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WISCONSIN PUBLIC SERVICE CORPORATION

Public Service

P.O. Box 1200, Green Bay, Wisconsin 54305

January 30, 1973

Regulatory File Cy.

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U.S. Atomic Energy Commission
Regulatory
Mail Section

Mr. Daniel R. Muller
Assistant Director of Environmental Projects
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Muller:

Subject: Submission of Revised Environmental (Non-Radiological) Technical Specification for the Kewaunee Nuclear Power Plant

AEC Docket 50-305

Pursuant to our letter of October 13, 1972, and based on subsequent discussion with members of your staff, we submit herewith, forty (40) copies of the revised Environmental (Non-Radiological) Technical Specifications for the Kewaunee Nuclear Power Plant.

Very truly yours,

E. W. James

E. W. James, Senior Vice President
Power Generation and Engineering

EWJ:mem

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APPENDIX B

NON-RADIOLOGICAL TECHNICAL SPECIFICATIONS

FOR

KEWAUNEE NUCLEAR POWER PLANT

KEWAUNEE, WISCONSIN

Wisconsin Public Service Corporation

Docket Number 50-305

1.0 DEFINITIONS

Normal Operation: Normal power operation is defined as greater than 2% thermal power in a non-emergency situation, which imples operating the plant using normal operating procedures.

Normal Power Increase or Decrease: Normal power increase or decrease is defined as scheduled plant startup or shutdowns and changes in electrical load while at normal power operation.

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.1 Thermal

2.1.1 Maximum Δ T across the condenser

Objective: Limit the temperature rise across the condenser

Specification: The discharge water temperature of the circulating water system shall not normally exceed the intake water temperature by more than 20°F during two circulating water pump operation and 28°F during one circulating water pump operation.

Should the temperature increase above the specified limits for more than one hour, it shall be recorded and reported in the Semi-Annual Operating Report. No immediate action will be taken; however, action shall be taken to determine the reason for the temperature increase and expected duration.

Basis: The rise of intake water temperature across the condenser is a fixed value based upon initial condenser design and circulating water pump operation.

3.0 MONITORING EQUIPMENT

3.1 Thermal

3.1.1 Maximum Δ T across the condenser

Objective: To insure that the intake and discharge temperatures will be monitored.

Specification: The intake water temperature will be measured in the forebay and retained in the plant computer with a printout every hour. The discharge temperature will be measured from the four water boxes of the condenser. These four points will be retained in the plant computer and are likewise printed out every hour. The backup system will consist of a continuous printout of the average from two elements in the forebay. The discharge temperature will be read locally. Both intake and discharge temperatures will be recorded hourly when the computer is down.

Basis: The intake and discharge temperature will be computer monitored in the control room which will provide a reliable method for determination of temperature differential across the condenser.

During de-icing operations approximately 2750 gpm of discharge water will be recirculated to the intake structure to prevent freeze-up of this intake network. In addition, approximately 14,500 gpm or 9,900 gpm of discharge water will be recirculated to the forebay continuously depending on two or one circulating water pump operation respectively.

3.0 MONITORING EQUIPMENT

It has been calculated that with the addition of this heated water to the large volume of circulating water the ambient temperature of the intake water will not be significantly increased.

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.1.2 Maximum Discharge Temperature

Objective: Limit the maximum temperature of the condenser discharge waters.

Specification: The condenser discharge water shall not normally exceed 86°F during normal plant operations with either one or two circulating water pump in operation. Should the discharge water temperature exceed 86°F a record of the occurrence shall be made and included in the Semi-Annual Operating Report.

Basis: The maximum discharge temperature was set at 86°F by the Wisconsin Department of Natural Resources waste permit #69-363.

3.0 MONITORING REQUIREMENTS

3.1.2 Maximum Discharge Temperature

Objective: To insure that the circulating water discharge temperature is monitored.

Specification: The condenser water box temperatures will be monitored and printed out every hour from the plant process computer in the control room. The computer will alarm when discharge temperatures reach 80°F so that appropriate action can be taken by the operator to insure that the maximum of 86°F is not reached. The back-up system is the same as described in 2.1.1.

Basis: The maximum discharge temperature will occur at the condenser waterbox. Monitoring of the temperature at this point will insure an accurate temperature before dilution with the ambient lake water.

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.1.3 Specified Mixing Zone

Objective: To determine a mixing zone for the thermal plume.

Specification: A numerical predictive thermal plume model for the condenser water discharge will be developed. This model will include temperature isolines and velocity contours within the plume influence. The model will consider the following:

a. It will be a three-dimensional numerical model.
b. Bottom topography will be included.
c. Influence of the Point Beach plume will be investigated.
d. Seasonal and spacial temperature variations will be included.
e. Near-shore currents will be included.
f. Sinking plume will be investigated.
g. One and two pump operation will be included.
h. Possibility of discharge waters causing a temperature rise at the intake structure will be examined.

A summary of the results of this study will be included in the Semi-Annual Operating Report upon completion of the project.

Basis: As part of the Lake Michigan thermal standards adopted by the Division of Environmental Protection of the Wisconsin Department of Natural Resources, it is required that a predictive model and measurements of the Kewaunee thermal plume be analyzed.

3.0 MONITORING REQUIREMENTS

3.1.3 Specified Mixing Zone

Objective: To determine a mixing zone for the thermal plume.

Specification: When mixing zone regulations are adopted by the State Department of Natural Resources, a program to implement the regulations will be adopted for the Kewaunee thermal plume.

Basis: The Wisconsin Lake Michigan Thermal Water Quality Standards, effective February 1, 1972, require that the plumes be modeled and studied before a mixing zone can be defined.

2.0 ENVIRONMENTAL PROTECTION CONDITION

It is expected that this model will be completed in 1973 and actual operating parameters included in the model in 1974.

3.0 MONITORING REQUIREMENTS

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.1.4 Rate of Temperature Change

Objective: To limit the rate of temperature change within the primary cycle, thereby limiting the temperature change of the condenser discharge water.

Specification: The rate of temperature change during normal plant operation will be 15°F per hour.

Deviation from this specification will be documented in the Semi-Annual Operating Report.

Basis: Detrimental effects to aquatic species has not been significant due to large step changes in power or plant trips. Many plants around Lake Michigan, including Point Beach, have had many hours of operation with large changes in power, including reactor trips, and have reported no related detrimental environmental effects.

3.0 MONITORING REQUIREMENTS

3.1.4 Rate of Temperature Change

Objective: To limit the rate of temperature change within the primary cycle, thereby limiting the temperature change of the condenser discharge water.

Specification: Condenser intake and discharge water will be monitored under 3.1.1.

Basis: Monitoring of the temperature change across the condenser will insure representative temperature measurement before dilution of the circulating water with ambient lake water.

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.1.5 De-icing Operations

Objective: To document periods of de-icing the circulating water intake structure.

Specification: Periods of de-icing operation will be documented in the Semi-Annual Operating Report, including inlet temperature of the incoming water on an hourly basis.

Basis: De-icing operations will occur when the intake waters approach the freezing point or when off-shore winds carry slush over the intakes. During these periods approximately 2750 gpm of water will be sprayed over the intake cones. An additional 14,500 gpm and 9,900 gpm, depending on two or one pump operation, will continuously be added by gravity feed from the discharge structure to the forebay.

3.0 MONITORING REQUIREMENTS

3.1.5 De-icing Operations

Objective: To document periods of de-icing the circulating water intake structure.

Specification: Since the de-icing pump must be physically turned on to initiate warmed discharge water to the intake a record will be maintained.

Basis: Monitoring of de-icing pump operation and intake temperature from the forebay will insure an accurate description and account of all de-icing operations.

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.2 Chlorine

2.2.1 Chlorination of Circulating Water System

Objective: To limit the amount of chlorine residual in the discharge water.

Specification: Should chlorination of the circulating water system be eminent, the concentration inside the plant immediately downstream of the condenser would be between 0.1 and 0.5 mg/l for about 10 minutes during the day.

Should chlorination become necessary the total residual chlorine concentration in the plant effluent will be monitored. If the chlorine concentration in the receiving water exceeds 0.1 mg/l for 30 minutes/day, all practical measures to reduce the concentration will be taken.

The results and duration of the hypochlorite additions will be documented in the Semi-Annual Operating Report.

Basis: Based on the intake water turbidity plus the lack of chlorination during the first 18 months of operation of Point Beach Unit 1 demonstrates that chlorination has not been necessary to control slime.

However, should chlorine be necessary the U.S. Environmental Protection Agency has recommended that the residual chlorine in the receiving water should not exceed 0.1 mg/l for 30 minutes/day.

3.0 MONITORING REQUIREMENTS

3.2 Chlorine

3.2.1 Chlorination of the Circulating Water System

Objective: To limit the amount of chlorine residual in the discharge water.

Specification: During periods of chlorination samples of circulating water will be taken immediately following the condenser, in the plant effluent as it enters the receiving water, and the receiving water itself. These samples will be analyzed using the amperometric method of analysis.

Should the amperometric titrator not function properly the colorimeter method of analysis will be used.

Basis: The amperometric method of analysis will insure extremely accurate results which will allow for complete documentation of chlorine residuals in the circulating water system and receiving waters.

The colorimetric method of analysis will serve as backup should the amperometric titrator fail.

2.2.2 Suspended and Dissolved Solids

Objective: To limit the total amount of solids discharged to the lake.

Specification: The majority of solids discharged to the lake will result from regeneration of the demineralizer system. All regenerant wastes from this system are directed to a waste neutralizing tank where they are neutralized before being released to the lake. Before each tank of waste is released a representative sample will be analyzed for suspended and dissolved solids. The pH of the released solution will range from 6 to 8 before dilution in the circulating water system. The total amount in gallons released will also be recorded.

The results of each discharge will be logged and average values will be reported in the Semi-Annual Operating Report.

Basis: The demineralizer system consists of twin cation, anion, and mixed bed units used to insure that the product water is high qaulity water capable of meeting stringent Nuclear Steam Supply specifications.

During normal operation it is expected that approximately 22,000 gallons of neutralized waste will be discharged from the primary cation and anion regeneration process once every two days while 3600 gallons of neutralized waste from the mixed bed regenerations will be discharged twice a month. It is possible, however, that

3.2.2 Suspended and Dissolved Solids

Objective: To limit the total amount of solids discharged to the lake.

Specification: Analysis of the waste neutralizing tank before release into the circulating water system will give an accurate account of the total solids discharged from the demineralizer system.

Analytical methods used to determine dissolved and suspended solids is Standards Methods or its equivalent. The pH of the discharged solution will be taken from an "in line" pH monitor and the range recorded in the discharge log book. Should the "in line" pH monitor fail, representative samples will be taken every 20 minutes during the release for pH determination.

Basis: Analysis of a representative sample from the waste neutralizing tank before dilution with the circulating water system by Standards Methods or its equivalent will insure that each batch discharged from the neutralizing tank is documented. Monitoring the pH of the waste stream will insure that the wastes are neutralized before release.

2.0 ENVIRONMENTAL PROTECTION CONDITION	3.0 MONITORING REQUIREMENTS
on any given day the chemical discharges from the neutralizing tank may contain wastes from both the primary cation and anion units <u>and</u> the mixed bed units.	

2.0 ENVIRONMENTAL PROTECTION CONDITION

2.2.3 Treatment Chemicals

<u>Objective</u>: To identify and quantify all treatment chemicals.

<u>Specification</u>: The total amounts of all chemicals identified below will be reported annually at the end of the calendar year in the Semi-Annual Operating Report.

1. Primary System
   a. Boric acid
2. Secondary treatment chemicals
   a. Phosphates
   b. Morpholine
   c. Hydrazine
3. Pre-treatment system chemicals
   a. Alum
   b. Lime
   c. Polyelectrolyte
   d. Hypochlorite
   e. Sodium Sulfite
4. Demineralizer System
   a. Caustic soda
   b. Sulphuric acid
5. Potable Water Softeners
   a. Salt

<u>Basis</u>: Boric acid is used as chemical shim during plant operation in order to control reactivity within the primary cycle.

Phosphate hydrazine and morpholine are used to chemically treat the secondary system. Of these chemicals only morpholine and phosphates are expected to enter the circulating water via the boiler blowdown. Since hydrazine breaks up into a gas at high temperatures, morpholine is used to

3.0 MONITORING REQUIREMENTS

3.2.3 Treatment Chemicals

<u>Objective</u>: To identify and quantify all treatment chemicals.

<u>Specification</u>: The total amounts of chemicals used in various unit operations within the plant will give an accurate account of quantities added to the environment.

<u>Basis</u>: The chemicals used in the different processes within the plant are required to provide safe and efficient operation of the various unit operations. All chemicals are added to these systems on an "as needed" basis.

2.0 ENVIRONMENTAL PROTECTION CONDITION	3.0 MONITORING REQUIREMENTS
increase condensate pH while phosphates are used to aid in fluidizing scale and sludge forming contaminants. The chemicals added to the pre-treatment system are alum to coagulate the turbidity in the water, lime to presoften the water, polyelectrolyte to aid in the development of the floc, hypochlorite solution to kill bacteria and sterilize the water and sodium sulfite to reduce any free chlorie before entering the demineralizers. Caustic soda and sulphuric are used in the demineralizer system regeneration process while salt is used to regenerate the water softener.	

4.1.1 Aquatic

a. General Ecological Survey

Objective: The specific aims of the general survey are as follows:

1. Identify certain physical characteristics such as water temperature, local lake cufrents, and bottom contours in the immediate plant influence.
2. Investigate benthic macroinvertebrates, zooplankton, phytoplankton, and periphyton populations and their distribution within the area of the thermal plume.
3. Characterize the distribution of fish at different seasons in the vicinity of the intake and discharge.
4. Determine whether the warm water discharge or intake of cooling water is having an adverse impact on the life history of fish in the vicinity of the plant.
5. Determine changes in the bacteriological and chemical makeup of the Lake Michigan waters in the vicinity of the plant.

Specification: The general ecological survey will be undertaken for two years after the plant becomes operational. The study program will remain flexible and may be modified if and when necessary to accommodate changes occurring during the study period.

A summary of the progress and results of these studies will be included in the Semi-Annual Operating Reports.

a. A map of the study area is shown in Figure 4.1.1-1. Sampling locations are shown together with a list of parameters in the program. As indicated on the map, the bottom contours in the vicinity of the plant are mapped and all sampling points are accurately located using shipboard navigation and depth finders.

b. Frequency

The frequency of field sampling for each category is presented in Table 4.1.1-1. The pattern of sampling is a modified quarterly system. Certain categories will be sampled twice at least 24 hours apart during each field trip. This will assist in negating the effects of abnormal conditions during any one sampling period.

c. Profile Locations

Seventeen profile sampling locations are established in a grid pattern as indicated in Figure 4.1.1-1. The profile locations are located at Stations 2-4, 6-8, 10-14, 15-17, and 20-22. Five locations are positioned offshore along the 10 foot depth contour, five along the 20 foot depth contour, and five along the 30 foot depth contour. One station is located at the mouth of the discharge and another at the 40 foot depth contour. Temperature and dissolved oxygen will be measured immediately below the lake surface and at each meter of depth at all locations twice during each quarter.

d. Chemistry and Bacteriology

Duplicate water samples are collected using a Kemmerer water sampler from three locations along each of the 10 and 20 foot depth contours and from a single location at the 40 foot contour (Figure 4.1.1-1). Samples along the 10 foot contour are from mid-depth; samples along the 20 foot contour are from 1 meter below the surface and from 1 meter above the bottom, and samples at the 40 foot contour are from the top, mid-point and bottom of the water column. This is a total of twelve (12) duplicate samples. A profile of the temperature and dissolved oxygen (DO) is determined at each of the lake sampling locations.

The chemical and bacteriological characteristics measured are as follows:

- Alkalinity, Total
- Ammonia
- Arsenic
- Bacteria, Standard Plate Count
- Bacteria, Total Coliform
- Bacteria, Fecal Coliform
- Bacteria, Fecal Streptococci
- Bio-Chemical Oxygen Demand (5-day)
- Boron
- Cadmium
- Chemical Oxygen Demand
- Chloride
- Chromium, Total
- Color, True
- Conductance, Specific
- Copper
- Floride
- Hardness, Total
- Iron
- Lead
- Manganese
- Mercury
- Nickel
- Nitrate
- Nitrite
- Organic Carbon, Total
- Organic Nitrogen, Total
- Orthophosphate Soluble
- Oxygen Dissolved
- pH
- Phosphorus, Total
- Potassium
- Silica
- Sodium
- Solids, Total Dissolved
- Sulfate
- Temperature Profiles
- Turbidity
- Zinc

e. Lake Currents

Currents are measured by means of drogues and continuous recording current meters will be re-evaluated at the site since past experience has indicated poor reliability of these meters in the field.

f. Phytoplankton

Duplicate water samples for phytoplankton analysis are collected at stations 2, 7, 11, 12, 14, 16, and 20 with a Kemmerer water sampler at a depth of one meter below the lake surface. Collection frequency will be twice each quarter. A species checklist and enumeration will be compiled for each sample.

g. Zooplankton

Zooplankton samples are collected with a conical #10 mesh net of 15 cm radius, equipped with a PVC plankton bucket. Vertical tows from a depth of 3 meters to the surface are made at all five zooplankton sampling locations (7, 11, 12, 13, and 16). Two replicate samples are taken at each location and depth. Organisms are identified to the lowest positive taxonomic level and enumerated. Populations are analyzed to determine the difference between locations.

h. Periphyton

Periphyton samples are collected once each quarter from naturally occurring rock substrates at each of the three sampling locations (1, 9 and 18) along the shoreline. The color species composition and abundance of the attached algae and the type of substrate upon which it grows are noted. In addition a survey to determine the extent of growth of benthic algae in deeper inshore areas is periodically made by a scuba diver. A species checklist, including the relative abundance of each species, is prepared for each sample to determine differences and similarities among locations.

i. Benthos

Benthos samples are taken at each of seven locations (7, 8, 11, 12, 14, 16, and 17) using a benthic pump. When weather conditions permit diving, a one-half square meter metal frame is dropped overboard and allowed to settle to the bottom. A scuba diver disturbs the sediments and brushes off the rocks within the area enclosed by the frame and at the same time controls the suction hose from the pump. All disturbed material is brought to the surface by the pump and passed through a fine mesh plankton net to collect organisms. Organisms are identified to the lowest positive taxonomic level and enumerated in abundance per square meter. These data will provide information on the distribution, abundance, and composition of the members of the benthic community.

j. Fish

Standard gill nets are used to sample the fish population twice each quarter at the location shown in Figure 4.1.1-1 (Stations A, B and C). Each gill net has one 300 foot panel of 2-1/2 inch stretched mesh size net, one 300 foot panel of 3-1/2 inch stretched mesh size net, and one 300 foot panel of 5-1/2 inch stretched mesh size net. Each gill net is fished overnight for approximately 18 hours.

Minnow seining is conducted twice each quarter using a seine consisting of 30 feet of six foot deep 1/4 inch Ace mesh netting. Minnow seining is done at approximately sunset at the locations shown in Figure 4.1.1-1 (Stations 510 and 19).

Fish eggs and larvae are sampled once each quarter using a benthic pump. The pump is operated for three minutes while the end of the suction hose moves across the bottom of the lake as the boat drifts. Pumping for fish eggs and larvae is conducted at locations shown in Figure 4.1.1-1 (Stations 6, 7, 11, 12, 20, and 21).

Each of the larger fish collected is individually identified, weighed and measured. Scale samples are taken for age and growth analysis and stomach samples are taken from selected individuals for food habit determination. Larval fish and fish eggs are identified.

Basis: This general ecological survey of the aquatic environment in the vicinity of the Kewaunee Plant will provide the necessary information to compare three years of preoperational study with data taken after the plant becomes operational. The program should be able to differentiate any changes caused by plant operation and will serve as a guide to initiate any corrective action that may evolve.

b. Entrainment

Objective: To determine the effect of entrainment upon phytoplankton, zooplankton and fish.

Specification: Entrainment studies will continue for one year after the plant becomes operational. A summary of the progress and results of this study will be included in the Semi-Annual Operating Report.

a. Fish

The number, size and weight of all fish collected in the circulating water trash basket shall be identified by plant personnel on a daily basis. Should large numbers of smelt or alewives be captured in the trash basket, the average size, number and weight shall be determined.

b. Phytoplankton

Phytoplankton analysis will be determined at the forebay and discharge until the plant reaches 100% power and/or until the viability of the phytoplankton is significantly impaired. When the above point is reached, the sampling locations will be moved to the intake, two locations in the plume located at a constant isotherm and two sampling locations in a control area north of the plume influence.

Duplicate samples will be taken and the concentration of chlorophyll a and photosynthetic rate as determined by ^{14}C uptake will be determined at 7, 24, 48 and 72 hours after collection. Species composition and density will be determined for selected sampling locations.

c. Zooplankton

Duplicate samples will be collected from the same stations as the phytoplankton samples. Analysis will consist of counting dead and live zooplankters 10 minutes and 4 hours after collection. Selected samples will also be analyzed for live-dead ratios as soon as possible after collection. Organisms will be identified to genus or species. The length of the organisms will be determined to assess the effect of size on condenser passage mortality. Species composition and density will be determined for selected sampling locations.

Basis: Post-operational data will be compared with data gathered before the plant became operational, thereby providing information in order to help determine the effect of the plant upon the entrained organisms.

4.2 Physical

4.2.1 Aquatic Thermal Plume Mapping
(See Section 2.1.3)

4.2.2 Erosion

Objective: To determine the amount of erosion in the vicinity of the plant.

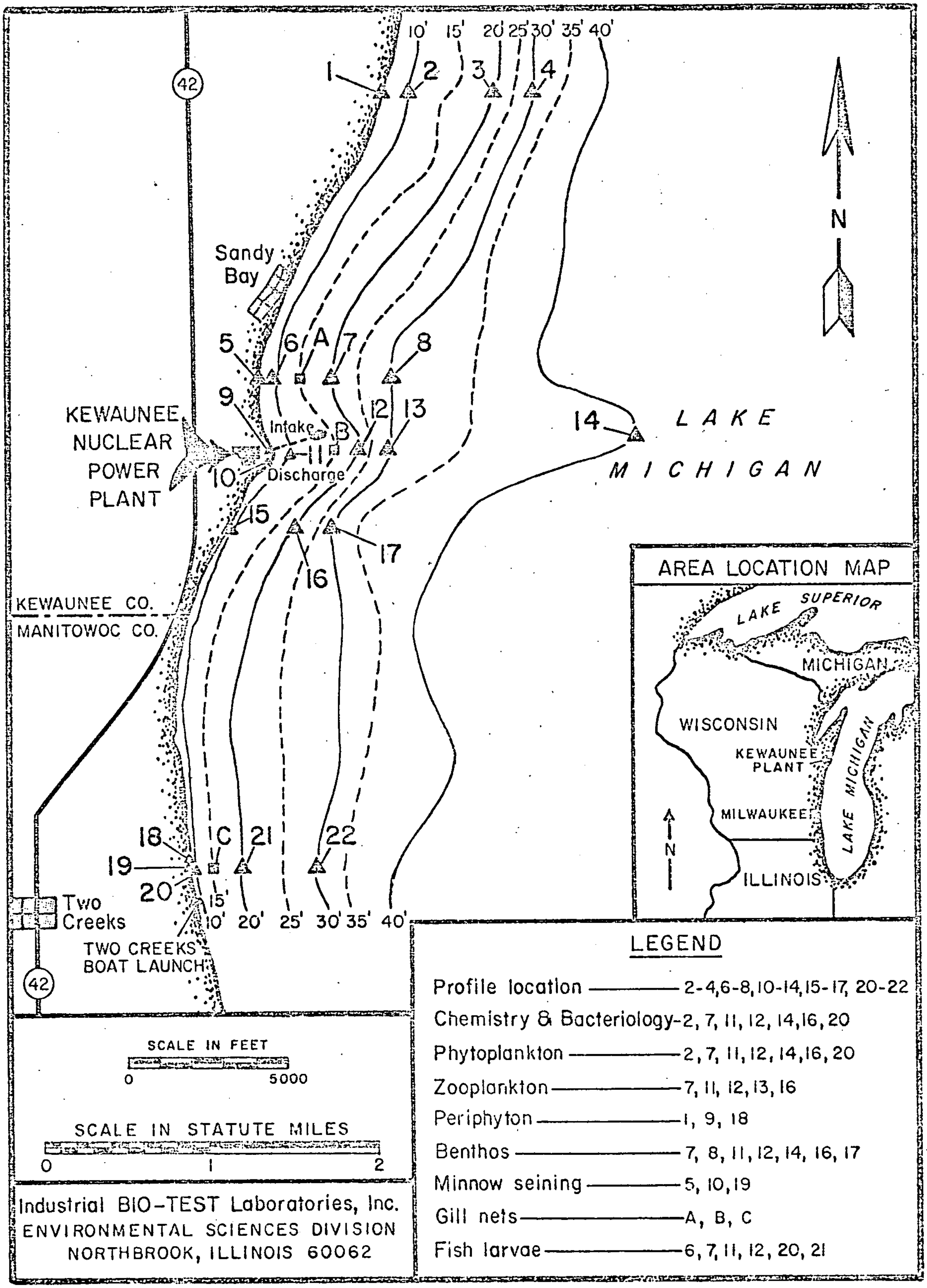
Specification: Aerial photograph of the shoreline will be taken quarterly for two years after the plant becomes operational to aid in determining the effect of local erosion on the lake shoreline in the vicinity of the plant.

Discussion of the results of these observations will be made annually in the Semi-Annual Operating Report.

Basis: Aerial photographs will provide reliable data in order to determine the amount of erosion taking place along the lake shoreline in the vicinity of the plant.

5.0 ADMINISTRATIVE

The non-radiological technical specifications will be subject to the Administrative Controls set up in Section 6 of the Technical Specifications.



SAMPLING LOCATIONS NEAR THE KEWAUNEE NUCLEAR POWER PLANT, KEWAUNEE, WISCONSIN

Figure 4.1.1-1

Table 4.1.1-1

Frequency of field sampling for categories sampled in Lake Michigan near the Kewaunee Nuclear Power Plant

Category	Sampling Period May	July	Sept.	Nov.
1. Water Quality	XX[a]	XX	XX	XX
2. Bacteriology	XX	XX	XX	XX
3. Water Column Profile	XX	XX	XX	XX
4. Zooplankton	XX	XX	XX	XX
5. Phytoplankton	XX	XX	XX	XX
6. Periphyton	X	X	X	X
7. Benthos	X	X	X	X
8. Fish	XX	XX	XX	XX
9. Near Shore Currents	X	X	X	X
10. Entrainment	X	X	X	X

a XX = Samples twice during the quarter at least 24 hours apart.