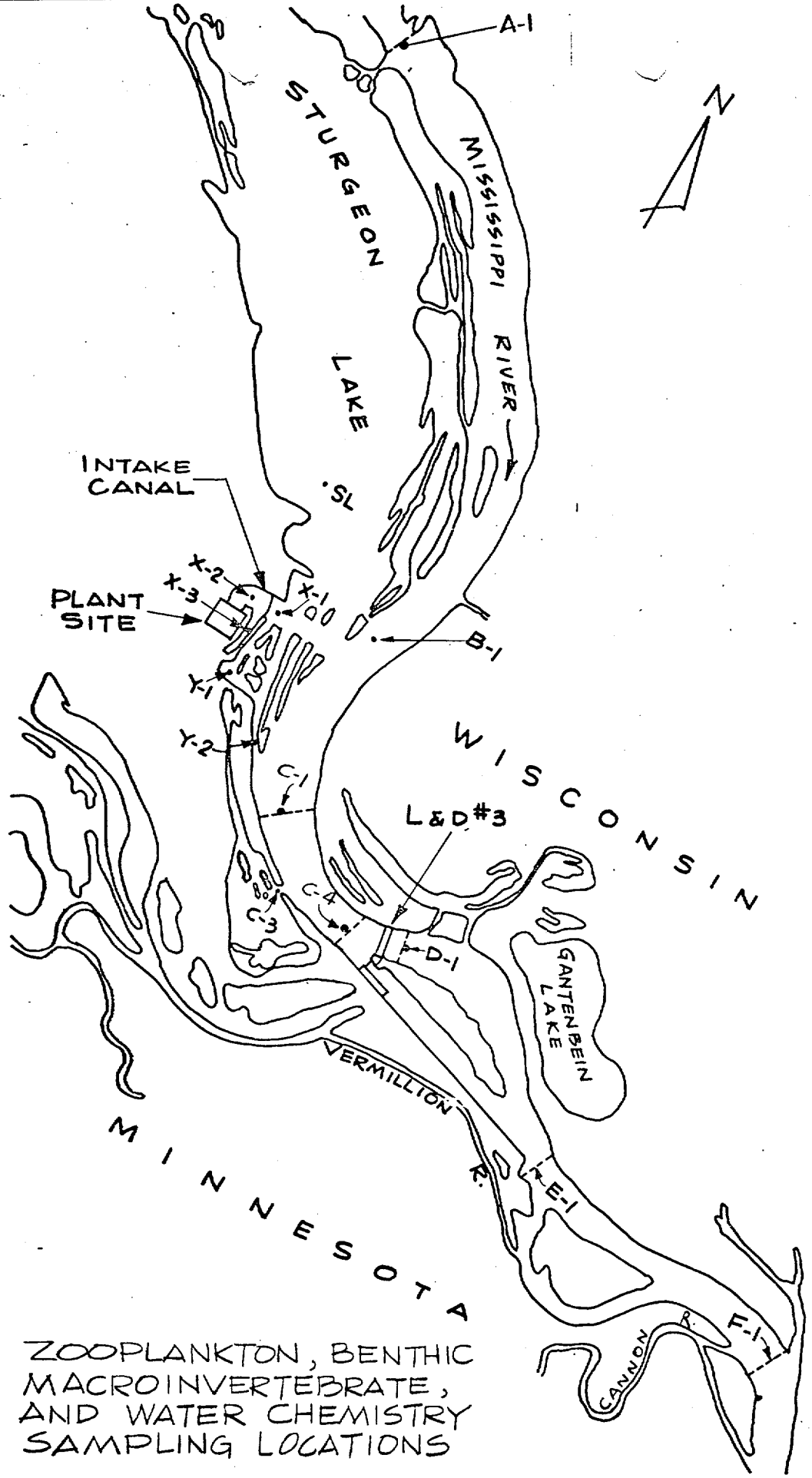
PHYTOPLANKTON SAMPLE LOCATIONS

FIG. 4.1.1-1



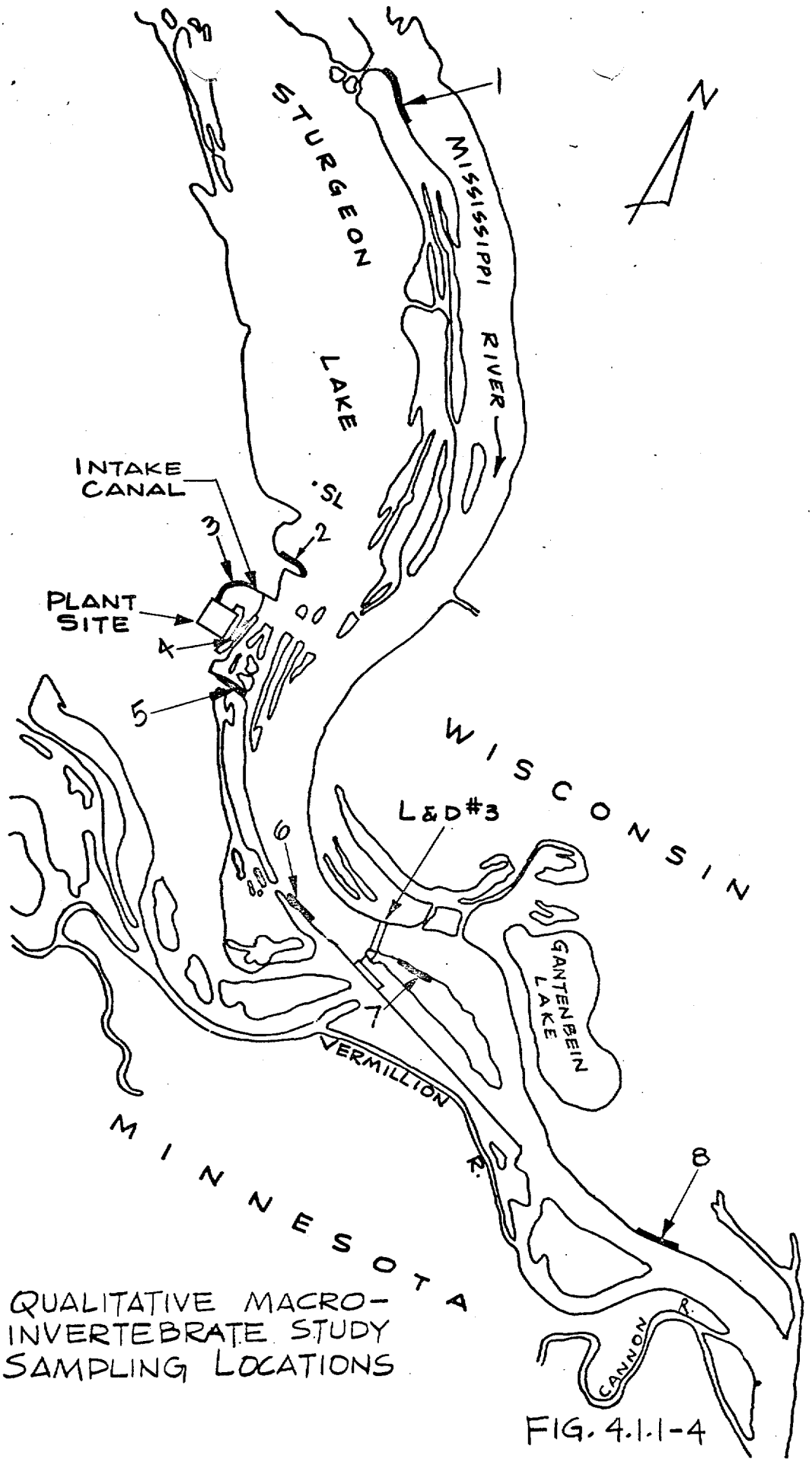
PERIPHYTON
SAMPLING LOCATIONS

FIG. 4.1.1-2



ZOOPLANKTON, BENTHIC MACROINVERTEBRATE, AND WATER CHEMISTRY SAMPLING LOCATIONS

FIG. 4.1.1-3



QUALITATIVE MACRO-INVERTEBRATE STUDY SAMPLING LOCATIONS

FIG. 4.1.1-4