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PLANT NAMES: Kewaunee Nuclear Power Plant

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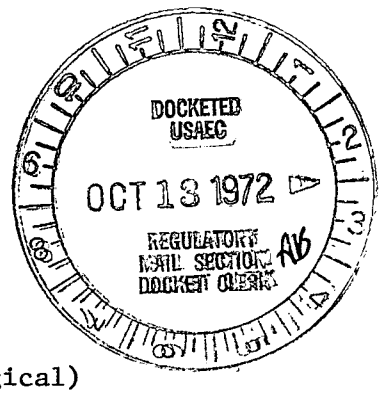
October 13, 1972



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

Dear Mr. Muller:

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

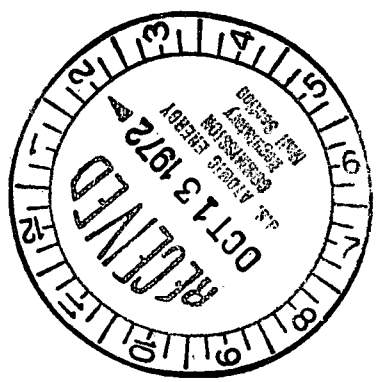
AEC Docket 50-305

Pursuant to your letter of September 21, 1972, we submit herewith, forty (40) copies of the Environmental (Non-Radiological) Technical Specifications for the Kewaunee Nuclear Power Plant.

Very truly yours,

E. W. James, Senior Vice-President
Power Generation & Engineering

EWJ:sna



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WISCONSIN PUBLIC SERVICE CORPORATION

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

October 13, 1972

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KEWAUNEE NUCLEAR POWER PLANT

NON-RADIOLOGICAL TECHNICAL SPECIFICATIONS

DRAFT

October 13, 1972

1.0 Operating Limits

1.1 Condenser Cooling Water Temperature Limits

Applicability

To place limitations on the circulating water discharge temperature during normal power increase or decrease.

Objective

To avoid as far as practicable subjecting the local aquatic ecosystem to excessive temperatures from the circulating water system.

Specification

a. Temperatures at the discharge of the circulating water system will be maintained in accordance with the State of Wisconsin's Department of Natural Resources waste discharge permit #69-363.

b. The maximum discharge temperature during normal power operation shall not exceed 86°F.

c. The temperature rise through the circulating water system shall not exceed 22°F during maximum summertime flow conditions and 29°F in the winter.

d. Where applicable, these specifications or affected portions thereof shall be superseded by future regulations which are adopted by the State of Wisconsin for Lake Michigan Waters.

Basis

The circulating water intake system is designed to provide a reliable supply of Lake Michigan water, regardless of weather or lake conditions, to critical plant systems and equipment. Normal operation of this system is with two circulating water pumps and two service water pumps in operation. Trash grills are placed over the intake crib inlets and are provided with recirculated water to remove any ice formations during winter operation.

The intake structure is below the ice blanket and at least 450 feet outboard of maximum windrow ice development.

The normal flow rate at the condenser is 413,000 gpm with a rise in water temperature of 20°F. This cooling is equal to 4.1×10^9 Btu/hr. In normal operation water is withdrawn from the lake at the intake structure, passed through the condenser, and returned to the lake via the discharge structure. In winter the lower temperature of the lake water allows a reduced-flow operation, such that only about 287,000 gpm passes through the condenser with a Δ T of 28°F. The circulating water system was designed to limit discharge temperature in compliance with applicable State of Wisconsin criteria (permit #69-363) governing thermal discharges. Kewaunee Plant's permit authorizes discharge water temperature of up to 86°F. To insure adequate protection of the public health and safety, certain short-term operating requirements and protective features of it cannot be limited or negotiated by condenser cooling water discharge requirements, i.e., automatic plant trips, manual plant trips initiated by licensed personnel in emergency or other situations requiring such action, and emergency power increases or decreases required by electrical distribution system conditions.

Operating experience at other nearby plants, i.e., Point Beach Nuclear Plant, has indicated that no significant adverse effect is likely to occur on Lake Michigan aquatic ecosystem from emergency shutdowns or plant trip conditions. At present there are no applicable regulations with respect to rates of temperature increase or decrease.

1.2 Chemical Discharges

Applicability

These limits apply to non-radioactive chemical releases from the waste neutralizing tank to the lake via the circulating water discharge.

Objective

To limit and maintain the chemical concentrations in the circulating water discharge to insignificant values in accordance with the waste discharge permit #69-363 issued by the Wisconsin Department of Natural Resources.

Specifications

a. Chemical wastes from the waste neutralizing tank released to the circulating water discharge shall be released at a rate such that, on the basis of calculations, the following conditions are met:

   a.1 As a result of the release of chemical wastes from the waste neutralizing tank, dissolved solids in the circulating water discharge shall not be increased by more than 10 parts per million when averaged over the period of release.

   a.2 As a result of the release of chemical wastes, total suspended solids in the circulating water discharge shall not be increased by more than 5 parts per million over the period of release.

b. Residual chlorine shall not exceed an average of 0.5 parts per million in the circulating water discharge during the period of use.

Basis

Chemical wastes originating primarily from plant pretreatment and makeup water treatment systems are insignificant compared to concentrations which are naturally occurring in Lake Michigan and consist mainly of sodium sulfate. The average concentration of total solids during limited release periods will have negligible effects on the naturally occurring total solids lake water. Dissolved solids in the lake range in excess of 150 ppm while suspended solids occasionally reach levels over 500 ppm near shore, due to wave action at the shoreline and land run-off. The limit of 5 ppm total solids increase over naturally occurring levels during release periods is not expected to have any

noticeable effect on the lake, especially in view of the fact that the near-shore waters have a substantially higher total solids content than off-shore water used as the source of the circulating water. Chlorine or chlorine compounds, originally intended for use in condenser fouling control, probably will not be needed. They have not been required during nearly two years' operation of the Point Beach Nuclear Plant. With no significant deterioration of present Lake Michigan water quality, they are not expected to be required for the Kewaunee Nuclear Plant due to the similarity of water quality at the two plants. However, in the event chlorine use is required, experience in the industry indicates a chlorine residual on the order of 0.5 parts per million is required for successful control of fouling. This chlorination, if required, will not be on a continuous basis, but rather on an intermittent basis.

2.0 Monitoring and Surveillance Program

2.1 Sampling Frequency and Locations

Applicability

This program is designed to evaluate the baseline physical, chemical and biological characteristics of Lake Michigan around the Kewaunee Nuclear Power Plant in accordance with the Wisconsin Department of Natural Resources Lake Michigan Thermal Standards (NR 102.04).

The following proposal has been approved by the DNR and is presently in operation.

Objective

The investigations outlined in this program are designed to evaluate the impact of a once-through cooling system.

The specific aims of this program are:

a. To identify certain physical characteristics such as water temperature, local lake currents, and bottom contours in the immediate area of plant influence.

b. To determine the chemical and bacteriological status (water quality) of Lake Michigan waters in the vicinity of the plant.

c. To investigate benthic macroinvertebrates, zooplankton, phytoplankton, and periphyton populations and their distributions within the area of expected thermal influence.

d. To characterize the distribution of fish at different seasons in the vicinity of the intake and discharge, with the primary interest to determine whether the warm water discharge or cooling water intake is having an adverse effect on the life history of the fish that will be found in the aquatic habitat adjacent to the plant.

e. To satisfy the requirements of the Wisconsin Department of Natural Resources with respect to the environmental impact of the plant upon the aquatic ecosystem.

Specification

The frequency of field sampling for each category is presented in Table I. The basic pattern of sampling is a modified quarterly system using a predetermined grid as indicated in Figure 1. Certain categories will be sampled twice at least 24 hours apart during each field trip. This approach will assist in negating the effects of abnormal conditions during any one sampling period.

a. Profiles of the Water Column

Seventeen (17) profile sampling locations shall be established as indicated by the grid in Table 1. Five locations will be positioned

offshore along the 10-foot depth contour, 5 along the 20-foot depth contour, and 5 along the 30-foot depth contour. One location will be positioned near the mouth of the discharge and another will be positioned approximately two miles offshore 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 each quarter.

b. Lake Currents

Lake currents shall be measured in the vicinity of the plant using two self-contained film-recording current meters. One meter will be located permanently in the immediate vicinity of the intake and discharge structures to provide "baseline" data to which data from the second meter can be compared. The second meter will be relocated each quarter based on site differences relative to bottom topography, water depth and shoreline configuration. Drogues will be used to assess the trajectory of the current as it passes the plant.

c. Water Quality

Duplicate samples for water quality analyses shall be collected from seven (7) sampling locations twice during each quarter. At three (3) locations near the 10-foot depth, mid-depth samples will be taken; at three (3) locations near the 30-foot depth, samples will be taken one meter below the surface and one meter above the bottom; at the one (1) location near the 40-foot depth, samples will be taken at the top, mid-point and bottom of the water column. This is a total of twelve (12) samples. The chemical characteristics to be measured are:

Total Organic Nitrogen	Turbidity
Ammonia	Specific Conductance
Nitrate	Chemical Oxygen Demand
Nitrite	Total Iron
Total Phosphorus	Total Chromium
Soluble Orthophosphate	Copper
Total Organic Carbon	Nickel
Fluoride	Zinc
Sulfate	Cadmium
Color	Arsenic
Chloride	Boron
Total Dissolved Solids	Lead
pH	Manganese
Alkalinity	Mercury
Total Hardness	Sodium
Silica	Potassium

Dissolved oxygen shall be determined as a part of water quality sampling as well as the water column profile determinations.

d. Bacteriology

Duplicate water samples will be collected at the same seven (7) sampling locations (12 samples) as for water quality analysis twice each quarter. Analyses of total plate counts, fecal coliform, and fecal streptococci bacteria shall be made as well as determinations of biochemical oxygen demand.

e. Phytoplankton

Duplicate water samples for phytoplankton analysis will be collected with a Kemmerer water sampler at a depth of one meter below the

lake surface. Frequency of collection and sampling locations will be the same as for water quality and bacteriological sampling. A species checklist and enumeration shall be compiled from each sample.

f. Zooplankton

Because of the variability of microcrustacea, vertical tows in five (5) separate locations will be made in the vicinity of the plant twice each quarter. The sampling pattern will permit collections to be made at the 20, 30 and 40-foot depth contours offshore. The plankton net used in the tows will also collect young life stages of fish which may be present. A species checklist and enumeration of zooplankton crustacea shall be compiled from each sample. Distribution and abundance of organisms that may be influenced by the thermal effluent will be determined.

g. Periphyton

Three (3) locations will be sampled in duplicate from naturally occurring substrates along the shoreline once each quarter. The color, composition and relative abundance of the attached algae and the type of substrate upon which it grows will be noted. A species checklist and enumeration shall be compiled from each sample.

h. Benthos

Seven (7) locations will be sampled in duplicate once each quarter. The exact positioning of the sampling locations will depend on the nature of the bottom sediments. A Ponar dredge will be used to obtain benthic samples where sediments permit; other methods will be explored where the dredge is not suitable. Sediment type and characteristics will be determined in connection with benthic organism sampling. Species will be enumerated, and distribution and abundance, as these may be influenced by the thermal effluent, will be determined.

i. Fish

Fish will be sampled twice during each of the four quarters. Sampling intervals will be distributed so as to yield information on a seasonal basis. The collection devices which will be used are: variable mesh gill nets and minnow seining.

The actual location of sampling stations will necessarily be dependent upon specific environmental considerations at the site. Three (3) collection stations in the lake will be employed, two within and one outside of the area of expected thermal influence. In addition, three shoreline sampling locations will be utilized for minnow seining.

For larger fishes collected, each shall be individually identified, weighed, and measured. Scale samples will be taken for age and growth analysis from selected individuals; also samples of stomach contents will be taken for determination of food habits.

In addition to sampling the larger fishes, special devices will be used during each sampling period to sample for larval fish or fish eggs. Sampling devices which may be utilized in this effort are: epibenthic pump, plankton cone net, and fine mesh bottom trawl.

A coordinated plan, using plant personnel, will be set up in order to evaluate periodically the species and numbers of fish that appear on the travelling intake screens.

During cold weather sampling, particularly if fish are examined in the period from January through May, special attention will be given to the presence of symptoms of gas bubble disease.

During specific sampling periods, plankton cone nets will be used in the intake and discharge areas of the plant, if the circulating pumps are operating, to assess the presence of larval fish or eggs that may be entrained in condenser cooling water.

Basis

The profile data will be examined to determine the degree of similarity in the water masses which make up the study area. During the summer the depth of the epiliminion (warmer, less dense layer of water near the surface) and the thermocline (transition area between upper and lower regions of summer stratification) will be determined.

Current speed and direction measurements together with persistence data will provide information on factors that may influence the shape and extent of thermal plume as well as some indication of the possible distribution of chemical or radiochemical substances released into the condenser water discharge.

The existing water quality will be determined and compared to state standards and data collected from other areas of the lake.

Bacteriological data, along with B.O.D. results, will be used to establish if domestic sewage or agricultural wastes are present near the site.

Phytoplankton data will assist in determining the water quality and the nutrient levels at the site to support algal growth. Abundance of specific species will present a basis for comparing the study area to other regions where similar surveys are being conducted. A shift in species composition can indicate subtle environmental changes because of the sensitivity of certain species to environmental conditions.

In addition to the environmental program described herein a number of additional studies have been made and others will continue, although such programs are not subject to the control of the license.

The list of studies presently underway is as follows:

1. University of Wisconsin - Milwaukee
   - Temperature
   - Radioactivity
   - Sediment
   - Phytoplankton
   - Zooplankton
   - Current Studies
   - Effect of Plankton as they pass through the cooling system

2. University of Wisconsin - Madison & Green Bay
   - Infrared Flyovers
   - Littoral Drift and Sediment Characteristics

3. State of Wisconsin Department of Health & Social Services
   - Radioactivity of Water, Algae, Fish, Milk and Vegetation

4. Great Lakes Research Division - University of Michigan - Dr. John C. Ayers
   - Biological Sampling
   - Dissolved Oxygen Sampling

Studies that have been completed are:

1. Lake Michigan Utility Study Group
   - Chemical Composition of Lake Michigan
   - Trace Element Analysis of Aquatic Biota

2. Helgeson Nuclear Services, Inc.
   - Underwater Gamma Probe

3. Industrial Bio-Test, Inc.
   - First Year - Thermal Monitoring Program

A comprehensive program to determine the evaluation of the major components in the food chain to man has been undertaken by the Lake Michigan Utility Study Group of which the licensee is a member.

This study represents an ongoing evaluation of the entire Lake Michigan aquatic ecosystem.

Environmental Research Group - Ann Arbor, Michigan
- Analysis of the Food Chain Concentration Factors to Man

3.0 Administrative Requirements

3.1 Recording and Reporting for Non-Radiological Parameters

Applicability

Determines the record keeping and monitoring of condenser cooling water intake and discharge temperatures; for chemicals released from the waste neutralizing tank, for the effect on fish and the non-radiological monitoring program.

Objective

To document the circulating water intake and discharge temperatures, chemical waste releases, fish data, and the non-radiological thermal monitoring results.

Specification

a. Hourly condenser inlet and outlet temperature readings shall be recorded noting daily maximum, minimum, and average temperatures including:

   a.1. Dates and time intervals during which the condenser cooling water system is in the "ice melt" mode of operation.

b. Records shall be kept on a permanent basis for chemical waste releases from the waste neutralizing tank and shall include the following:

   b.1. Total volume, in gallons, of chemical waste releases.

   b.2. Total solids released, in pounds, to Lake Michigan.

   b.3. Concentration increases for total solids, for each period of releases, after dilution in the circulating water.

c. Records shall be kept on a permanent basis of chlorine residuals during periods of chlorination, and shall include the following:

   c.1. Length and number of chlorination periods.

c.2. Chlorine residuals in parts per million for each chlorination.

c.3. Total equivalent chlorine released to Lake Michigan, in pounds.

d. The following records pertaining to fish shall be kept for a minimum of five years after plant startup:

d.1. Estimate of number of fish of each species over 6" in length, except alewives, found in the circulating water trash basket.

d.2. Estimate of size ranges of fish of all species over 6 inches in length, except alewives.

d.3. Estimate of total weight of fish over 6" in length, except alewives.

e. Quarterly progress reports of the non-radiological thermal monitoring program shall be reported to the Wisconsin Department of Natural Resources with the final comprehensive report submitted to the DNR in 1974.

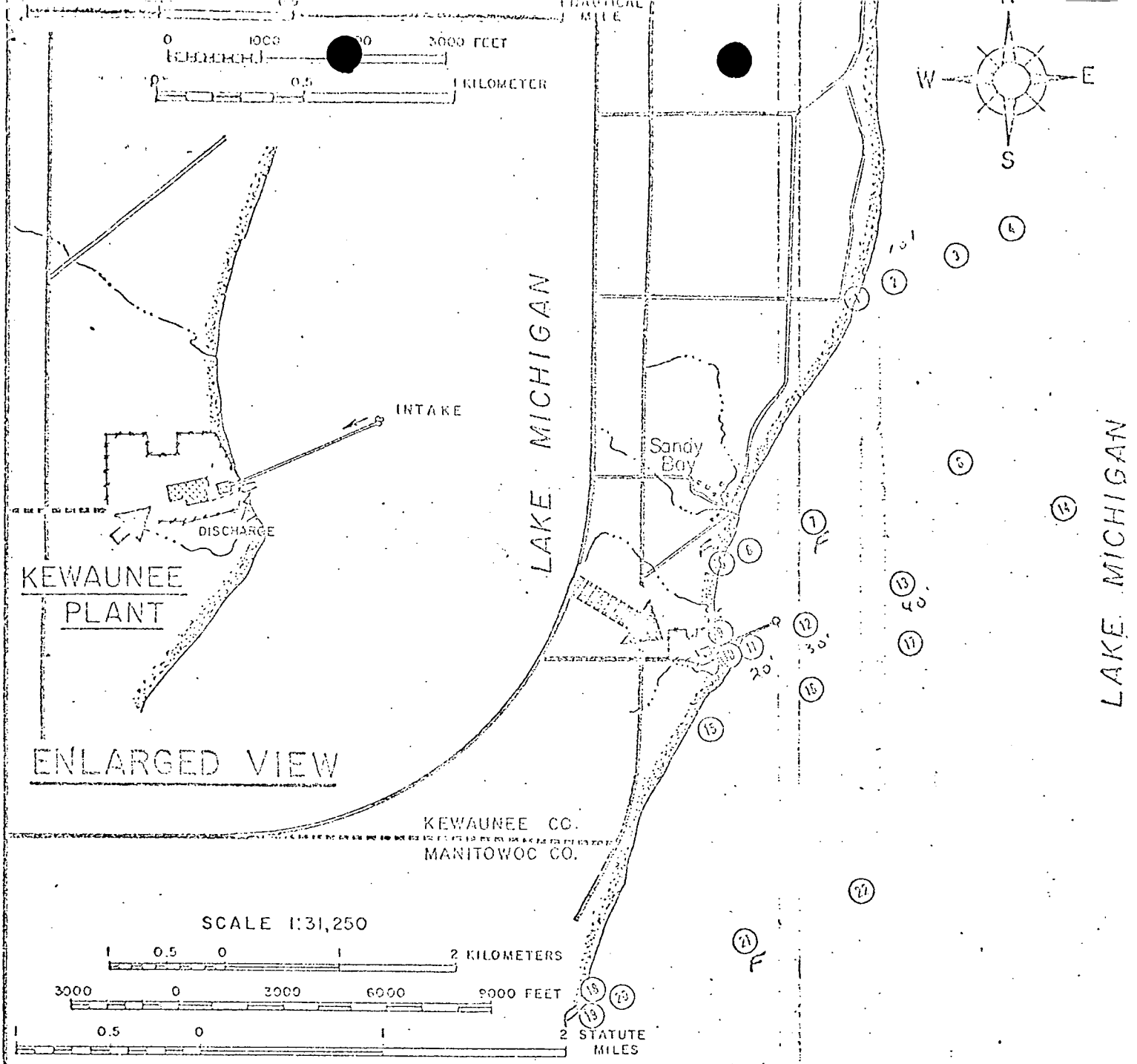
TABLE I

FREQUENCY OF FIELD SAMPLING
BY CATEGORY

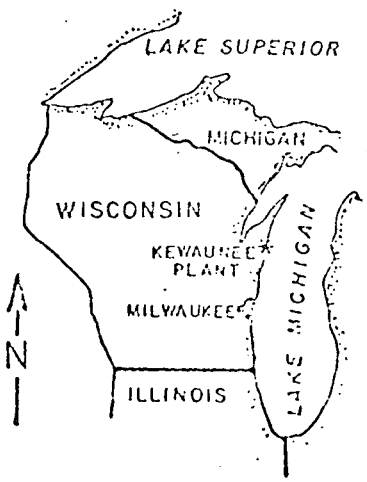
Category	Sampling Period - 1972			
	May	July	Sept.	Nov.
1. Water Column Profile	XX[1/]	XX	XX	XX
2. Lake Currents[2/]	X	X	X	X
3. Water Quality	XX	XX	XX	XX
4. Bacteriology	XX	XX	XX	XX
5. Phytoplankton	XX	XX	XX	XX
6. Zooplankton	XX	XX	XX	XX
7. Periphyton	X	X	X	X
8. Benthos	X	X	X	X
9. Fish	XX	XX	XX	XX

1/ XX = Two independent samplings during the quarter.

2/ Certain aspects will be monitored on a continuous basis.



AREA LOCATION MAP



LEGEND

PROFILE LOCATION = 2-4, 6-8, 10-14, 15-17, 20-22

WATER QUALITY = 2, 7, 11, 12, 14, 16, 20

PHYTOPLANKTON = 2, 7, 11, 12, 14, 16, 20

ZOOPLANKTON = 6, 11, 12, 13, 15

PERIPHYTON = 1, 9, 18

BENTHOS = 7, 8, 11, 12, 14, 16, 17

FISH = 5, 7, 10, 12, 19, 21

Industrial BIO-TEST Laboratories, Inc.
Environmental Science Division
NORTHBROOK, ILLINOIS

FIG. 1.

PROPOSED SAMPLING LOCATIONS NEAR KEWAUNEE POWER PLANT

Prepared by: Ratko J. Ristić