

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY
WORKING PAPER SERIES**



**REPORT
ON
LONG LAKE
LAKE COUNTY
ILLINOIS
EPA REGION V
WORKING PAPER No. 309**

**CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON
and
ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA**

REPORT

ON

LONG LAKE

LAKE COUNTY

ILLINOIS

EPA REGION V

WORKING PAPER No. 309

WITH THE COOPERATION OF THE

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

AND THE

ILLINOIS NATIONAL GUARD

JUNE, 1975

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

- a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.
- b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.
- c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Illinois Environmental Protection Agency for professional involvement and to the Illinois National Guard for conducting the tributary sampling phase of the Survey.

Dr. Richard H. Briceland, Director of the Illinois Environmental Protection Agency; and Ronald M. Barganz, State Survey Coordinator, and John J. Forneris, Manager of Region III, Field Operations Section of the Division of Water Pollution Control, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

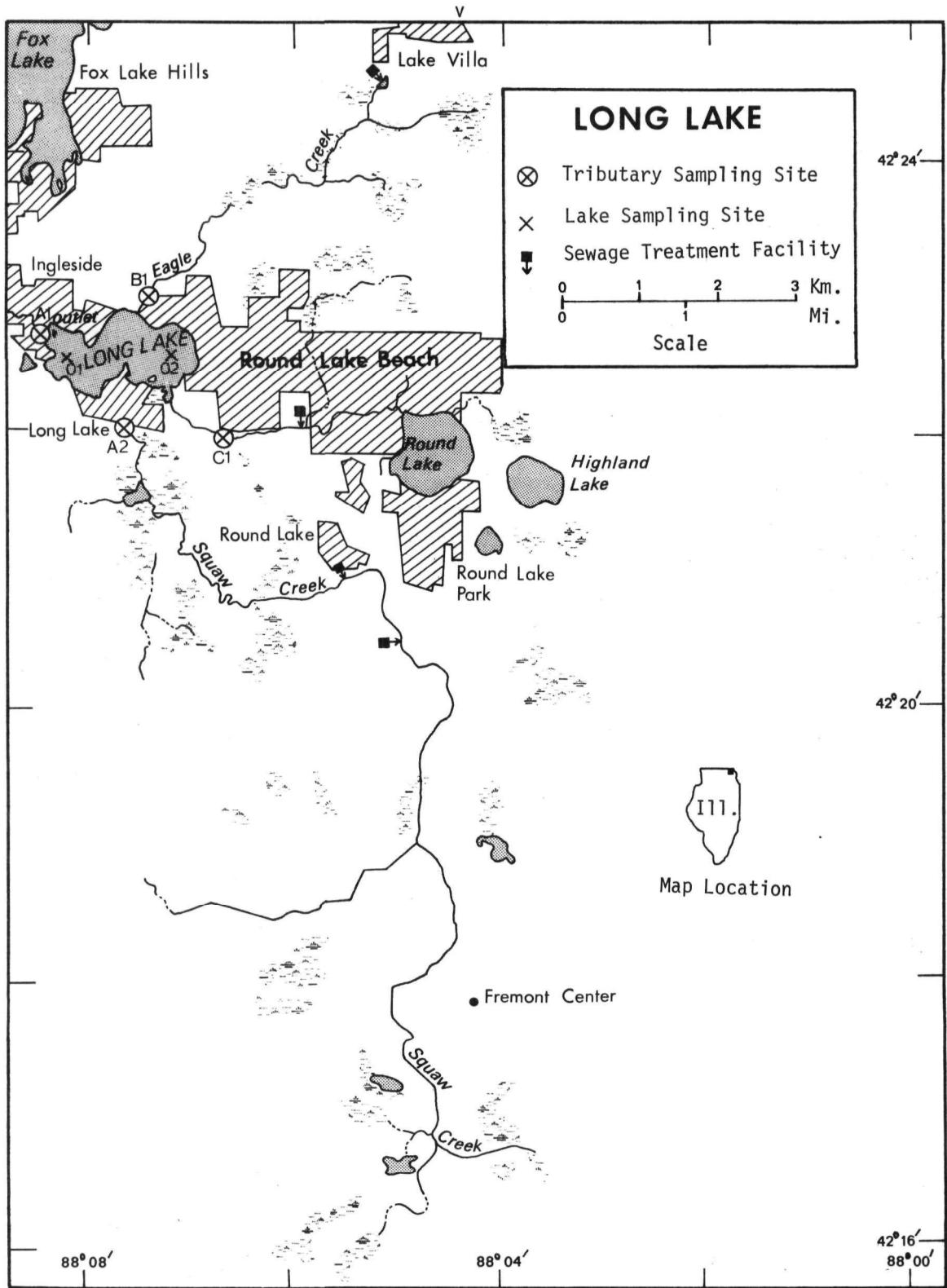
Major General Harold R. Patton, the Adjutant General of Illinois, and Project Officer Colonel Daniel L. Fane, who directed the volunteer efforts of the Illinois National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

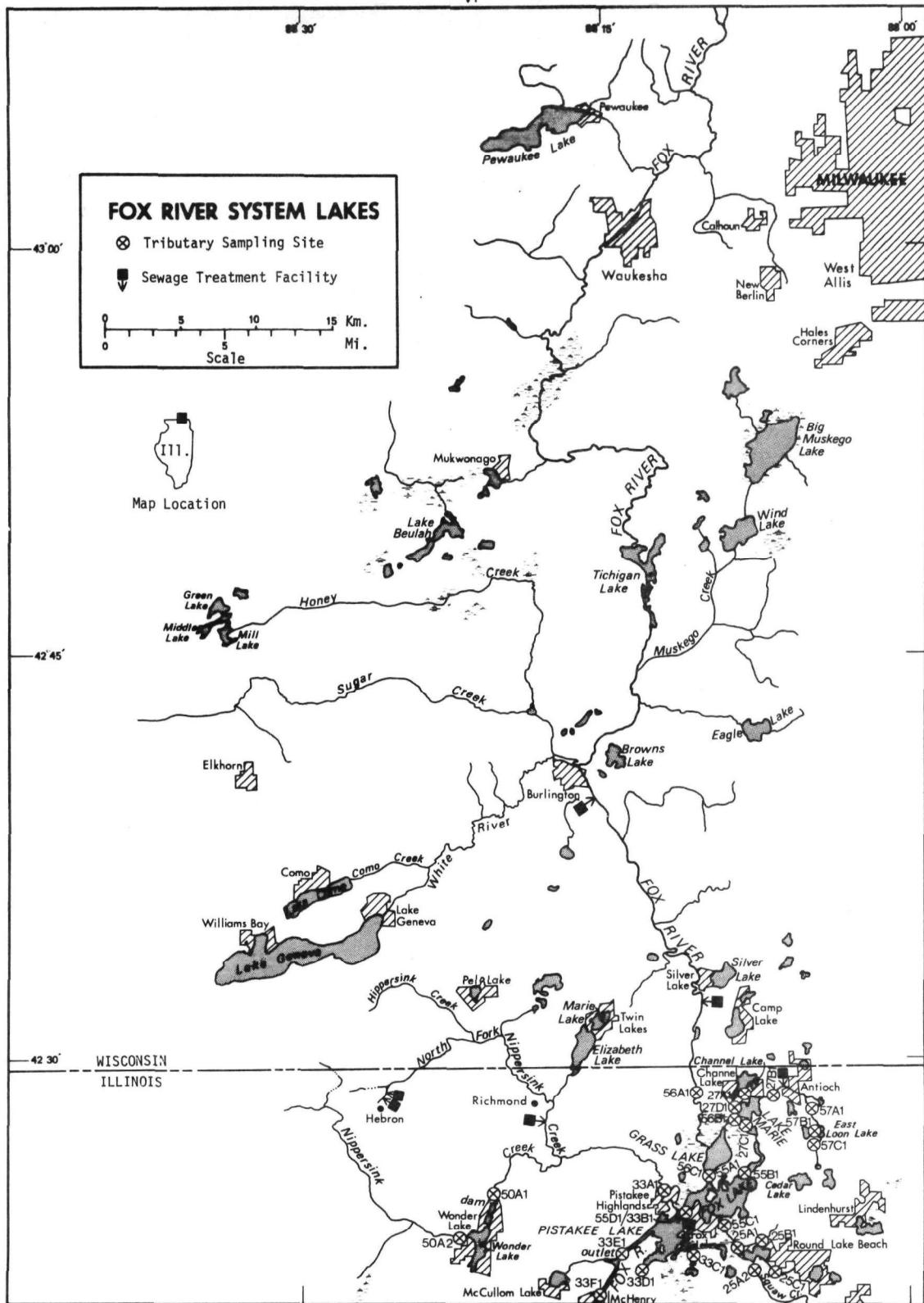
NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF ILLINOIS

<u>LAKE NAME</u>	<u>COUNTY</u>
Baldwin	Randolph
Bloomington	McLean
Carlyle	Bond, Clinton, Fayette
Cedar	Lake
Charleston	Coles
Coffeen	Montgomery
Crab Orchard	Jackson, Williamson
Decatur	Macon
DePue	Bureau
East Loon	Lake
Fox	Lake
Grass	Lake
Highland Silver	Madison
Holiday	LaSalle
Horseshoe	Madison
Long	Lake
Lou Yaeger	Montgomery
Marie	Lake
Old Ben Mine	Franklin
Pistakee	Lake, McHenry
Raccoon	Marion
Rend	Franklin, Jefferson
Sangchris	Christian
Shelbyville	Moultrie, Shelby
Slocum	Lake
Springfield	Sangamon
Storey	Knox
Vandalia	Fayette
Vermilion	Vermilion
Wee Ma Tuk	Fulton
Wonder	McHenry





LONG LAKE

STORET NO. 1725

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Long Lake is eutrophic. It ranked 29th when the 31 Illinois lakes sampled in 1973 were compared using a combination of six parameters*. Twenty-eight of the lakes had less median total phosphorus, 29 had less median dissolved phosphorus, 17 had less median inorganic nitrogen, 21 had less mean chlorophyll a, and 18 had greater mean Secchi disc transparency.

Survey limnologists noted surface concentrations of blue-green algae in August, 1973.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Long Lake was limited by nitrogen at the time the sample was taken (05/09/73). The lake data indicate nitrogen limitation in August and October as well.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution of known point sources accounted for 87.3% of the total load reaching Long Lake during the sampling year. The major portion of the

* See Appendix A.

load, 81.5%, was contributed by the Round Lake Sanitary District wastewater treatment plant. The remainder came from the Village of Lake Villa, Fremont School, Camp Hickory, and industrial wastewater treatment facilities.

The present loading rate of $23.66 \text{ g/m}^2/\text{yr}$ is nearly 29 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 13). For this reason, all phosphorus inputs to the lake should be minimized to the greatest practicable extent. Complete removal of phosphorus from the listed point source loads would reduce the loading rate to $3.03 \text{ g/m}^2/\text{yr}$ and should at least slow the present rate of eutrophication now occurring. The relatively short mean hydraulic retention time of 32 days would facilitate water quality improvement once phosphorus controls are initiated.

2. Non-point sources--The phosphorus contribution of non-point sources amounted to 12.7% of the total load to the lake. Squaw Creek contributed 6.6%, Eagle Creek contributed 2.5%, and Unnamed Creek C-1 contributed 2.3% of this total. Ungaged tributaries were estimated to have contributed 11.6%.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS[†]

A. Lake Morphometry^{††}:

1. Surface area: 1.03 kilometers².
2. Mean depth: 1.6 meters.
3. Maximum depth: >4.9 meters.
4. Volume: 1.648×10^6 m³.
5. Mean hydraulic retention time: 32 days.

B. Tributary and Outlet:

(See Appendix C for flow data)

1. Tributaries -

<u>Name</u>	<u>Drainage area (km²)*</u>	<u>Mean flow (m³/sec)*</u>
Squaw Creek	64.1	0.4
Eagle Creek	11.3	0.1
Unnamed Creek C-1	15.3	0.1
Minor tributaries & immediate drainage -	<u>8.0</u>	<u><0.1</u>
Totals	98.7	0.6

2. Outlet -

Squaw Creek	99.7**	0.6
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C. Precipitation***:

1. Year of sampling: 112.2 centimeters.
2. Mean annual: 83.3 centimeters.

[†] Table of metric conversions--Appendix B.

^{††} Forneris, 1973.

* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".

** Includes area of lake.

*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Long Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 4.9 meters at station 1 and 4.3 meters at station 2.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LONG LAKE
STORET CODE 1725

PARAMETER	1ST SAMPLING (5/ 9/73)			2ND SAMPLING (8/ 7/73)			3RD SAMPLING (10/16/73)		
	2 SITES			2 SITES			2 SITES		
	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN
TEMP (C)	13.4 - 14.3	13.9	13.9	24.5 - 26.2	25.3	25.2	17.1 - 17.6	17.3	17.3
DISS OXY (MG/L)	6.8 - 9.4	8.4	8.8	6.2 - 10.0	8.1	8.2	6.8 - 9.0	8.0	8.2
CNDCTVY (MCROMO)	570. - 640.	587.	575.	614. - 624.	620.	620.	579. - 583.	581.	580.
PH (STAND UNITS)	8.1 - 8.8	8.3	8.1	8.6 - 9.0	8.9	8.9	8.5 - 8.6	8.5	8.5
TOT ALK (MG/L)	195. - 203.	199.	200.	203. - 284.	266.	276.	210. - 232.	222.	228.
TOT P (MG/L)	0.204 - 0.376	0.240	0.215	0.652 - 0.924	0.750	0.725	0.744 - 0.828	0.785	0.764
ORTHO P (MG/L)	0.116 - 0.129	0.122	0.122	0.392 - 0.494	0.434	0.421	0.441 - 0.474	0.454	0.450
NO2+NO3 (MG/L)	1.010 - 1.060	1.032	1.025	0.060 - 0.120	0.092	0.085	0.720 - 0.750	0.734	0.730
AMMONIA (MG/L)	0.160 - 0.220	0.180	0.170	0.080 - 0.250	0.142	0.105	0.440 - 0.660	0.566	0.590
KJEL N (MG/L)	0.900 - 1.200	1.017	0.950	1.800 - 2.800	2.217	2.100	2.200 - 2.900	2.640	2.700
INORG N (MG/L)	1.180 - 1.240	1.212	1.210	0.160 - 0.370	0.233	0.205	1.190 - 1.400	1.300	1.320
TOTAL N (MG/L)	1.910 - 2.250	2.048	1.995	1.860 - 2.920	2.308	2.205	2.950 - 3.640	3.374	3.430
CHLRPYL A (UG/L)	44.2 - 44.9	44.5	44.5	29.8 - 54.6	42.2	42.2	60.7 - 61.8	61.2	61.2
SECCHI (METERS)	0.5 - 0.5	0.5	0.5	0.3 - 0.8	0.5	0.5	0.3 - 0.3	0.3	0.3

B. Biological characteristics:

1. Phytoplankton (incomplete at this time) -

<u>Sampling Date</u>	<u>Dominant Genera</u>	<u>Algal units per ml</u>
05/09/73	1. <u>Stephanodiscus sp.</u> 2. <u>Cryptomonas sp.</u> 3. <u>Melosira sp.</u> 4. <u>Pediastrum sp.</u> 5. <u>Synedra sp.</u> Other genera	1,091 436 236 18 18 <u>1</u>
	Total	1,800
08/07/73	1. <u>Microcystis sp.</u> 2. <u>Aphanizomenon sp.</u> 3. <u>Stephanodiscus sp.</u> 4. <u>Cryptomonas sp.</u> 5. Blue-green filaments Other genera	1,205 585 344 155 103 <u>225</u>
	Total	2,617
10/16/73	1. <u>Stephanodiscus sp.</u> 2. <u>Aphanizomenon sp.</u> 3. Flagellates 4. Blue-green filaments 5. <u>Cryptomonas sp.</u> Other genera	1,355 214 186 128 106 <u>453</u>
	Total	2,442

2. Chlorophyll a -

<u>Sampling Date</u>	<u>Station Number</u>	<u>Chlorophyll a ($\mu\text{g/l}$)</u>
05/09/73	01	44.2
	02	44.9
08/07/73	01	29.8
	02	54.6
10/16/73	01	60.7
	02	61.8

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

<u>Spike (mg/l)</u>	<u>Ortho P Conc. (mg/l)</u>	<u>Inorganic N Conc. (mg/l)</u>	<u>Maximum yield (mg/l-dry wt.)</u>
Control	0.085	1.220	30.6
0.050 P	0.135	1.220	29.7
0.050 P + 1.0 N	0.135	2.220	41.7
1.0 N	0.085	2.220	39.6

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Long Lake was high at the time the assay sample was collected. Also, a significant increase in yield when only nitrogen was added indicates that this lake was limited by nitrogen at that time. Note the lack of response when only orthophosphorus was added.

The lake data indicate Long Lake was limited by nitrogen at the other sampling times as well. The mean inorganic nitrogen/orthophosphorus ratios were less than 1/1 in August and 3/1 in October.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Illinois National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff month of March when two samples were collected. Sampling was begun in June, 1973, and was completed in May, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Illinois District Office of the U.S. Geological Survey for most of the tributary sites nearest the lake. However, flow estimates for Squaw and Eagle creeks were not included. Flow rates for these tributaries were determined by multiplying the runoff coefficient used by U.S.G.S., in $m^3/sec/km^2$, by the corresponding drainage areas of each creek planimetered by the Survey geographer.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any. However, the nutrient loads measured at the Round Lake Sanitary District wastewater treatment facility exceeded the loads measured in Unnamed Creek C-1 and the background load for this stream and the unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/yr$, at station A-1 of nearby Lake Pistakee

(see map, page vi) and multiplying the means by the C-1 and ZZ areas in km².

The operators of the Village of Lake Villa, Round Lake Sanitary District, Travenol Labs, Inc., and Heppner Mfg. Company wastewater treatment plants provided monthly effluent samples and corresponding flow data. However, Camp Hickory and Fremont School did not participate in the sampling program. Nutrient loads for these sources were estimated at 1.134 kg P and 3.401 kg N/capita/year, and flows were estimated at 0.3785 m³/capita/day.

A. Waste Sources:

1. Known municipal -

<u>Name</u>	<u>Pop. Served</u>	<u>Treatment</u>	<u>Mean Flow (m³/d)</u>	<u>Receiving Water</u>
Village of Lake Villa*	1,200	stab. pond	378.5	Eagle Creek
Round Lake San. Dist.*	16,300	trickling filter	8,396.7	Unnamed Stream (C-1)
Camp Hickory**	140	Imhoff	53.0	ditch to Squaw Creek
Fremont Sch.**	500	act. sludge	189.2	drainage tile from Fremont Center/ Squaw Creek

* Treatment plant questionnaires.

** Anonymous, 1972.

2. Known industrial -

<u>Name</u>	<u>Product</u>	<u>Treatment</u>	<u>Mean Flow (m³/d)</u>	<u>Receiving Water</u>
Heppner Mfg.*	radio speakers	trickling filter	16.4	Squaw Creek
Travenol Labs, Inc.*	medical & bio. products	act. sludge + pond**	1,100.9	Unnamed trib. to Squaw Creek

* Treatment plant questionnaires.

** Effluent is pumped from the pond to a 3.5-acre evaporation field planted in rice grass. Effluent that does not evaporate runs back along the surface to the pond. The evaporation field has the capacity to evaporate 29 inches per year and is used at full capacity. Local rainfall is 33" per year. The pond spills into Squaw Creek only during overflow from storm runoff which goes into Lake Lure. The latter essentially is a 300-acre swamp one mile above Long Lake.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg P/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
Squaw Creek	1,610	6.6
Eagle Creek	615	2.5
Unnamed Creek C-1	565	2.3
b. Minor tributaries & immediate drainage (non-point load) -	295	1.2
c. Known municipal STP's -		
Round Lake San. District	19,860	81.5
Village of Lake Villa	600	2.5
Fremont School	565	2.3
Camp Hickory	160	0.7
d. Septic tanks* -	60	0.2
e. Known industrial -		
Travenol Labs, Inc.	?	-
Heppner Mfg.	20	0.1
f. Direct precipitation** -	<u>20</u>	<u>0.1</u>
Total	24,370	100.0

2. Outputs -

Lake outlet - Squaw Creek 9,195

3. Net annual P accumulation - 15,175 kg.

* Estimate based on 205 lakeshore dwellings; see Working Paper No. 175.

** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

<u>Source</u>	<u>kg N/ yr</u>	<u>% of total</u>
a. Tributaries (non-point load) -		
Squaw Creek	41,710	35.3
Eagle Creek	6,000	5.1
Unnamed Creek C-1	10,315	8.7
b. Minor tributaries & immediate drainage (non-point load) -		
	5,395	4.6
c. Known municipal STP's -		
Round Lake San. District	48,050	40.6
Village of Lake Villa	1,300	1.1
Fremont School	1,700	1.4
Camp Hickory	475	0.4
d. Septic tanks* -		
	2,185	1.9
e. Known industrial -		
Travenol Labs, Inc.	?	-
Heppner Mfg.	15	<0.1
f. Direct precipitation** -		
	<u>1,110</u>	<u>0.9</u>
Total	118,255	100.0

2. Outputs -

Lake outlet - Squaw Creek 64,845

3. Net annual N accumulation - 53,410 kg.

* Estimate based on 205 lakeshore dwellings; see Working Paper No. 175.

** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

<u>Tributary</u>	<u>kg P/km²/yr</u>	<u>kg N/km²/yr</u>
Squaw Creek	25	651
Eagle Creek	54	531
Unnamed Creek C-1	37	674

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m ² /yr	23.66	14.73	114.8	63.0

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Long Lake:

"Dangerous" (eutrophic rate)	0.82
"Permissible" (oligotrophic rate)	0.41

V. LITERATURE REVIEWED

Anonymous, 1972. Wastewater treatment works data book. IL Env. Prot. Agency, Springfield.

Forneris, John J., 1973. Personal communication (lake morphometry). IL Env. Prot. Agency, Springfield.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
1703	LAKE BLOOMINGTON	0.050	5.730	464.667	26.200	14.800	0.020
1706	LAKE CARLYLE	0.084	1.270	477.889	17.367	11.000	0.032
1708	LAKE CHARLESTON	0.160	4.680	490.667	12.000	8.400	0.065
1711	COFFEEN LAKE	0.032	0.260	456.222	7.700	14.900	0.012
1712	CRAB ORCHARD LAKE	0.082	0.200	482.222	59.867	13.800	0.013
1714	LAKE DECATUR	0.129	3.750	479.571	43.000	14.500	0.062
1725	LONG LAKE	0.704	1.190	482.667	49.333	8.800	0.398
1726	LAKE LOU YAEGER	0.186	1.600	489.583	10.662	11.400	0.076
1727	LAKE MARIE	0.098	0.370	467.667	39.533	14.700	0.057
1733	PISTAKEE LAKE	0.203	0.370	485.667	75.867	7.000	0.062
1735	REND LAKE	0.071	0.210	471.500	23.533	12.700	0.012
1739	LAKE SHELBYVILLE	0.062	3.290	461.333	17.161	14.800	0.019
1740	SILVER LAKE (HIGHLAND)	0.226	0.970	489.500	5.822	14.800	0.057
1742	LAKE SPRINGFIELD	0.108	3.265	483.385	13.013	10.800	0.059
1748	VERMILION LAKE	0.109	4.695	481.500	31.150	14.200	0.050
1750	WONDER LAKE	0.426	0.890	486.000	98.533	7.800	0.132
1751	LAKE STORY	0.072	2.510	459.333	17.250	14.800	0.021
1752	DEPUE LAKE	0.438	4.050	490.000	58.833	7.600	0.276
1753	LAKE SANGCHRIS	0.050	1.970	475.417	19.292	14.500	0.009
1754	LAKE HOLIDAY	0.167	3.135	485.167	51.217	7.200	0.046
1755	FOX LAKE	0.219	0.375	486.167	63.850	8.800	0.083
1756	GRASS LAKE	0.301	0.820	481.000	83.500	5.900	0.093
1757	EAST LOON LAKE	0.076	0.120	450.000	22.300	14.900	0.018
1758	SLOCUM LAKE	0.865	0.200	487.333	221.100	5.800	0.362
1759	CEDAR LAKE	0.029	0.170	400.333	5.767	12.800	0.013
1761	LAKE WEMATUK	0.069	1.770	466.333	7.967	14.500	0.031
1762	RACCOON LAKE	0.106	0.310	484.333	19.217	13.800	0.020
1763	BALDWIN LAKE	0.044	0.140	461.167	11.333	13.200	0.007

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P
1764	LAKE VANDALIA	0.116	0.480	478.111	11.278	14.800	0.023
1765	OLD BEN MINE RESERVOIR	0.930	0.205	478.333	31.433	11.200	0.575
1766	HORSESHOE LAKE	0.127	0.705	482.833	182.250	6.800	0.018

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NU
1703	LAKE BLOOMINGTON	88 (26)	0 (0)	80 (24)	47 (14)	13 (2)	68 (20)	296
1706	LAKE CARLYLE	63 (19)	40 (12)	63 (19)	63 (19)	63 (19)	53 (16)	345
1708	LAKE CHARLESTON	37 (11)	7 (2)	0 (0)	77 (23)	77 (23)	27 (8)	225
1711	COFFEEN LAKE	97 (29)	77 (23)	93 (28)	93 (28)	2 (0)	92 (27)	454
1712	CRAB ORCHARD LAKE	67 (20)	90 (27)	43 (13)	20 (6)	42 (12)	85 (25)	347
1714	LAKE DECATUR	40 (12)	13 (4)	53 (16)	33 (10)	30 (8)	32 (9)	201
1725	LONG LAKE	7 (2)	43 (13)	40 (12)	30 (9)	72 (21)	3 (1)	195
1726	LAKE LOU YAEGER	30 (9)	37 (11)	7 (2)	87 (26)	57 (17)	23 (7)	241
1727	LAKE MARIE	60 (18)	68 (20)	73 (22)	37 (11)	23 (7)	42 (12)	303
1733	PISTAKEE LAKE	27 (8)	68 (20)	23 (7)	13 (4)	90 (27)	32 (9)	253
1735	REND LAKE	77 (23)	80 (24)	70 (21)	50 (15)	53 (16)	92 (27)	422
1739	LAKE SHELBYVILLE	83 (25)	17 (5)	83 (25)	70 (21)	13 (2)	73 (22)	339
1740	SILVER LAKE (HIGHLAND)	20 (6)	47 (14)	10 (3)	97 (29)	13 (2)	42 (12)	229
1742	LAKE SPRINGFIELD	53 (16)	20 (6)	33 (10)	73 (22)	67 (20)	37 (11)	283
1748	VERMILION LAKE	50 (15)	3 (1)	47 (14)	43 (13)	37 (11)	47 (14)	227
1750	WONDER LAKE	13 (4)	50 (15)	20 (6)	7 (2)	80 (24)	13 (4)	183
1751	LAKE STORY	73 (22)	27 (8)	90 (27)	67 (20)	13 (2)	63 (19)	333
1752	DEPUE LAKE	10 (3)	10 (3)	3 (1)	23 (7)	83 (25)	10 (3)	139
1753	LAKE SANGCHRIS	88 (26)	30 (9)	67 (20)	57 (17)	30 (8)	97 (29)	369
1754	LAKE HOLIDAY	33 (10)	23 (7)	27 (8)	27 (8)	87 (26)	50 (15)	247
1755	FOX LAKE	23 (7)	63 (19)	17 (5)	17 (5)	72 (21)	20 (6)	212
1756	GRASS LAKE	17 (5)	53 (16)	50 (15)	10 (3)	97 (29)	17 (5)	244
1757	EAST LOON LAKE	70 (21)	100 (30)	97 (29)	53 (16)	2 (0)	77 (23)	399
1758	SLOCUM LAKE	3 (1)	87 (26)	13 (4)	0 (0)	100 (30)	7 (2)	210
1759	CEDAR LAKE	100 (30)	93 (28)	100 (30)	100 (30)	50 (15)	85 (25)	528
1761	LAKE WEMATUK	80 (24)	33 (10)	77 (23)	90 (27)	30 (8)	57 (17)	367
1762	RACCOON LAKE	57 (17)	73 (22)	30 (9)	60 (18)	42 (12)	68 (20)	330
1763	BALDWIN LAKE	93 (28)	97 (29)	87 (26)	80 (24)	47 (14)	100 (30)	504

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NU
1764	LAKE VANDALIA	47 (14)	60 (18)	60 (18)	83 (25)	13 (2)	60 (18)	323
1765	OLD BEN MINE RESERVOIR	0 (0)	83 (25)	57 (17)	40 (12)	60 (18)	0 (0)	240
1766	HORSESHOE LAKE	43 (13)	57 (17)	37 (11)	3 (1)	93 (28)	80 (24)	313

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1759	CEDAR LAKE	528
2	1763	BALDWIN LAKE	504
3	1711	COFFEEN LAKE	454
4	1735	REND LAKE	422
5	1757	EAST LOON LAKE	399
6	1753	LAKE SANGCHRIS	369
7	1761	LAKE WEMATUK	367
8	1712	CRAB ORCHARD LAKE	347
9	1706	LAKE CARLYLE	345
10	1739	LAKE SHELBYVILLE	339
11	1751	LAKE STORY	333
12	1762	RACCOON LAKE	330
13	1764	LAKE VANDALIA	323
14	1766	HORSESHOE LAKE	313
15	1727	LAKE MARIE	303
16	1703	LAKE BLOOMINGTON	296
17	1742	LAKE SPRINGFIELD	283
18	1733	PISTAKEE LAKE	253
19	1754	LAKE HOLIDAY	247
20	1756	GRASS LAKE	244
21	1726	LAKE LOU YAEGER	241
22	1765	OLD BEN MINE RESERVOIR	240
23	1740	SILVER LAKE (HIGHLAND)	229
24	1748	VERMILION LAKE	227
25	1708	LAKE CHARLESTON	225
26	1755	FOX LAKE	212
27	1758	SLOCUM LAKE	210
28	1714	LAKE DECATUR	201

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
29	1725	LONG LAKE	195
30	1750	WONDER LAKE	183
31	1752	DEPUE LAKE	139

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR ILLINOIS

10/23/75

LAKE CODE 1725 LONG LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 99.7

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS)												MEAN
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1725A1	99.7	0.65	0.98	1.21	1.24	0.98	0.82	0.49	0.26	0.18	0.19	0.29	0.34	0.63
1725C1	21.0	0.13	0.21	0.25	0.26	0.20	0.17	0.10	0.05	0.03	0.04	0.06	0.07	0.13
1725ZZ	79.3	0.52	0.77	0.95	0.99	0.78	0.65	0.39	0.20	0.14	0.16	0.23	0.28	0.50

SUMMARY

TOTAL DRAINAGE AREA OF LAKE =	99.7	TOTAL FLOW IN =	7.62
SUM OF SUB-DRAINAGE AREAS =	100.2	TOTAL FLOW OUT =	7.63

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1725A1	6	73	2.01	3	2.29				
	7	73	0.74	7	2.04				
	8	73	0.31	4	0.24				
	9	73	0.11	8	0.04				
	10	73	0.20	13	0.71				
	11	73	0.93	3	1.05				
	12	73	2.15	2	0.65				
	1	74	2.27	5	0.62				
	2	74	1.47	3	1.64	23	2.12		
	3	74	1.53	9	1.98	16	1.59		
	4	74	1.59	7	1.36				
	5	74	2.12	18	3.96				
	6	73	0.42	3	0.48				
	7	73	0.15	7	0.42				
1725C1	8	73	0.06	4	0.05				
	9	73	0.02	8	0.01				
	10	73	0.04	13	0.13				
	11	73	0.18	3	0.20				
	12	73	0.42	2	0.13				
	1	74	0.45	5	0.13				
	2	74	0.45	3	0.51	23	0.65		
	3	74	0.45	9	0.59	16	0.45		
	4	74	0.45	7	0.40				
	5	74	0.65	18	1.19				
	6	73	1.59	3	1.81				
	7	73	0.57	7	1.61				
	8	73	0.25	4	0.19				
	9	73	0.09	8	0.03				
1725ZZ	10	73	0.17	13	0.57				
	11	73	0.76	3	0.85				
	12	73	1.73	2	0.51				
	1	74	1.81	5	0.51				
	2	74	1.02	3	1.13	23	1.47		
	4	74	1.13	7	0.96				
	5	74	1.47	18	2.78				

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/10/23

172501
42 22 33.0 088 08 10.0
LONG LAKE
17097 ILLINOIS

DATE FROM TO	TIME OF DAY	DEPTH FEET	WATER TEMP CENT	00010 DO MG/L	00300 TRANSP SECCHI INCHES	00077 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 TALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	11EPALES 3		2111202 0020 FEET DEPTH	
												00671 PHOS-DIS ORTHO MG/L P			
73/05/09	11 50	0000	13.8			18		590	8.20	196	0.190	1.200	1.050	0.122	
	11 50	0004	13.8	8.4				570	8.10	195	0.160	1.000	1.060	0.116	
	11 50	0016	13.4	6.8				640	8.80	197	0.220	1.200	1.020	0.129	
73/08/07	14 45	0000	25.2			30		617	8.90	203	0.100	1.800	0.060	0.444	
	14 45	0005	25.2	8.0				618	8.90	280	0.100	1.900	0.080	0.482	
	14 45	0011	24.5	6.2				614	8.60	284	0.210	1.900	0.090	0.494	
73/10/16	12 25	0000	17.6			12		580							
	12 25	0005	17.6	7.6				580	8.50	210	0.590	2.700	0.730	0.441	
	12 25	0012	17.6	6.8				580	8.50	210	0.590	2.700	0.730	0.441	

DATE FROM TO	TIME OF DAY	DEPTH FEET	PHOS-TOT MG/L P	00665	32217
				CHLRPHYL A UG/L	
73/05/09	11 50	0000	0.214		44.2
	11 50	0004	0.204		
	11 50	0016	0.376		
73/08/07	14 45	0000	0.670		29.8
	14 45	0005	0.704		
	14 45	0011	0.652		
73/10/16	12 25	0000			60.7
	12 25	0005	0.828		
	12 25	0012	0.828		

STORET RETRIEVAL DATE 75/10/23

172502
42 22 37.0 088 07 10.0
LONG LAKE
17097 ILLINOIS

11EPALES
3 2111202
0018 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH	00410 TALK CACO3	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/05/09	12 15	0000	14.3		20 9.2 9.4	580	8.30	202	0.170	0.900	1.020	0.124
	12 15	0004	14.2			570	8.10	202	0.170	0.900	1.010	0.121
	12 15	0014	14.1			570	8.10	203	0.170	0.900	1.030	0.122
73/08/07	15 00	0000	26.2		12 10.0 8.4	623	9.00	270	0.080	2.600	0.080	0.398
	15 00	0005	26.0			622	9.00	272	0.110	2.800	0.120	0.396
	15 00	0014	25.0			624	8.90	284	0.250	2.300	0.120	0.392
73/10/16	12 05	0000	17.1		12 9.0 8.8	583	8.60	230	0.440	2.200	0.750	0.474
	12 05	0005	17.1			581	8.50	232	0.550	2.700	0.720	0.450
	12 05	0011	17.1			579		228	0.660	2.900	0.740	0.464

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/05/09	12 15	0000	0.216	44.9
	12 15	0004	0.208	
	12 15	0014	0.221	
73/08/07	15 00	0000	0.924	54.6
	15 00	0005	0.746	
	15 00	0014	0.804	
73/10/16	12 05	0000	0.762	61.8
	12 05	0005	0.764	
	12 05	0011	0.744	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/10/23

1725A1
 42 22 40.0 088 08 22.0
 SQUAW CREEK
 17115 7.5 FOX LAKE
 0/LONG LAKE
 WILSON RD BRDG AT SW EDGE OF INGLESIDE
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL	00625 TOT KJEL N	00610 NH3-N TOTAL	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
			MG/L	MG/L	MG/L	MG/L P	MG/L P
73/06/03	11 30		0.910	3.300	0.105	0.168	0.220
73/07/07	09 25		0.370	2.800	0.044	0.310	0.430
73/08/04	09 55		0.310	2.700	0.032	0.560	0.680
73/09/08	12 30		0.260	1.600	0.054	0.700	0.865
73/10/13	09 40		0.680	2.500	0.520	0.510	0.660
73/11/03	10 10		0.710	2.100	0.470	0.490	0.700
73/12/02	10 00		0.890	2.000	0.370	0.490	0.610
74/01/05	13 20		2.100	1.600	0.400	0.360	0.400
74/02/03	11 00		2.400	1.400	0.260	0.165	0.250
74/03/09	10 25		1.600	1.500	0.330	0.210	0.345
74/03/16	09 35		1.500	5.200	0.735	0.345	0.460
74/04/07	11 45		1.600	1.700	0.490	0.290	0.400
74/05/18	08 00		1.120	1.700	0.170	0.171	0.300

STORET RETRIEVAL DATE 75/10/23

1725A2
42 22 00.0 088 07 37.0
SQUAW CREEK
17 7.5 WAUCONDA
0/LONG LAKE
ST RT 134 BRDG AT S EDGE OF LONG LAKE
11EPALES 2111204
4 0000 FEET DEPTH

DATE	TIME	DEPTH	00630	00625	00610	00671	00665
			N02&N03	TOT KJEL	NH3-N	PHOS-DIS	PHOS-TOT
FROM	OF		N-TOTAL	N	TOTAL	ORTHO	
TO	DAY	FEET	MG/L	MG/L	MG/L	MG/L P	MG/L P
73/06/03	11	15	0.920	3.300	0.130	0.064	0.240
73/07/07	09	15	0.550	4.000	0.350	0.105	0.270
73/08/04	09	45	0.118	4.400	0.075	0.093	0.290
73/09/08	12	20	0.300	2.600	0.147	0.140	0.310
73/10/13	09	30	0.820	2.100	0.150	0.066	0.195
73/11/03	10	05	1.580	1.700	0.132	0.052	0.200
73/12/02	09	45	1.700	1.300	0.072	0.026	0.065
74/01/05	13	55	2.200	0.900	0.200	0.028	0.055
74/02/03	11	45	3.300	1.200	0.080	0.035	0.095
74/03/09	10	15	1.920	1.300	0.070	0.040	0.190
74/03/16	09	30	1.200	1.100	0.090	0.030	0.080
74/04/07	11	25	1.600	1.200	0.075	0.035	0.155
74/05/18	07	45	2.100	1.825	0.070	0.050	0.255

STORET RETRIEVAL DATE 75/10/23

172581
42 23 00.0 088 07 22.0
EAGLE CREEK
17 7.5 ANTIOCH
0/LONG LAKE
ROLLINS RD BRDG NW EDGE ROUND LK BEACH
11EPALES 2111204
4 0000 FEET DEPTH

DATE	TIME	DEPTH	00630 N02&N03	00625 TOT KJEL	00610 NH3-N	00671 PHOS-DIS	00665 PHOS-TOT
FROM	OF		N-TOTAL	N	TOTAL	ORTHO	
TO	DAY	FEET	MG/L	MG/L	MG/L	MG/L P	MG/L P
73/06/03	11	45	0.154	1.280	0.072	0.500	0.590
73/07/07	09	30	0.210	4.200	0.105	0.730	1.050
73/08/04	10	05	0.021	4.400	0.105	0.500	0.620
73/09/08	12	40	0.015	2.200	0.024	0.860	1.100
73/10/13	09	45	0.160	1.730	0.088	0.189	0.280
73/11/03	10	20	0.300	1.350	0.071	0.075	0.250
73/12/02	10	15	0.660	1.400	0.050	0.096	0.145
74/01/05	13	05	0.630	1.700	0.780	0.100	0.175
74/02/03	10	30	1.700	0.900	0.160	0.110	0.150
74/03/09	10	40	0.460	0.900	0.030	0.075	0.155
74/03/16	09	45	0.250	2.100	0.113	0.050	0.095
74/04/07	11	55	0.245	1.300	0.075	0.080	0.130
74/05/18	08	20	0.490	1.300	0.065	0.127	0.270

STORET RETRIEVAL DATE 75/10/23

1725C1
 42 21 55.0 088 06 40.0
 UNNAMED STREAM
 17 7.5 GRAYS LAKE
 0/LONG LAKE
 GRUB HILL RD BRDG SW EDGE ROUND LK BEACH
 11EPALES 2111204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3	00625 TOT KJEL	00610 NH3-N	00671 PHOS-DIS	00665 PHOS-TOT
			MG/L	MG/L	MG/L	MG/L P	MG/L P
73/06/03	11 00		0.610	5.500	1.900	1.020	1.350
73/07/07	09 05		0.580	17.800	13.200	6.600	7.100
73/08/04	09 30		0.220	22.000	17.000	4.100	10.500
73/09/08	12 10			19.000	15.200		9.000
73/10/13	09 20		0.460	7.800	3.600	2.000	2.630
73/11/03	09 50		0.500	11.500	8.200	3.900	4.720
73/12/02	09 30		0.440	4.800	1.920	1.500	1.720
74/01/05	14 20		0.810	5.500	2.520	1.200	1.800
74/02/03	12 10		1.700	2.400	0.550	0.350	0.580
74/03/09	10 00		0.970	3.400	0.760	0.490	0.900
74/03/16	09 20		0.740	4.600	1.650	0.970	1.200
74/04/07	11 00		0.680	5.000	2.200	1.200	1.800
74/05/18	07 00		0.770	2.600	0.680	0.375	0.660

STORET RETRIEVAL DATE 75/10/23

1725BA IP1725BA P001200
 42 24 36.0 088 05 09.0
 VILLAGE OF LAKE VILLA
 17115 7.5 ANTIOCH
 T/LONG LAKE
 EAGLE CREEK
 11EPALES
 4 2141204
 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&N03 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/07/16	13 30		1.000	8.800	0.230	2.900	3.800	0.100	0.100
	14 30		0.340	8.300	0.100	2.800	3.700	0.100	0.100
73/08/23	11 00								
CP(T)-			0.570	10.000	0.280	2.480	2.700	0.090	0.100
73/08/23	15 35								
73/09/20	11 05								
CP(T)-			0.850	5.300	0.240	3.150	3.800	0.100	0.100
73/09/20	16 00								
73/10/15	10 00								
CP(T)-			1.060	14.000	0.130	4.100	7.400	0.100	0.100
73/10/15	15 00								
73/11/29	08 00								
CP(T)-			0.340	12.000	0.270	5.900	7.300	0.120	0.100
73/11/29	15 30								
74/02/27	08 00		0.760	6.700	0.084	2.700	3.225	0.110	0.100
74/03/30	08 00								
CP(T)-			0.080	6.300	0.050K	1.850	4.200	0.090	0.100
74/03/30	16 30								
74/04/28	09 00								
CP(T)-			0.440	7.500	0.130	1.480	2.600	0.110	0.100
74/04/28	15 30								

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/23

1725CA TF1725CA P016300
 42 22 05.0 088 05 59.0
 ROUND LAKE SANITARY DISTRICT
 17 7.5 GRAYSLAKE
 T/LONG LAKE
 UNNAMED
 11EPALES 2141204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 N-TOTAL	00625 TOT KJEL MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS TOTAL MG/L	00665 PHOS-TOT ORTHO MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/09/10	10 00		0.950	22.000	7.250	3.400	10.000	1.900	1.800
73/10/24	09 30		0.600	16.000	0.440	5.000	6.400	2.200	2.000
73/11/15	08 30		0.960	18.000	3.990	6.500	7.400	2.400	2.200
73/12/12	10 15		1.400	9.400	0.110	2.520	3.900	3.000	2.500
74/01/21	15 00		0.080	16.000	4.200	5.520	7.700	6.000	3.500
74/03/08	10 00		1.200	6.600	0.050K	1.700	2.600	2.500	2.000
74/05/15	13 45		0.720	13.000	1.150	3.900	5.600	3.000	1.600
74/05/22	11 00		1.000	7.700	0.130	1.950	3.300	3.000	2.000
74/06/21	10 30		0.600	13.000	0.370	3.800	5.100	2.400	2.000
74/07/25	09 00		0.040	21.000	6.800	8.000	9.500	2.500	2.500
74/11/13	10 00		0.160	27.000	11.000	9.250	10.500	2.300	2.300

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/23

1725CB AS1725CB P001500*
 42 21 11.0 088 05 35.0
 TRAVENOL LABS INC. (ROUND LAKE)
 17 7.5 GRAY'S LAKE
 T/LONG LAKE
 UNNAMED / SQUAW CREEK
 11EPALES 2141204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL	00625 TOT KJEL N	00610 NH3-N TOTAL	00671 PHOS-DIS ORTHO	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/09/29	11 00		0.390	1.300	0.500	1.400	1.500	0.534	0.402
73/11/02	08 30		0.140	4.900	0.190	2.000	2.250	0.240	0.133
73/12/03	10 30		0.390	4.500	0.096	1.680	2.000	0.255	0.264
74/01/02	11 30		0.240	5.800	0.040K	2.400	2.800	0.248	0.255
74/02/05	11 00		0.120	3.800	0.100	2.310	2.600	0.271	0.280
74/03/04	10 30		0.120	3.300	0.050K	1.650	2.100	0.253	0.236
74/04/04	11 30		0.640	2.600	0.480	1.650	1.950	0.281	0.287
74/06/05	11 00		0.080	3.200	0.050K	1.550	1.550	0.352	0.364
74/07/09	11 15		0.120	4.000	0.057	1.600	1.650	0.288	0.288
74/08/05	09 30		0.120	2.600	0.058	8.600	8.700	0.310	0.320
74/09/09	09 15		0.120	2.200	0.050K	4.250	4.800	0.360	0.370

K VALUE KNOWN TO BE
 LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/23

1725DA SF1725DA P000035*
 42 20 18.0 088 05 16.0
 HEPPNER MFG CO. ROUND LAKE
 17 7.5 GRAYSVILLE
 T/LONG LAKE
 DITCH/SQUAW CREEK
 11EPALES 2141204
 4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 N-TOTAL	00625 TOT KJEL N	00610 NH3-N TOTAL	00671 PHOS-DIS ORTHO	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST	50053 CONDUIT FLOW-MGD MGD
73/09/28	07 00		1.150	0.500	0.490	1.000	2.000	0.005	0.004
73/11/08	09 00		1.800	0.500K	0.028	1.890	3.750	0.005	0.004
73/12/17	08 30		0.580	2.950	0.074	1.890	3.150	0.004	0.005
74/01/09	08 30		0.640	0.500K	0.040K	1.480	2.100	0.005	0.005
74/02/04	07 30		0.760	9.000	0.040K	2.880	3.900	0.004	0.005
74/04/12	08 30		0.560	2.700	0.050K	6.400	7.900	0.004	0.005
	13 15		0.440	1.000K	0.050K	3.400	3.780	0.004	0.005
74/05/09	10 30		0.400	3.100	0.094	5.500	6.600	0.004	0.004
74/06/16	08 30		0.800	2.200	0.260	4.700	5.300	0.003	0.004
74/07/23	08 30		0.200	1.000K	0.050K	0.220	0.473	0.004	0.004
74/08/20	08 30		3.100	0.600	0.050K	3.100	3.530	0.004	0.004
74/09/09	09 00		0.400	1.000K	0.240	0.200	0.280	0.005	0.004

K VALUE KNOWN TO BE
LESS THAN INDICATED