CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

MINES BRANCH

MINERAL PROCESSING DIVISION

INDUSTRIAL WATER RESOURCES OF CANADA

WATER SURVEY REPORT NO. 14

THE UPPER GREAT LAKES DRAINAGE BASIN IN CANADA, 1957-63

BY

J. F. J. THOMAS AND R. M. GALE

Price: $2.50

Mines Branch Monograph No. 870

ERRATA

Page 10	'†' should appear after all bracketed numbers in "Total basin" column.
Page 11	'††' should appear after all bracketed numbers in "Total basin" column. '**' should appear after 1,610 in "Total basin" column opposite Hudson Bay.
Page 18	Line 27 under "pH": 6.2 should read 8.2.
Page 22	Station No. 14: "* Analysis submitted by Alchem Ltd., Burlington, Ont." should appear as a footnote.
Page 40	Station No. 70: '†' should appear after "Water Level" heading.
Page 64	Station No. 162: "*See* also Station No. 183, page 68" should appear as a footnote.
Page 103	South River: "135" should appear after "page" in footnote.
Page 131	Twelfth line from bottom: "Pickeral" should read Pickerel.
Page 134	Fourth line from top: "Sheshagwaning" should read Sheshegwaning.

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ROGER DUHAMEL, F.R.S.C.
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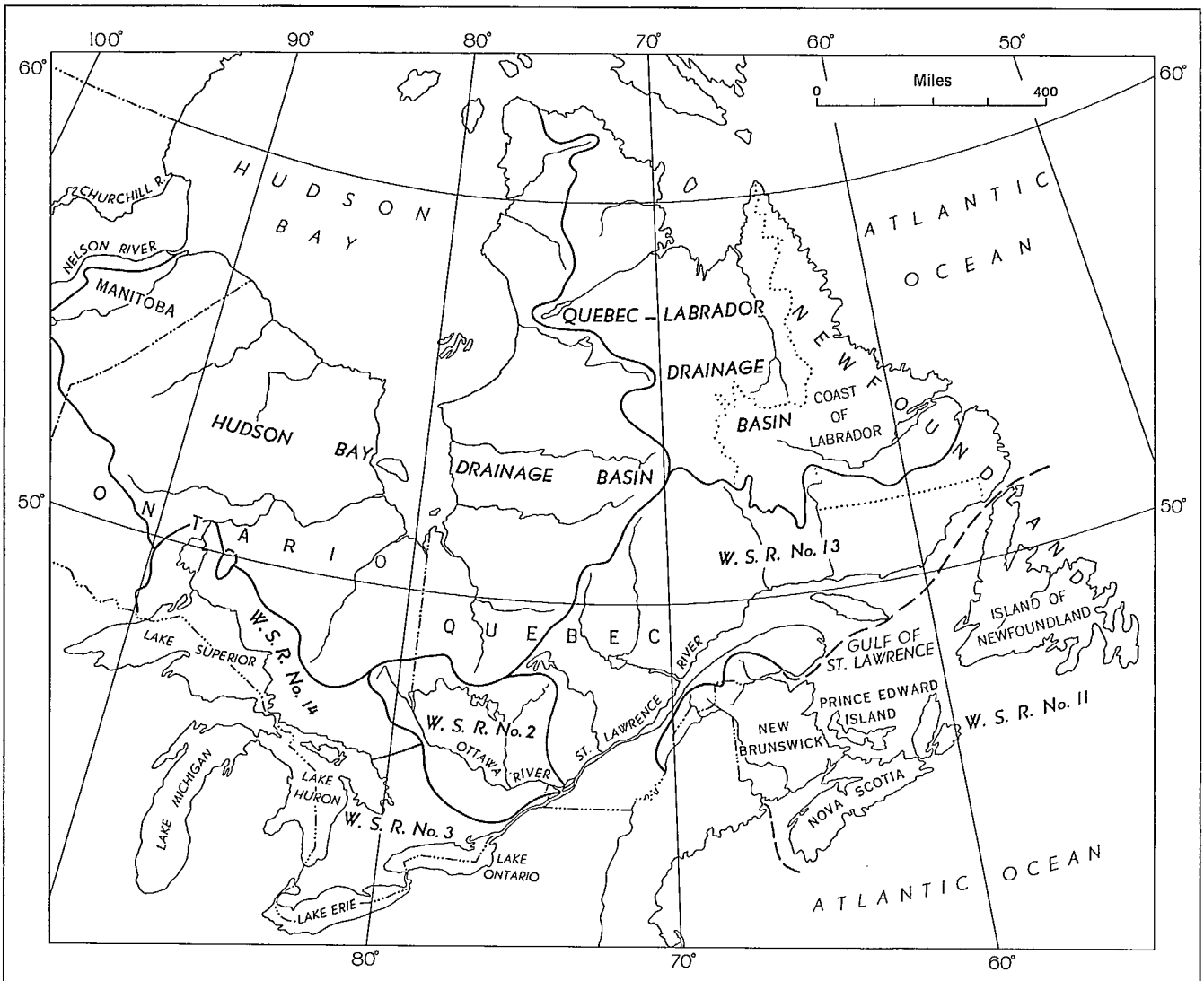

LEGEND

W. S. R. No. 2 . . . . Water Survey Report No. 2, Ottawa River Drainage Basin; Mines Branch Report No. 834, published 1952

W. S. R. No. 3 . . . . Water Survey Report No. 3, Upper St. Lawrence River- Central Great Lakes Drainage Basin in Canada; Mines Branch Report No. 837, published 1954.

W. S. R. No. 11 . . . . Water Survey Report No. 11, The Atlantic Provinces, and the St. John River Drainage Basin in Canada, 1954-56; Mines Branch Report No. 864, published 1960.

W. S. R. No. 13 . . . . Water Survey Report No. 13, Lower St. Lawrence River Drainage Basin in Canada, 1956-1960; Mines Branch Report No. 869

W. S. R. No. 14 . . . Water Survey Report No. 14, Upper Great Lakes Drainage Basin in Canada, 1959-1963; Mines Branch Report No. 870

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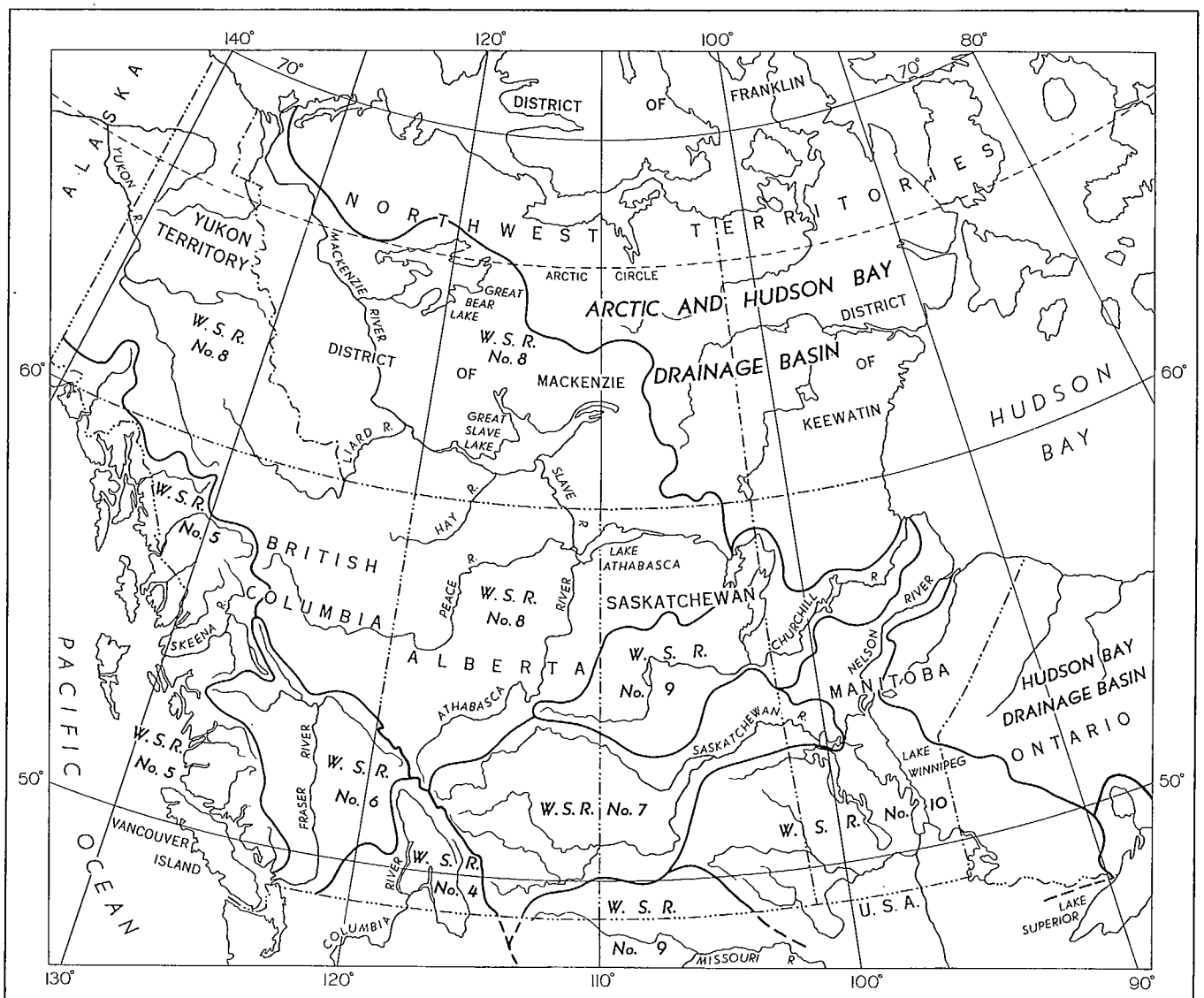
FIGURE 1. REFERENCE MAP OF DRAINAGE BASINS IN EASTERN CANADA



LEGEND

W. S. R. No. 4 ..... Water Survey Report No. 4, Columbia River Drainage Basin; Mines Branch Rept. No. 838, published 1953

W. S. R. No. 5 ..... Water Survey Report No. 5, Skeena River Drainage Basin, Vancouver Island, and Coastal Areas of British Columbia; Mines Branch Rept. No. 839, published 1953

W. S. R. No. 6 ..... Water Survey Report No. 6, Fraser River Drainage Basin; Mines Branch Rept. No. 842, published 1954

W. S. R. No. 7 ..... Water Survey Report No. 7, Saskatchewan River Drainage Basin; Mines Branch Rept. No. 849, published 1956

W. S. R. No. 8 ..... Water Survey Report No. 8, Mackenzie and Yukon Rivers Drainage Basins in Canada; Mines Branch Report No. 856, published 1957

W. S. R. No. 9 ..... Water Survey Report No. 9, Churchill River and Mississippi River Drainage Basins in Canada; Mines Branch Report No. 858, published 1957

W.S.R. No. 10 ..... Water Survey Report No. 10, Nelson River Drainage Basin in Canada; Mines Branch Report No. 861, published 1957

SCALE OF MILES

100 0 100 200 300 400 500

G. S. C.

FIGURE 2. REFERENCE MAP OF DRAINAGE BASINS IN WESTERN CANADA

Chemical Quality of Surface and Municipal Water Supplies in the Upper Great Lakes Drainage Basin in Canada, 1957-1963

INTRODUCTION

This report is the fourteenth in the series tabulating data on the chemical quality of surface and municipal water supplies available for industrial and domestic use in Canada. Water Survey Report 1[1] introduced this series and outlines the aim, scope and general procedure of the country-wide survey; it also includes general information, tables and graphs for use in interpreting the analytical results appearing in subsequent reports.

Studies on water quality in the specific areas or drainage basins outlined in Figures 1 and 2 are reported in detail in Water Survey Reports 2 to 11 inclusive, Report No. 13, and in this report, No. 14. These figures serve as indices to these twelve reports. Water Survey Report No. 12[2] and a supplement[3] to it tabulate information on water quality at army installations in Canada and supplements the data given in the other reports of this series.

Quality studies of drainage into Hudson Bay (exclusive of the Nelson and Churchill River systems) and of the drainage basins of Labrador and the Arctic Coast and Islands are still to be reported (*see* Figures 1 and 2). Studies have been completed in some of these areas but data on water quality are still being collected from relatively inaccessible parts of these basins. A report on available data is now in preparation.

Water-quality studies are continuing—with a five-year program of monthly or quarterly sampling now under way—of a number of major surface-water supplies in western Canada, i.e. the area shown in Figure 2. Information is still being obtained on water quality in the Territories and of new municipal water supplies.

This report records the results of studies begun in late 1957 in the relatively small but important basin of the Upper Great Lakes in Canada. This basin is a part of the large Great Lakes-St. Lawrence River system that was divided into four sub-basins for purposes of chemical quality studies. It is defined as beginning at the French River tributary drainage and includes natural drainage in Canada into the Great Lakes system, north and west of this point. Because of unavoidable delay in publication of the data obtained during a year's study, 1957-1958, and because of rapidly changing industrial and population distribution within the basin, further studies were necessarily carried out in later years, especially in 1962 and 1963.

The method of presentation in this report remains essentially the same as that employed in previous reports so that continuity of the series be maintained. No attempt is made to discuss in detail all the information recorded herein or obtained during the survey. However, as in previous reports of this series, some statistics on water quality and use are presented and briefly discussed. A more detailed scientific interpretation and presentation of some of the data is possible but since the data are used by persons and organizations for different purposes the procedure used in the previous reports is continued, that is, the data are presented in such detail that the user can interpret and analyse these for his specific purpose.

Table I and Figures 1 and 2 show the relationships of area and population (1956 and 1961) in the basin covered by this report and the other basins or areas studied. Reference should be made to tables and maps included in the other reports of this series (Figures 1 and 2) for details on various basin boundaries.

Table II gives in detail the analytical results obtained on surface waters in this basin over the period 1957 to 1963. Most of these results are for the one-year period, late 1957 to late 1958, but, since 1958, spot samples were also collected at a number of key sampling locations to show the continuing quality of the waters. The quality data on samples collected in 1963 at some previous sampling locations are included under stations 164-183, inclusive, in Table II and should be compared to data previously obtained at the same locations and reported earlier in Table II. Figure 3 (in pocket) shows the location of the sampling stations, which are listed alphabetically in Appendix A.

Relationships found between dissolved mineral content and river discharge are shown in Figures 4, 5 and 6; these figures, respectively, report the quality data of Table II on Spanish River at Espanola, Ont., Michipicoten River at High Falls, Ont., and Little White River near Bellingham, Ont. Similar graphs can be prepared from Table II for a number of other rivers and locations.

---

[1] Dept. Mines and Technical Surveys, Mines Branch. *Scope, procedure and interpretation of survey studies.* Water Survey Report No. 1, Mines Branch Report No. 833, Ottawa, 1953. 69p.

[2] Dept. Mines and Technical Surveys, Mines Branch. *Water quality at some Canadian military establishments, 1956-57.* Water Survey Report No. 12, Mines Branch Report No. 865. Ottawa, 1959. 125p.

[3] Dept. Mines and Technical Surveys, Mines Branch. *Water quality at some Canadian military establishments, 1959-1962. Supplement to Water Survey Report No. 12.* Mines Branch Report No. 872, Ottawa, 1963. 56p.

Table III reports the chemical quality of most waters, including ground waters, supplied by organized municipal systems within the basin during the period of this report. These municipalities are listed alphabetically in Appendix B; their locations are shown on the map of the area (Figure 3, in pocket) to classify them as to water hardness. A description of these systems and water-works plants and their operation in 1959, 1961, or later is also given.

Table IV reports on the operation and quality of waters supplied by private systems in a number of mine townsites and small communities, particularly in the mining area of Elliot Lake. These small communities are listed in Appendix C, but most are not shown on the map (Figure 3, in pocket).

Table V summarizes information available on the number of water systems, the character of the water sources, type of water treatment, if any, and the population served by these systems in 1959, 1961 and/or 1963. Additional statistics, especially on water hardness of municipal waters, are presented in Table VI.

Survey studies in the area covered by this report were greatly facilitated by the cooperation of provincial and municipal officials, many of the latter collecting water samples and providing information on the operation of their water works. The assistance of a number of mining companies and industrial firms in the collection of surface-water samples and in supplying data on townsites, mining communities, and on industrial water use, is also gratefully acknowledged.

Officials of the Water Resources Branch, Department of Northern Affairs and National Resources supplied the data on river discharge.

TABLE I

AREA AND POPULATION DISTRIBUTION IN THE DRAINAGE BASINS OF EASTERN CANADA (1956 AND 1961)

TABLE I

Area and Population Distribution in the Drainage Basins of Eastern Canada (1956 and 1961)

Drainage basin		Approximate area drained, square miles in (Per cent of area drained in)							
		Ontario	Quebec	New Brunswick	Nova Scotia	Prince Edward Island	Newfoundland		Total basin
							Island	Labrador	
ST. LAWRENCE RIVER SYSTEM	Lower St. Lawrence River (W.S. Report No. 13)	0	189,600 (31.9)	0	0	0	0	11,200 (9.8)	200,800 [16.5]†
	Upper St. Lawrence River - Central Great Lakes (W.S. Report No. 3)	55,200 (13.4)	0	0	0	0	0	0	55,200 [4.6]
	Ottawa River (W.S. Report No. 2)	29,675 (5.0)	38,560 (6.5)	0	0	0	0	0	59,235 [4.9]
	Upper Great Lakes (This report)	67,800[a] (16.4)	0	0	0	0	0	0	67,800 [5.6]
The Atlantic Provinces and the Saint John River (W.S. Report No. 11)		0	4,700 (0.8)	28,354 (100)	21,425 (100)	2,184 (100)	43,359 (100)	0	100,022 [8.1]
Nelson River (W.S. Report No. 10)		47,045 (11.4)	0	0	0	0	0	0	47,045* [3.9]†
Hudson Bay		221,862[a] (53.8)	207,250 (34.8)	0	0	0	0	0	429,112* [35.3]††
Labrador		0	154,750 (26.0)	0	0	0	0	101,626 (90.2)	256,376 [21.1]
Total province		412,582 (100)	594,860 (100)	28,354 (100)	21,425 (100)	2,184 (100)	43,359 (100)	112,826 (100)	1,215,590 [100]
Per cent of Canada		10.71	15.44	0.74	0.55	0.057	1.13	2.92	31.55

* Total basin area in eastern Canada only
** Total basin population in eastern Canada only
† Per cent of total area of eastern Canada
†† Per cent of total population of eastern Canada
[a] Areas adjusted from previous reports to place Long Lake and Ogoki Diversions in the Hudson Bay drainage basin

TABLE I

Area and Population Distribution in the Drainage Basins of Eastern Canada (1956 and 1961)

Year	Estimated population in hundreds in drainage basins in (Per cent of total population in drainage basins in)							
	Ontario	Quebec	New Brunswick	Nova Scotia	Prince Edward Island	Newfoundland		Total basin
						Island	Labrador	
1956	0	39,287 (84.88)	0	0	0	0	19 (17.4)	39,306 [33.3]†
1961	0	44,642 (84.9)	0	0	0	0	18 (13.3)	44,660 [33.35]†
1956	43,928 (81.3)	0	0	0	0	0	0	43,928 [37.2]
1961	50,489 (81.0)	0	0	0	0	0	0	50,489 [37.7]
1956	5,585 (10.3)	5,120 (11.06)	0	0	0	0	0	10,705 [9.1]
1961	6,542 (10.5)	5,858[e] (11.1)	0	0	0	0	0	12,400 [9.3]
1956	3,179 (5.9)	0	0	0	0	0	0	3,179 [2.7]
1961	3,882 (6.2)	0	0	0	0	0	0	3,882 [2.9]
1956	0	910 (1.97)	5,546 (100)	6,947 (100)	993 (100)	4,043 (100)	0	18,439 [15.6]
1961	0	1,015 (1.9)	5,979 (100)	7,370 (100)	1,046 (100)	4,443 (100)	0	19,853 [14.8]
1956	685 (1.3)	0	0	0	0	0	0	685** [0.6]
1961	735 (1.2)	0	0	0	0	0	0	735** [0.55]
1956	672 (1.2)	938 (2.03)	0	0	0	0	0	1,610 [1.4]
1961	713 (1.1)	1,027 (2.0)	0	0	0	0	0	1,740** [1.3]
1956	0	29 (0.06)	0	0	0	0	90 (82.6)	119 [0.1]
1961	0	50 (0.1)	0	0	0	0	117 (86.7)	167 [0.1]
1956	54,049	46,284	5,546	6,947	993	4,043	109	117,971
1961	62,361	52,592	5,979	7,370	1,046	4,443	135	133,926
	34.1	28.8	3.3	4.0	0.6	2.4	0.1	73.3

[e] estimated

THE UPPER GREAT LAKES DRAINAGE BASIN IN CANADA*

The St. Lawrence River-Great Lakes system, some 2,280 miles in length, drains about 383,000 square miles in Canada comprising 36 and 38 per cent of the area of the provinces of Ontario and Quebec, respectively. Since these areas include most of the heavily industrialized and highly populated regions of Canada, this large basin was divided into four basins for survey purposes: namely the Lower St. Lawrence River basin, the Upper St. Lawrence River-Central Great Lakes basin, the Ottawa River basin, and the Upper Great Lakes basin (*see* Figure 1). The first three basin studies were reported in Water Survey Reports Nos. 13, 2 and 3, respectively; this report covers survey studies carried out in the fourth sub-basin–the Upper Great Lakes drainage area in Canada.

Figure 3 shows the boundaries of the Upper Great Lakes Basin. Two areas, the Long Lake diversion (1,630 sq mi) and the Ogoki diversion (5,545 sq mi),–drainage from which is diverted by dams to the Upper Great Lakes system–have not been included in this basin but are in the Hudson Bay basin from which they are diverted.

Water quality of a southern portion of the French River drainage basin was reported in Water Survey Report No. 3 as part of the Upper St. Lawrence River-Central Great Lakes basin. Some recent data on this area are included in this report for information and comparison. The boundary between the Upper Great Lakes and Central Great Lakes basins still remains at the French-Pickerel rivers and the south shore of Lake Nipissing. However, a small heavily populated area on the east shore of Lake Nipissing–metropolitan North Bay– has been included in this basin and report although most of this area draws its water by organized system from the Ottawa River drainage basin. The portion of the French River-Lake Nipissing basin still included in the Central Great Lakes drainage basin (about 730 sq mi), as well as the above-mentioned two northern diversion areas, are shown dotted in Figure 3 (in pocket).

The Upper Great Lakes drainage basin in Canada lies entirely in Ontario and includes some 67,800 square miles, including the area of the Great Lakes out to the international boundary. Table I shows that this basin, some 16.4 per cent of Ontario, is somewhat larger than either the Ottawa River basin (59,235 sq mi) or the Upper St. Lawrence River-Central Great Lakes basins (55,200 sq mi). It is, however, considerably smaller than the Lower St. Lawrence River basin and about the same size as the provinces of Nova Scotia and Prince Edward Island and the island of Newfoundland (total area, 66,968 sq mi).

The Great Lakes-St. Lawrence River system has been of major importance to the development of Canada. For more than 300 years this system was the main route to Upper Canada and western Canada; it is still a major artery for the transport of raw and manufactured products between industralized eastern Canada and the United States, to the Canadian north and west.

Within the last half-century hydro-electric power from many tributary rivers of the Upper Great Lakes system has supplied the energy needed for industrial expansion in Ontario. These rivers, many of them short, rise in the Canadian Shield plateau in heavily forested areas dotted with lakes and, consequently, their discharge is rapid and fairly constant although they can be readily regulated by dams.

Except for Manitoulin and St. Joseph islands which are in the St. Lawrence Lowlands physiographic region, the basin lies in the Canadian Shield region. This Shield, covering about 49 per cent of Canada, is the core of the continent and is in the form of a shield with the top in the Far North. It tilts to the east to mountains on Baffin Island and the Torngat Mountains of Labrador. In the south and west it rises to uplands of 600 to 1,500 feet. The centre of the Shield is depressed and contains Hudson Bay. In the Upper Great Lakes basin the Shield extends along the north shore of Lake Superior as a plateau up to 1,500 feet elevation. It is mainly composed of Precambrian rocks formed by complex sequences of sedimentation, volcanism, metamorphism, mountain building, igneous intrusion, erosion and glaciation. Two series of rocks are found, the Archaean and Proterozoic; the former are mainly crystalline and occur in domes 1,200 to 1,500 feet high, with small sedimentary depressions.

The Proterozoic rocks are mainly sedimentary and often lie in shallow basins, 600 feet or more below the

* Department of Mines. Div. Geol. Surv., *Geology of Quebec.* VII. Geol. Rept. No. 20. Quebec, 1944, 3v.
Department of Mines and Technical Surveys, Geol. Surv. Can. *Geology and economic minerals of Canada.* Econ. Geol. Ser. No. 1, 4th ed. Ottawa, 1957, 517 p.
Dominion Bureau of Statistics. *Canada Year Book 1960.* Ottawa, 1960, 1304 p.

uplands; such a basin is found near Port Arthur. These Proterozoic rocks were, however, squeezed into ranges of the Cuyana and Penokean mountains, north and south of Lake Superior, respectively, and the La Cloche mountains, north of Lake Huron.

When the Shield was glaciated the ice deepened the valleys, scooped out the soft plains, wore down ridges, and spread quantities of debris, leaving the present great lakes and clay belts. As a result of the receding glaciers, plains are found in this basin near Nipigon and North Bay. Glaciation also resulted in a rather disorganized drainage system of many lakes and streams.

Agricultural land in this basin is based entirely on the clays and beach gravels left on the lake margins and in depressions by sedimentary deposition and ice retreat. The lack of arable land and the geographical character of the basin has resulted in population concentration along the main rivers and lakes, except for certain areas where mining is an important industry.

The Shield is noted for its mineral wealth, much of which is probably still to be exploited. Minerals include iron, gold, nickel, copper, lead, zinc and uranium. Within the Upper Great Lakes basin occurs one of the richest mineral areas of the world--the nickel-copper basin at Sudbury. Important iron deposits are mined along the north shore of Lake Superior near Wawa; copper mining is carried on in the Manitouwadge area and, in recent years, large deposits of pitchblende have been mined in the Elliot Lake area. Gold and silver have also been mined in this drainage basin. Because the basin is heavily-wooded and hydro-electric power and water transport are readily available the production of pulp and paper is one of the most important industries of the area. Readily available power and water transportation has also contributed to the development of other important industries within the basin, such as iron and steel production at Sault Ste Marie.

Recent opening of the Great Lakes to ocean traffic, and rapid extension of highways within the basin will, no doubt, greatly accelerate economic and industrial growth. In the past, inaccessibility of much of the basin because of the rugged terrain, and the limited agricultural land available has slowed development. The 1956 population of the basin was about 318,000 (5.9 per cent of Ontario's population). This increased in 1961 to about 388,200 or 6.2% of the province's population.

The basin is a major tourist area for United States citizens and Canadians. Recent opening of new highways and the improvement of others is rapidly expanding this industry.

The 1,100 square miles of Manitoulin Island, and a very small area of nearby islands and mainland that lie in the St. Lawrence Lowlands physiographic region are composed mainly of sedimentary limestones. Manitoulin Island is relatively flat and agriculture is the principal industry. On the nearby mainland limestone is quarried, mainly for use in the Sudbury smelters.

SURVEY PROCEDURE

The methods of sampling and the survey procedure employed in this basin were essentially the same as those used in previous surveys in this series; they are outlined in some detail in Water Survey Report No. 1.

Most sampling stations were established in the basin in early 1957 and a year-long program of monthly, bi-monthly or quarterly sampling was initiated later that year. These stations, listed in Appendix A and shown in Figure 3 (in pocket), were chosen, where possible, to give representative samples of the larger river and lake waters. No daily sampling stations were operated, but, at each sampling location attempts were made to obtain additional samples at periods of high and low water.

Field work was carried out during the summers of 1958 and 1959 when samples of municipal waters and other surface waters were collected and, at times, partially analysed by field tests. Samples were also collected at this time at many of the monthly or quarterly stations, but ready access to a number of these on the north shore of Lake Superior was not then possible. These field results are shown in Tables II and III in brackets beside the analyses of the same samples made later in the Ottawa laboratory. A comparison of these results indicates certain qualities of the waters *in situ* and shows any significant changes in chemical quality that may have occurred during storage and shipment.

Since 1960, with the opening of a highway along the north shore of Lake Superior, additional surface and municipal water samples, as well as information on new municipal water works, have been obtained.

Because many mine townsites and other small communities, especially those in the Sudbury and Elliot Lake areas, used waters from small organized, private systems, a survey of these was carried out in 1959 and

again in 1962-63. A study was also made of total industrial use of water in some areas in 1959-1960. Since then severe curtailment of the uranium mining industry, and major population shifts in the basin outdated much of the information obtained on municipal and industrial water use during 1959-1960. As a result publication of this report was delayed until most of the basin was resurveyed during 1962-1963. Additional surface waters were also collected in this resurvey and have been included in this report under Stations 164-183, inclusive, in Table II.

ANALYTICAL PROCEDURE

The analytical methods and techniques used in this study are essentially those employed in the survey studies published in Water Survey Reports 11 and 13. Basic analytical techniques and interpretation of data are also discussed in Water Survey Report No. 1.

Standard procedures for the analysis of water published by the American Public Health Association[1] and by the American Society for Testing and Materials[2] were employed for most determinations. However, close co-operation between the Mineral Processing Division of the Mines Branch and committees of these societies sometimes enabled the Division to use certain newer techniques and procedures prior to publication.

The analytical work of this report was carried out mainly during the period 1957 to 1959 inclusive, although a number of municipal waters were collected and analysed in later years. Although changes in analytical procedure discussed in Water Survey Reports No. 11 and 13 are applicable to most waters reported for this basin, the analytical methods used during the period of this report are briefly outlined as follows.

As soon as possible after receipt water samples were analysed in the laboratory for those constituents which could significantly change in storage. Although these *immediate tests* were usually carried out within 4 to 7 days after sample collection, longer storage sometimes resulted because of unforeseen circumstances such as delay in shipping. In Tables II, III and IV, the first figure listed under storage period is the number of days from sampling until these *immediate tests* were begun, the second figure is the number of days from sampling until the remaining tests were started.

The *immediate tests* carried out were as follows:

pH - measured by a pH meter.

Specific Conductance - measured with a 60-cycle current, 115-volt enclosed-switch-type Wheatstone bridge, a pointer-type a.c. galvanometer, an insulating transformer, and a pipette-type conductivity cell of about 0.3 cell constant.

Colour - by visual comparison of the supernatant or filtered water against Hazen colour standards in a commercial comparator.

Turbidity - the Jackson candle turbidimeter was used for high turbidity waters, the Hellige turbidimeter for for waters having low to medium turbidity.

Total hardness - by titration with a standard solution of sodium ethylenediaminetetraacetic acid (EDTA) using Erichrome Black T as visual endpoint indicator.

Calcium - by titration with standard EDTA using murexide or, after February 13, 1959, calcon as visual endpoint indicator.

Magnesium - calculated as the difference between the values found by titration for total hardness and for calcium.

Alkalinity - by titration with standard (0.02N) sulphuric acid employing a potentiometric endpoint. After February 11, 1959 alkalinities were determined by the technique developed in this Division's laboratories whereby errors caused by variations in the titration endpoint with total alkalinity concentration are eliminated[3].

Oxygen Consumed by Permanganate ($KMnO_4$) - This test, which measures the amount of a standard potassium permanganate solution reduced by a known amount of water at boiling temperature (100°C) in 1 hour, was carried out on a selected number of surface and municipal waters. The test is, to some degree, a measure of the organic matter and can with care be used to indicate pollution of a water supply.

---

[1] Am. Public Health Assoc. *Standard methods for the examination of water, sewage, and industrial wastes.* 11th ed. New York, 1960.
[2] Am. Soc. for Testing and Materials. *Manual on industrial water.* Spec. Tech. Publ., No. 148D, Philadelphia. 1959.
[3] Thomas, J.F.J., and Lynch, J.J. *Determination of carbonate alkalinity in natural waters.* J. Am. Water Works. Assoc. New York. 1960. V. 52, No. 2, p. 259-268.

Copper and Zinc - periodically, spot tests are done on the supernatant water using a sensitive field method employing dithizone[1].

Ammonia - by direct Nesslerization of the supernatant water with visual comparison against prepared standards. No attempt was usually made to determine ammonia by distillation, even when direct Nesslerization failed because of interference by other constituents present in the water.

The following tests were usually done at a later date:

Aluminum - was determined spectrophotometrically by the aluminon method until about August 1957; since then it has been determined by a mixed ferron-orthophenathroline procedure[2].

Total Iron and Total Manganese - After July 28, 1959 separate samples of all ground waters were collected for the determination of iron and manganese. These separate samples, assumed clear when drawn, were acidified in the sample container and the total iron determined by the $\alpha\,\alpha$-dipridyl procedure; the total manganese, by the periodate method or, after November 26, 1958, by the persulphate method, or both.

Dissolved Iron and Dissolved Manganese - were determined on the supernatant or filtered portions of all waters by the same procedures as used for total iron and total manganese.

Copper and Zinc - when shown to be present in significant amounts by the above rapid field test, were determined until September 1959 by the dihydroxyethyldithiocarbamate[3] and dithizone[4] procedures, respectively. The neocuproine procedure[5] was used to determine copper from May 1963 to October 1963; since then a zinc dibenzyldithiocarbamate procedure[6] has been used. The zincon method[5] was employed for zinc until June 1963; since then the sensitive dithizone procedure employing photometric colour detection was used.

Sulphate - Since March, 1956 sulphates have been determined by titration with barium chloride using thorin as a visual endpoint detector[5]. This method is particularly suited to waters with low sulphate content, ion exchange being used to remove cation interference; when the sulphate content is high the standard gravimetric procedure[4,5] is often used to check the colorimetric procedure.

Chloride was determined by titration with a standard mercuric nitrate solution, using microburettes and visual endpoint detection[7]. Since May 6, 1963 most chlorides have been potentiometrically titrated with standard silver nitrate solution using a silver-potassium sulphate electrode system as indicator[8]. The mercuric nitrate method is still used for very low chloride content waters and periodically as a check on the potentiometric method.

Fluoride was determined by the standard zirconium-alizarin procedure until December 12, 1960, distillation being employed only when interferences were suspected or high fluorides found. Since then fluoride has been determined by the SPADNS procedure, with distillation to isolate fluoride whenever interference is evident[9].

Nitrate - Until about August 13, 1961 nitrate ion was determined by the standard phenoldisulphonic-acid method with visual comparison against standards in Nessler tubes[9]. High nitrate waters were checked by the brucine method[7] with comparison being made in a spectrophotometer.

Between August 13, 1961 and November 4, 1963 the brucine method was routinely used for nitrate determination on most waters. Since November 4, 1963 a modification of the ultra-violet absorption procedure for nitrates[10] has been used. The ultra-violet absorption method is rapid and sensitive if proper attention is given to interference by organic matter in the water.

Phosphate - the determination of total and/or dissolved phosphate was begun routinely on selected waters in late 1960, the standard procedure employing the reductant stannous chloride being used[7]. Since July 11, 1963 a modification of this method has been used which employs bismuth nitrate to increase the sensitivity of the test and amino naphthol sulphonic acid as the reductant.[11]

Silica - The standard spectrophotometric procedure for silica employing reduction with stannous chloride was used, no attempt being made to solublize any silica present in a form not measured by this procedure.[5]

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[1] Warren, N.V. Delavault, R.E. and Irish, Ruth I, *Acetonic dithizone in geochemistry.* Econ. Geol., Ser. V.48, No. 4. 1953. p. 306-311.
[2] Rainwater, F.H. and Thatcher, L.L. *Methods for collection and analysis of water samples.* U.S. Geol. Surv., Water Supply Paper 1454. Washington, U.S. Govt. Print. Off. 1960. p. 297.
[3] Ibid p. 157
[4] *See* footnote 1, page 15
[5] *See* footnote 2, page 14
[6] Hissel, J. and Cabot-Dethier, M. *Le dosage du cuivre dans les eaux pour chaudiere-comparaison de trois methodes de dosage.* Cebedeau. Nov. 1962, No. 228, p. 549-554.
[7] *See* footnote 2, page 14
[8] Modification of automatic titration of the method given in footnote 1, page 14
[9] *See* footnote 1, page 14
[10] Goldman, E and Jacobs, R. *Determination of nitrate by ultra violet absorption.* J. Amer. Water Works Assoc. New York, 1961 p. 187 V53, No. 1.
[11] Modified method reported by V.M. Marcy, Calgon Company, Pittsburg, Pa.

Boron was determined only on major surface-water supplies once or twice yearly, usually at or near times of high and low flow; the standard titration procedure with added mannitol was employed.[1]

Suspended Matter and Residue on Evaporation - To permit increased coverage on waters, the determination of suspended matter and residue on evaporation, as well as tests for copper, zinc, iron, aluminum and manganese, were omitted on two out of three samples received from the monthly sampling stations. Suspended matter was determined only when the turbidity was 3 units or over. It is considered that sufficient information is still obtained from this abbreviated analysis to show if significant seasonal variation is occurring.

Calculated *'averages'* for water quality at monthly sampling stations are omitted from this report. Such averages mean little if the water quality varies widely or if adequate discharge records are not available. Averages should be determined from numerous samples weighted as to discharge.

Saturation Index, Stability Index and Per Cent Sodium are reported for all waters. Interpretation of these calculated values has already been discussed in Water Survey Reports Nos. 1, 10 and 12. In brief, per cent sodium when correlated with total mineralization and boron content indicates the suitability of a water for irrigation.

Since June 6, 1962 a *Sodium Adsorption Ratio (SAR)* has also been calculated. This ratio, $\frac{Na\ (epm)}{\sqrt{\frac{Ca + Mg\ (epm)}{2}}}$ the result of work by the U.S. Dept. of Agriculture, is a revised form of the above sodium-percentage concept and is related to the experimentally determined adsorption of sodium by soils. It is considered to be more directly significant than the per cent sodium value for estimating the results of using a water for irrigation. However, its use is limited to considering base-exchange reactions in soils and evaluation of irrigation waters, whereas the per cent sodium is useful also in plotting quality data and direct comparison of analytical data. Both values are reported in this report, the per cent sodium partly to maintain continuity throughout the series[2,3,4].

The Saturation and Stability Indices are useful for assessing the corrosive tendency of a water. Care, however must be exercised in interpreting these indices since many other factors are important to the rate and extent of corrosion in aqueous solution. For example, when calcium hardness is less than 10 ppm as $CaCO_3$ and the alkalinity correspondingly low, there is no pH at which calcium carbonate can precipitate and the indices—which are based on the carbon dioxide-pH-calcium carbonate equilibrium—then have little significance. This is the case with many of the very soft and low-mineralized waters of the Upper Great Lakes basin. These indices and the free carbon-dioxide contents are calculated and reported for each water at the temperature of analyses. They change significantly with changing temperature. The carbon-dioxide content of a cold, deep well water may be markedly different from the content of the same water at laboratory temperature.

Dissolved Oxygen was not determined on surface waters at sampling because it varies so widely with location, depth and temperature; in most rivers the dissolved oxygen content, unless depleted by algae growth or pollution, is always near saturation. A survey of the dissolved oxygen content or B.O.D. (Biochemical Oxygen Demand) of a river requires a detailed and specially designed survey of the river.

Elements other than those reported in this survey are in solution in trace amounts in surface and ground waters. Some of these have greatly increased in importance, but lack of personnel and laboratory facilities did not permit their routine determination in this study. Separate samples, filtered and acidified at the time of collection, are required if an accurate figure is to be obtained for trace elements, such as barium, silver, cobalt and nickel. These requirements limit the location of sampling stations and raise difficulties in obtaining sample collectors; spectrographic analyses of residues for these and other trace elements are done from time to time for special studies.

Modifications in techniques and new equipment are continually being tested in the laboratory; in some cases to increase the speed of analysis without loss of accuracy or precision, and in other cases to improve the sensitivity and precision of a method.

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[1] *See* footnote 1, page 15
[2] Wilcox, L.V. *The quality of water for irrigation use.* U.S. Dept. Agric. Tech. Bull. 962, 1948.
[3] U.S. Salinity Laboratory Staff. *Diagnosis and improvement of saline and alkali soils.* U.S. Dept. Agric. Handbook No. 60, 1954.
[4] *Study and interpretation of the chemical characteristics of natural waters.* U.S. Geol. Surv. Water Supply Paper 1473, U.S. Govt. Print. Off. 1959, p. 148-9.

TABLE II

CHEMICAL ANALYSES OF SURFACE WATERS IN THE UPPER GREAT LAKES DRAINAGE BASIN

TABLE II

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 1 – LAKE HURON (GEORGIAN BAY)																		
			Water Level															
1	Nov. 1/57	12:59	577.37†	577.57†	46	4.5	1	7.8	20	0.4	.....	.....	71.6	0.097	.....	18.4	115	14.7
2	Dec. 1	13:29	577.70	577.34	40	.....	3	7.4	25	0.9	.....	.....	.....	.....	.....	.....	99.3	12.4
3	Jan. 2/58	24:25	577.46	577.25	37	3.9	1	7.8	20	0.4	.....	.....	78.4	0.107	.....	25.2	111	14.2
4	Feb. 1	23:30	577.28	577.27	36	.....	2	7.7	15	0.4	.....	.....	.....	.....	.....	.....	117	14.5
5	Mar. 1	9:46	577.04	577.16	35	.....	1	7.8	20	0.3	.....	.....	.....	.....	.....	.....	124	14.8
6	Apr. 1	8:15	577.11	577.16	35	3.7	3	7.4	20	0.3	.....	.....	83.2	0.113	.....	24.8	119	14.4
7	May	No sample taken		577.16														
8	June 1	4:11	577.10	577.08	46	.....	1	7.9	15	0.9	.....	.....	.....	.....	.....	.....	122	15.6
9	July 1	15:48	577.08	577.16	52	3.2	1	7.9	15	2	.....	.....	68.4	0.093	.....	16.4	127	15.6
10	July 31	20:36	577.17	577.16	61	.....	3	7.5	10	0	.....	.....	.....	.....	.....	.....	129	16.4
11	Sept. 1	23:136	577.29	576.96	62	.....	1	7.9	10	0	.....	.....	.....	.....	.....	.....	131	16.7

† Elevation in feet above mean level at Father Point referred to the International Great Lakes Datum (1955) (IGLD 1955) at Collingwood, Ont. (Canadian Hydrographic Service)

STATION NO. 2 – LAKE HURON (GEORGIAN BAY)*

			Water Level															
12	July 23/57	38:67	578.18†	578.24†	70	2.4	3.5	7.7 (8.1)	0	0.9	.....	.....	133	0.181	.....	25.2	219	27.9
13	Aug.	No sample taken		578.03														
14	Sept.	No sample taken		577.90														
15	Oct. 8	15:20	577.60	577.59	58	2.2	1	8.2	5	0.4	.....	.....	120	0.163	.....	25.6	207	28.2
16	Nov. 7	6:15	517.60	577.49	46	.....	1	8.1	5	0.5	.....	.....	.....	.....	.....	.....	201	26.2
17	Dec. 8	5:22	578.22	577.33	46	.....	1	8.2	5	2	.....	.....	.....	.....	.....	.....	212	27.9
18	Jan. 8/58	18:19	577.26	577.35	33	1.7	1	8.1	5	0.9	.....	.....	127	0.173	.....	31.2	203	26.4
19	Feb.	No sample taken		577.40														
20	Mar. 12	:43	577.29	577.22	34	.....	1	8.1	5	0.4	.....	.....	.....	.....	.....	.....	203	26.8
21	Apr. 8	17:42	577.41	577.21	37	1.7	1	8.2	0	0.4	.....	.....	115	0.156	.....	12.8	196	26.0
22	May 9	6:19	577.32	577.19	43	.....	1	8.2	5	0.4	.....	.....	.....	.....	.....	.....	197	25.9
23	June 8	17:30	577.19	577.17	50	.....	1	8.1	5	0.5	.....	.....	.....	.....	.....	.....	203	26.2
24	July 7	24:48	577.28	577.26	62	1.7	2	7.9	0	0.9	.....	.....	131	0.178	.....	28.0	211	26.9
25	Aug. 5	84:184	577.14	577.17	68	.....	1	8.1 (8.4)	10 (10)	0	.....	.....	136	0.185	.....	40.0	214	27.8
26	Aug. 10	23:39	577.35	577.17	67	.....	1	8.2	5	0	.....	.....	.....	.....	.....	.....	206	27.0
27	Sept. 8	16:128	577.17	577.04	62	.....	0.9	6.2	0	0	.....	.....	.....	.....	.....	.....	200	26.1

† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Goderich, Ont. (Canadian Hydrographic Service).
* From ferry dock

STATION NO. 3 – LAKE HURON (GEORGIAN BAY, NORTH CHANNEL)

			Water Level															
28	July 24/57	44:83	578.16†	578.16†	58	2.2	3	7.7 (7.9)	0	0.8	.....	.....	108	0.147	.....	27.2	178	22.0
29	Aug. 5/58*	84:185	577.27	577.11	69	1.7	0.8	8.2 (8.2)	10 (10)	0	.....	.....	111	0.151	.....	42.4	179	22.1

† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Thessalon, Ont. (Canadian Hydrographic Service).
* At street tap, chlorinated.

STATION NO. 4 – LAKE HURON (GEORGIAN BAY, NORTH CHANNEL)

			Water Level															
30	Aug. 4/58*	84:185	577.17†	577.11†	72	1.5	1.5	7.9	5	0.8	.....	.....	98.0	0.133	.....	21.6	160	20.7

* At government wharf
† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Thessalon, Ont. (Canadian Hydrographic Service)

STATION NO. 5 – LAKE HURON (GEORGIAN BAY, NORTH CHANNEL)

			Water Level															
31	Aug. 3/58*	85:183	577.20†	577.07†	71	2	3	7.6 (7.9)	5 (15)	0.9	.....	.....	103	0.140	.....	44.0	162	20.5

* At government wharf
† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Thessalon, Ont. (Canadian Hydrographic Service)

TABLE II

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at PARRY SOUND																									
3.9	.....	0.01	0.01	0.03	0.00	0.0	2.1	0.7	0.0	0.0	49.1	12.2	2.9	0.0	0.4	3.7	.....	.....	12.4	52.7	64.8	7.8	−0.8	9.4	1
3.1	.....	.....	.....	.....	.....	.....	1.8	0.8	0.05	0.0	40.3	12.2	2.5	.....	0.2	2.1	.....	.....	10.6	43.7	55.0	8.0	−1.4	10	2
3.6	.....	0.02	0.00	0.00	0.00	0.0	1.6	0.7	0.05	0.0	47.4	11.2	2.7	0.0	0.4	2.5	.....	0.00	11.3	50.2	60.3	6.4	−0.8	9.4	3
3.8	.....	.....	.....	.....	.....	.....	1.7	0.7	0.05	0.0	47.3	11.5	3.1	0.0	0.5	2.6	.....	.....	13.0	51.8	61.7	6.5	−0.9	9.5	4
3.9	.....	.....	.....	.....	.....	.....	1.7	0.7	0.05	0.0	49.1	12.5	2.8	.....	0.1	2.5	.....	.....	12.7	53.0	63.2	6.4	−0.8	9.5	5
4.0	.....	0.03	0.00	0.03	0.00	0.0	1.8	0.7	0.1	0.0	47.9	13.3	3.0	0.0	0.4	2.4	.....	.....	13.1	52.4	63.7	6.8	−1.2	9.8	6
4.1	.....	.....	.....	.....	.....	.....	1.7	0.7	0.05	0.0	51.8	12.1	2.6	.....	0.8	2.7	.....	0.00	13.3	55.8	63.2	6.1	−0.9	9.7	7 8
4.3	.....	0.04	0.00	0.01	Trace	0.0	1.8	0.7	0.1	0.0	53.1	11.4	3.0	0.0	0.6	2.6	.....	.....	13.0	56.6	65.2	2.9	−0.6	9.1	9
4.3	.....	.....	.....	.....	.....	.....	1.8	0.7	0.05	0.0	56.4	12.0	3.1	.....	1.0	2.5	.....	.....	12.3	58.6	69.6	6.2	−1.0	9.5	10
4.6	.....	.....	.....	.....	.....	.....	2.1	0.7	0.05	0.0	55.5	12.6	4.3	.....	1.0	1.6	.....	0.04	15.1	60.6	70.9	6.9	−0.6	9.1	11
at SOUTH BAYMOUTH, MANITOULIN ISLAND																									
8.8	.....	Trace	0.00	0.05	0.02	0.01	2.5	0.9	0.0	0.0	111	16.9	4.0	0.0	0.4	3.3	.....	.....	14.6	106	120	4.8	−0.3	8.3	12
																									13
7.4	.....	0.00		0.07	0.00	0.0	2.2	0.8	0.0	0.0	104	16.1	4.3	0.0	0.1	2.5	.....	.....	15.3	101	113	4.5	+0.2	7.8	14 15
7.6	.....	.....	.....	.....	.....	.....	2.6	0.9	0.0	0.0	99.6	14.6	4.9	.....	0.6	3.5	.....	.....	14.9	96.6	110	5.5	0	8.1	16
8.3	.....	.....	.....	.....	.....	.....	2.8	0.9	0.0	0.0	107	17.5	4.5	.....	0.1	4.0	.....	.....	16.0	104	119	5.5	+0.1	8.0	17
7.7	.....	Trace	0.00	0.03	0.00	0.0	2.3	0.9	0.0	0.0	101	13.7	5.0	0.0	0.6	2.4	.....	0.00	14.9	97.5	109	4.9	0.0	8.1	18
																									19
7.2	.....	.....	.....	.....	.....	.....	2.3	0.8	0.0	0.0	100	14.0	4.7	.....	0.8	2.8	.....	.....	14.3	96.5	109	4.9	0.0	8.1	20
7.8	.....	0.00	0.00	0.01	0.00	0.0	2.4	0.7	0.05	0.0	98.7	13.8	4.0	0.0	0.6	7.4	.....	.....	15.9	96.9	111	5.1	0.0	8.2	21
7.3	.....	.....	.....	.....	.....	.....	2.5	0.7	0.05	0.0	97.6	12.9	4.5	.....	0.6	3.5	.....	0.00	14.5	94.6	106	5.4	+0.1	8.0	22
7.8	.....	.....	.....	.....	.....	.....	2.5	0.7	0.1	.....	100	14.6	4.7	.....	0.3	4.9	.....	.....	15.2	97.4	111	5.2	0.0	8.1	23
8.2	.....	0.00	0.00	0.01	0.00	0.0	2.2	0.7	0.05	0.0	104	15.2	4.8	0.0	0.4	4.3	.....	.....	15.6	101	114	4.5	−0.2	8.3	24
8.8	.....	0.00	0.00	0.04	Trace	0.05	2.1	0.8	0.05	0.0	107	15.4	3.7	0.0	0.6	4.2	.....	.....	17.6	106 (107)	116	4.1	+0.1	7.9	25
8.3	.....	.....	.....	.....	.....	.....	2.2	0.7	0.0	0.0	103	15.2	4.1	.....	0.8	4.1	.....	.....	16.8	102	113	4.5	+0.1	8.0	26
7.7	.....	.....	.....	.....	.....	.....	2.4	0.8	0.05	0.0	95.8	14.3	6.1	.....	1.0	3.8	.....	0.00	18.2	96.8	109	5.1	0.0	8.2	27
at LITTLE CURRENT, MANITOULIN ISLAND																									
6.5	.....	0.03	0.00	0.05	Trace	0.00	2.6	0.8	0.0	0.0	82.3	14.4	4.5	0.2	0.8	3.1	.....	.....	14.1	81.6	95.6	6.4	−0.6	8.9	28
6.6	0.03	.....	0.00	0.03	.....	.....	3.3	0.8	.....	0.0	83.1	13.0	5.6	0.0	0.8	5.2	.....	.....	14.1 (14.8)	82.3 (84.5)	98.4	7.9	0.0	8.2	29
at GORE BAY, MANITOULIN ISLAND																									
5.6	.....	0.00	0.00	0.02	Trace	0.00	2.4	0.6	0.1	0.0	75.5	11.4	3.3	0.0	1.0	6.1	.....	.....	12.8	74.7	88.2	6.5	−0.4	8.7	30
at MELDRUM BAY, MANITOULIN ISLAND																									
5.8	.....	0.00	0.00	0.03	Trace	0.05	2.6	1.1	0.1	0.0	75.3	9.5	3.0	0.0	4.0	3.5	.....	.....	13.2	75.0	87.2	6.9	−0.7	9.0	31

96900—2½

TABLE II - (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 6 – LAKE HURON (GEORGIAN BAY, NORTH CHANNEL)																		
1	Sept. 29/59	189:217	Water Level 577.20†	577.14†	63	.....	2	7.9 (7.9)	5	4	.....	.....	.....	.....	.....	.....	160	20.4
STATION NO. 7 – LAKE HURON (GEORGIAN BAY, NORTH CHANNEL)																		
2	Aug. 8/58*	90:187	Water Level 577.09†	577.11†	63	1.6	1	8.0 (7.9)	0 (10)	0	.....	.....	93.6	0.127	.....	18.8	154	20.1
STATION NO. 8 – LAKE HURON (GEORGIAN BAY, ST. JOSEPH CHANNEL)																		
3	Aug. 13/58*	86:194	Water Level 577.14†	577.11†	.....	2.0	1	7.9	5	3	13	10	62.8	0.085	.....	4.4	95.2	13.1
STATION NO. 9 – ST. MARY'S RIVER*																		
4	Oct. 25/51	.....	Water Level 601.37†	601.53†	48	.....	.....	7.8	2	2	.....	.....	.....	.....	.....	.....	94.2	14.7
5	July 26/57	52:81	600.69	600.81	62	1.7	·1	8.0	5	0.8	.....	.....	68.8	0.094	.....	10.4	100	14.0
6	Aug.	No sample taken		600.77														
7	Sept.	No sample taken		600.74														
8	Oct. 11	10:17	600.57	600.57	54	2.7	1	7.8	5	0.3	.....	.....	52.4	0.071	.....	15.2	74.8	12.9
9	Nov. 14	11:18	600.29	600.57	47	.....	0.8	8.0	0	0.9	.....	.....	.....	.....	.....	.....	92.9	12.9
10	Dec. 13	27:35	600.18	600.33	35	.....	0.8	8.0	5	0.3	.....	.....	.....	.....	.....	.....	93.2	13.0
11	Jan. 13/58	17:31	599.72	599.87	34	2.2	1	7.9	5	0.3	.....	.....	58.0	0.079	.....	9.2	91.7	12.9
12	Feb. 11	31:41	599.70	599.73	34	.....	0.8	8.0	3	0	.....	.....	.....	.....	.....	.....	90.9	13.0
13	Mar. 11	26:44	599.56	599.54	34	.....	1	7.9	0	0.3	.....	.....	.....	.....	.....	.....	94.2	13.0
14	Apr. 11	14:39	599.55	599.56	.....	1.5	1	7.8	0	0	.....	.....	60.8	0.083	.....	16.4	94.3	13.4
15	May 12	3:16	599.78	599.72	43	.....	1	7.9	10	0.3	.....	.....	.....	.....	.....	.....	93.4	13.0
16	June 11	14:27	599.89	599.92	50	.....	1	7.8	5	0	.....	.....	.....	.....	.....	.....	93.6	13.0
17	July 11	27:45	600.25	600.28	52	2.6	2	7.7	5	0.8	.....	.....	60.0	0.083	.....	13.2	92.3	13.3
18	Aug. 11	22:38	600.50	600.50	67	.....	2.5	7.5	5	0	.....	.....	.....	.....	.....	.....	89.7	13.0
19	Sept. 11	13:125	600.59	600.61	61	.....	4	7.3	0	0.8	.....	.....	.....	.....	.....	.....	93.7	12.9
20	May 26/62**	30:32	599.82	598.46	47	.....	2	7.6	0	2	.....	.....	.....	.....	.....	.....	93.3	12.2
STATION NO. 10 – LAKE SUPERIOR (BATCHAWANA BAY)																		
21	Aug. 11/58*	87:191	Water Level 600.50†	600.50†	69	1.6	1	7.9 (7.7)	0 (15)	0	.....	.....	60.8	0.083	.....	14.8	94.4	13.1

* At plant intake pump *(See* also Table III, page 102)
** At city tap
† Elevations in feet above mean level at Father Point referred to IGLD (1955) at upper entrance to Canadian lock at Sault Ste. Marie, Ont. (Canadian Hydrographic Service)
†† Total and dissolved

* At plant intake
† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Thessalon, Ont. (Canadian Hydrographic Service)

* Sampled at crossing to St. Joseph Island
† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Thessalon, Ont. (Canadian Hydrographic Service)

* From shore near Sand Point
† Elevation in feet above mean level at Father Point referred to IGLD (1955) at upper entrance to Canadian lock at Sault Ste. Marie, Ont. (Canadian Hydrographic Service)

TABLE II - (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	
at ALGOMA																									
5.6	0.22	0.01	0.00*	0.07	0.00	0.00	3.2	0.8	0.0	0.0	73.6	15.7	5.0	0.05	0.4	6.8	<0.1	....	12.8	73.2	102	8.4	−0.4	8.7	1
at THESSALON																									
5.5	.....	Trace	0.00	0.03	0.00	0.00	2.1	0.5	0.1	0.0 (0)	74.0 (77.6)	8.5	3.4	0.0	1.0	3.3	.....	.....	12.1 (9.2)	72.8 (72.8)	80.9	5.8	−0.3	8.6	2
near DESBARATS																									
2.9	0.18	0.03	0.00	0.02	0.00	0.05	1.2	0.6	0.05	0.0 (0)	50.8 (50.1)	3.1	1.3	0.0	0.9	2.6	.....	.....	2.9 (1.7)	44.6 (42.8)	51.0	5.4	−0.7	9.3	3
at SAULT STE MARIE																									
2.8	.....	.....	.....	.....	.....	.....	1.5	0.3	.....	0.0	51.7	7.4	1.2	.....	0.2	2.5	.....	.....	6.0	48.4	61.7	6.3	−0.8	9.4	4
2.9	.....	0.03	0.00	0.09	Trace	0.00	1.2	0.5	0.0	0.0	54.7	3.9	1.2	0.1	0.8	3.9	.....	.....	2.0	46.9	55.6	5.2	−0.6	9.2	5 6 7
2.8	.....	0.00	0.00	0.05	0.00	0.00	1.0	0.5	0.0	0.0	50.6	3.4	1.6	0.0	0.5	3.0	.....	.....	2.2	43.7	50.7	4.6	−1.0	9.8	8
3.1	.....	.....	.....	.....	.....	.....	1.2	0.5	0.0	0.0	50.8	3.6	1.7	.....	0.6	2.8	.....	.....	3.2	44.9	51.4	5.4	−0.7	9.4	9
2.8	.....	.....	.....	.....	.....	.....	1.1	0.4	0.0	0.0	50.2	3.8	1.2	.....	0.7	2.9	.....	.....	2.8	44.0	50.6	5.1	−0.7	9.4	10
2.9	.....	0.06	0.00	0.08	Trace	0.00	1.1	0.5	0.0	0.0	50.5	4.3	1.5	0.0	0.5	3.6	.....	0.00	2.8	44.1	52.3	5.0	−0.9	9.7	11
2.8	.....	.....	.....	.....	.....	.....	1.2	0.4	0.05	0.0	51.7	3.2	1.0	.....	0.8	3.6	.....	.....	1.6	44.0	51.5	5.5	−0.7	9.4	12
3.1	.....	.....	.....	.....	.....	.....	1.1	0.5	0.05	0.0	51.4	3.3	1.3	.....	0.8	3.1	.....	.....	3.0	45.2	51.6	4.9	−0.8	9.5	13
2.9	.....	0.00	0.00	0.04	0.00	0.00	1.5	0.5	0.05	0.0	51.4	3.5	1.2	0.0	0.8	4.2	.....	.....	3.2	45.4	53.4	6.6	−1.0	9.8	14
2.8	.....	.....	.....	.....	.....	.....	1.0	0.4	0.05	0.0	50.5	3.3	1.3	.....	1.2	2.5	.....	0.00	2.6	44.0	50.3	4.7	−0.7	9.3	15
2.9	.....	.....	.....	.....	.....	.....	1.2	0.5	0.05	0.0	51.1	4.4	1.4	.....	0.8	3.2	.....	.....	2.5	44.4	52.5	5.5	−0.9	9.6	16
2.7	.....	Trace	0.00	0.03	Trace	0.00	1.2	0.5	0.15	0.0	51.8	3.8	1.5	0.0	0.7	4.7	.....	.....	1.8	44.3	53.9	5.5	−0.9	9.5	17
2.9	.....	.....	.....	.....	.....	.....	1.1	0.5	0.05	0.0	51.3	3.6	0.8	.....	1.2	5.8	.....	.....	2.3	44.4	54.2	5.0	−1.2	9.9	18
2.8	.....	.....	.....	.....	.....	.....	1.2	0.5	0.05	0.0	48.9	2.5	2.2	.....	0.5	3.5	.....	0.00	3.6	43.7	50.2	5.6	−1.4	10	19
3.1	0.04	0.01	0.00††	0.01	0.01	0.00	1.1	0.5	.....	0.0	48.5	3.6	2.0	0.08	1.4	2.1	0.16	.....	3.6	43.4	50.1	5.1	−1.1	9.8	20
near BATCHAWANA																									
2.9	.....	0.00	0.00	0.02	0.00	0.00	1.2	0.5	0.05	0.0 (0)	50.8 (48.9)	2.7	1.3	0.00	1.5	6.3	.....	.....	2.9 (4.5)	44.6 (45.6)	54.5	5.4	−0.8	9.5	21

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 11 – LAKE SUPERIOR																		
			Water Level															
1	Oct. 16/57	9.20	600.60†	600.60†	55	2.5	0.8	8.2	5	3	25	24	72.4	0.098	.....	17.6	106	15.0
2	Nov. 18	15:21	600.37	600.55	42	.....	3	7.4	10	0.9	.....	.....	.....	.....	.....	.....	115	15.3
3	Dec. 18	26:30	600.09	600.34	39	.....	1	7.8	15	0.9	.....	.....	.....	.....	.....	.....	117	14.9
4	Jan. /58	No sample taken		600.04														
5	Feb. 18	23:49	599.95	599.84	36	1.6	1	7.9	5	0.4	.....	.....	.....	.....	.....	.....	104	13.8
6	Mar. 18	10:44	599.62	599.67	34	.....	2	7.7	10	0.3	.....	.....	.....	.....	.....	.....	101	13.7
7	Apr. 16	20:26	599.51	599.59	37	.....	1	7.8	10	0.4	.....	.....	.....	.....	.....	.....	116	14.8
8	May 16	14:20	599.70	599.75	39	3.5	2	7.6	15	2	.....	.....	66.8	0.091	.....	15.6	111	14.7
9	June 16	24:32	600·05	599.95	43	.....	1	7.8	10	0.9	.....	.....	.....	.....	.....	.....	115	14.9
10	July 16	30:40	600.41	600.33	48	.....	2	7.6	5	0	.....	.....	.....	.....	.....	.....	95.4	13.5
11	Aug. 19	24:147	600.40	600.51	54	2.0	1	7.8	5	0	.....	.....	71.6	0.097	.....	8.8	102	15.6
12	Sept. 16	9:126	600.74	600.75	54	.....	2	7.7	0	0	.....	.....	.....	.....	.....	.....	96.4	13.4

† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Michipicoten Harbour, Ont. (Canadian Hydrographic Service)

STATION NO. 12 – LAKE SUPERIOR

			Water Level															
13	Aug. 5/57	92:205	600.74†	600.75†	49	2.0	1	7.8	0	0.4	.....	.....	67.2	0.091	.....	19.6	98.9	12.8
14	May 25/62	21:39	698.53	598.39	45	2.6	2.5	7.5	10	0	.....	.....	62.8	0.085	.....	20.0	92.1	11.7

† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Port Arthur, Ont.
* Total and dissolved

STATION NO. 13 – LAKE SUPERIOR (NIPIGON BAY)

			Water Level															
15	Aug. 14/59	26:46	600.87†	600.91†	59	4.9	2	7.9	10	2	.....	.....	101	0.137	.....	30.4	151	23.7

† Elevation in feet above mean level at Father Point referred to IGLD (1955) at Port Arthur, Ont.
See also Table III - Red Rock - page 101

STATION NO. 14 – LAKE SUPERIOR (THUNDER BAY)

			Water Level															
16	June 15/53*	.....	601.16†	600.14†	.....	.....	.....	7.3	0	2	.....	.....	90	0.122	.....	.....	.....	.....
17	Mar. 17/54*	.....	599.79	599.74	.....	.....	3	7.6	0	3	.....	.....	64	0.087	.....	.....	.....	.....
18	Mar. 22/55*	.....	599.52	599.66	.....	.....	.....	6.9	0	2	.....	.....	105	0.143	.....	.....	.....	.....
19	Oct. 14/55*	.....	600.80	600.80	.....	.....	.....	7.5	0	2	.....	.....	55	0.075	.....	.....	.....	.....
20	Oct. 17/57	8:19	600.47	600.55	48	3.1	1	7.8	5	0.3	.....	.....	47.2	0.064	.....	19.6	96.8	13.4
21	Nov. 22	11:24	600.52	600.43	40	.....	2	7.6	5	3	.....	.....	.....	.....	.....	.....	100	13.4
22	Dec. 19	29:39	600.25	600.25	33	1.8	2	7.7	5	0.7	.....	.....	64.8	0.088	.....	17.2	99.6	13.5
23	Jan. /58	No sample taken		600.00														
24	Feb. 19	22:48	599.77	599.83	23	1.6	2	7.7	5	0.3	.....	.....	59.6	0.081	.....	26.4	99.5	13.8
25	Mar. 13	21:49	599.71	599.71	33	.....	3	7.5	5	0	.....	.....	.....	.....	.....	.....	99.1	13.5
26	April	No sample taken		599.67														
27	May 14	16:22	599.82	599.82	37	3.4	2	7.7	10	0	.....	.....	62.0	0.084	.....	28.8	97.6	13.4
28	June 25	21:47	600.02	600.04	48	.....	1	7.9	10	0.8	.....	.....	.....	.....	.....	.....	94.3	13.2
29	July 16	30:47	600.45	600.45	52	2.2	4	7.3	5	0	.....	.....	57.6	0.078	.....	10.4	95.3	13.3
30	Aug. 20	23:43	600.35	600.45	46	.....	7	7.1	5	0	.....	.....	.....	.....	.....	.....	96.3	13.4
31	Sept. 24	15:121	600.69	600.70	52	.....	1	7.8	5	0	.....	.....	.....	.....	.....	.....	101	13.3
32	October	No sample taken		600.61														
33	November	No sample taken		600.50														
34	Dec. 12	18:31	600.27	600.28	34	.....	4	7.3	5	0	.....	.....	84.4	0.115	.....	29.2	96.4	13.3
35	Mar. 11/59	12:27	599.77	599.73	.....	1.7	0.9	8.0	5	0.3	.....	.....	65.6	0.089	.....	14.8	106	13.7
36	April	No sample taken		599.70														
37	May	No sample taken		600.10														

† Elevation in feet above mean at Father Point referred to IGLD (1955) at Port Arthur, Ont.

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at MARATHON																									
2.9	.....	0.00	0.00	0.03	0.00	0.00	1.5	0.5	0.0	0.0	56.6	3.9	2.2	0.0	0.1	6.9	.....	.....	3.0	49.4	60.9	6.2	−0.4	9.0	1
3.2	.....	.....	.....	.....	.....	.....	2.9	0.5	0.0	0.0	51.4	4.3	7.3	.....	0.8	2.3	.....	.....	9.1	51.3	61.9	11	−1.2	9.8	2
2.9	.....	.....	.....	.....	.....	.....	3.4	0.4	0.0	0.0	55.0	3.7	6.0	.....	0.3	3.7	.....	.....	4.0	49.1	62.4	13	−0.8	9.4	3
																									4
2.8	.....	Trace	Trace	0.07	0.00	0.00	1.9	0.4	0.1	0.0	52.3	3.7	3.4	0.0	1.0	4.0	.....	.....	3.0	45.9	56.9	8.1	−0.8	9.5	5
2.8	.....	.....	.....	.....	.....	.....	1.8	0.5	0.05	0.0	51.8	3.4	2.8	.....	0.6	4.1	.....	.....	3.2	45.7	55.3	7.8	−0.9	9.5	6
3.4	.....	.....	.....	.....	.....	.....	2.8	0.5	0.1	0.0	51.9	3.9	6.2	.....	0.6	2.8	.....	.....	8.3	50.9	60.6	11	−0.8	9.4	7
3.2	.....	0.03	Trace	0.04	0.00	0.00	2.3	0.5	0.05	0.0	53.1	3.8	4.9	0.0	0.6	3.7	.....	.....	6.2	49.8	59.9	9.0	−1.0	9.6	8
2.8	.....	.....	.....	.....	.....	.....	3.1	0.5	0.05	0.0	55.3	4.1	4.4	.....	0.6	2.8	.....	.....	3.3	48.7	56.0	12	−0.8	9.4	9
3.1	.....	.....	.....	.....	.....	.....	1.1	0.4	0.05	0.0	53.5	3.3	1.8	.....	0.6	4.0	.....	.....	2.5	46.4	54.1	4.8	−1.6	9.6	10
2.0	.....	Trace	0.00	0.02	0.00	0.00	1.8	0.4	0.05	0.0	50.5	3.2	4.7	0.0	0.5	3.8	.....	0.00	5.7	47.1	56.9	7.6	−0.9	9.6	11
3.0	.....	.....	.....	.....	.....	.....	1.4	0.6	.....	0.0	50.1	3.0	2.6	.....	0.5	3.9	.....	.....	4.7	45.8	53.1	6.1	−0.9	9.5	12
near ROSSPORT																									
2.8	.....	0.00	0.00	0.04	0.00	0.05	1.5	0.8	0.0	0.0	48.8	3.4	1.6	0.0	2.5	2.5	.....	.....	3.5	43.5	52.0	6.8	−0.9	9.6	13
																			(3.5)	(44.8)					
3.2	0.02	Trace	0.00*	0.00	0.00	0.00	1.2	0.4	.....	0.0	48.0	3.9	1.6	0.06	1.0	2.2	<0.1	....	3.0	42.4	48.9	5.7	−1.2	9.9	14
at RED ROCK																									
3.7	0.34	0.02	Trace	0.00	Trace	0.10	1.5	0.7	0.0	0.0	83.1	5.0	2.6	0.0	1.5	5.0	.....	.....	6.1	74.3	84.8	4.1	−0.2	8.3	15
at PORT ARTHUR																									
.....	0.7	.....	.....	0.00	.....	.....	.....	.....	0.0	.....	.....	0	2	.....	.....	4.0	.....	.....	0.0	45	.....	.....	.....	.....	16
.....	Trace	.....	.....	0.00	.....	.....	.....	.....	0.0	0.0	63.4	0	4	.....	.....	3.8	.....	.....	0.0	44	.....	.....	.....	.....	17
.....	0.1	.....	.....	0.00	.....	.....	.....	.....	.0.0	.....	.....	4	10	.....	.....	2.7	.....	.....	0.0	50	.....	.....	.....	.....	18
.....	Trace	.....	.....	0.10	.....	.....	.....	.....	0.0	.....	.....	0	8	.....	.....	2.9	.....	.....	0.0	50	.....	.....	.....	.....	19
2.8	.....	Trace	0.00	0.00	0.00	0.00	1.3	0.5	0.0	0.0	51.4	3.4	1.6	0.2	0.1	2.8	.....	.....	2.8	45.0	51.5	5.8	−0.9	9.4	20
3.0	.....	.....	.....	.....	.....	.....	1.8	0.5	0.0	0.0	52.2	4.7	2.2	.....	0.8	2.8	.....	.....	3.0	45.8	63.4	7.7	−1.1	9.8	21
3.2	.....	0.02	0.00	Trace	0.00	0.00	1.4	0.6	0.0	0.0	53.4	4.3	1.3	0.0	0.8	2.8	.....	0.00	3.0	46.8	54.2	6.0	−0.9	9.5	22
																									23
2.9	.....	0.01	0.00	0.04	0.00	0.05	1.2	0.5	0.05	0.0	54.0	3.4	1.7	0.0	0.8	2.9	.....	.....	2.1	46.4	53.9	5.2	−0.9	9.5	24
2.9	.....	.....	.....	.....	.....	.....	1.3	0.6	0.1	0.0	53.0	3.5	1.4	.....	1.3	2.9	.....	.....	2.1	45.6	53.6	5.7	−1.2	9.9	25
																									26
3.0	.....	0.02	0.00	0.05	0.00	0.00	1.3	0.6	0.05	0.0	51.9	3.7	1.5	0.0	0.8	3.9	.....	0.00	3.2	45.8	53.8	5.7	+1.0	9.7	27
3.0	.....	.....	.....	.....	.....	.....	1.4	0.5	0.0	0.0	52.1	3.5	1.4	.....	0.8	3.4	.....	.....	2.6	45.3	52.8	6.2	−0.7	9.3	28
2.7	.....	Trace	0.00	0.00	0.00	0.00	1.2	0.5	0.05	0.0	52.7	2.4	2.1	0.0	1.0	2.6	.....	.....	1.1	44.3	51.7	5.5	−1.3	9.9	29
3.0	.....	.....	.....	.....	.....	.....	1.2	0.6	0.05	0.0	51.1	3.3	1.7	.....	0.6	3.2	.....	.....	3.9	45.8	52.1	5.3	−1.6	10	30
3.0	.....	.....	.....	.....	.....	.....	1.2	0.4	0.1	0.0	51.2	2.9	2.3	.....	0.5	3.3	.....	0.00	3.5	45.5	52.1	5.4	−0.8	9.4	31
																									32
																									33
3.3	.....	0.00	0.00	0.01	0.00	0.00	1.2	0.5	0.0	0.0	52.2	5.4	1.5	0.0	0.3	3.4	.....	.....	4.0	46.8	54.6	5.2	−1.3	9.9	34
3.5	.....	0.02	0.00	0.02	0.00	0.05	2.2	0.5	0.0	0.0	56.1	4.0	1.2	0.1	1.0	3.2	.....	.....	2.6	48.6	57.8	8.8	−0.6	9.2	35
																									36
																									37

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 14 – LAKE SUPERIOR (THUNDER BAY)																		
			Water Level															
1	June 10/59	6:14	600.48†	600.47	44	2.5	2	7.7	10	0.3	.....	.....	68.0	0.092	.....	17.2	95.8	13.2
2	July 17	5:10	600.76	600.73	47	3.5	2.5	7.5	10	0.8	.....	.....	50.0	0.068	.....	10.4	94.4	13.2
3	Aug. 7	11:19	600.76	600.91	56	2.5	2.5	7.5	10	0.8	.....	.....	67.6	0.092	.....	15.6	94.0	13.4
4	May 25/62*	80:75	598.53	598.39	48	.....	14	6.8	5	0	.....	.....	.....	.....	.....	.....	95.0	12.9
STATION NO. 15 – LAKE TIMAGAMI																		
5	Aug. 15/57	84:136	.....	.....	69	4.0	1	7.5 (7.8)	10 (40)	0.4	.....	.....	46.8	0.064	.....	12.8	71.5	8.4
STATION NO. 16 – TIMAGAMI RIVER																		
6	July 21/57*	39:68	1,010†	2,880†	.....	5.9	1	7.3	20	1	.....	.....	50.8	0.069	138	19.2	58.0	6.5
7	Nov. 13	9:56	1,460	2,170	43	10.0	1.5	7.2	40	0.4	.....	.....	51.6	0.070	202	22.4	64.5	7.1
8	Dec.	No sample taken		1,460														
9	Jan. 3/58	23:24	2,630	1,660	32	.....	2	7.0	20	0.3	.....	.....	.....	.....	.....	.....	62.5	6.9
10	Feb.	No sample taken		1,810														
11	Mar. 3	15:36	1,700	1,660	.....	4.3	2	7.1	20	1	.....	.....	54.4	0.074	249	24.0	64.1	7.2
12	May 2	26:35	968	1,040	43	.....	1	7.2	25	1	.....	.....	.....	.....	.....	.....	59.4	6.5
13	July 2	36:54	980	459	66	5.7	2	7.2	30	0.8	.....	.....	48.0	0.065	126	19.6	63.4	7.4
14	Aug. 21*	84:197	431	362	67	4.2	3.5	6.9 (7.4)	15 (35)	0	.....	.....	49.6	0.067	57.2	19.2	64.6	7.1
15	Sept. 1	17:191	243	755	61	4.6	2	7.2	20	0	.....	.....	83.6	0.114	54.8	32.4	66.2	7.5
STATION NO. 17 – STURGEON RIVER																		
16	Jan. 28/48	:20	1,550†	1,590†	33	.....	.....	7.1	35	2	.....	.....	48.6	0.066	203	18.2	61.9	7.1
17	Aug. 30/48	:28	1,290	1,420	.....	.....	.....	7.2	80	1	.....	.....	55.4	0.075	192	22.2	73.7	11.2
18	July 18/57	40:63	4,310	8,220	72	7.1	2	6.8 (6.6)	30	4	15	8.9	63.2	0.086	734	24.0	66.2	6.9
19	Aug.	No sample taken		2,110														
20	Sept.	No sample taken		2,040														
21	Oct. 1	8:14	2,070	2,120	.....	7.9	2	7.1	40	0.8	.....	.....	55.6	0.076	311	20.8	61.0	7.0
22	Nov. 4	8:18	2,250	5,440	43	.....	2	7.1	50	0.4	.....	.....	.....	.....	.....	.....	67.4	7.3
23	Dec. 2	8:14	3,440	4,220	30	.....	2	7.1	35	2	.....	.....	.....	.....	.....	.....	65.6	6.9
24	Jan. 6/58	20:21	3,580	3,310	32	5.3	2	6.9	25	0.8	.....	.....	50.4	0.069	489	20.4	62.7	6.7
25	Feb. 3	21:37	3,270	3,110	33	.....	2	7.1	20	1	.....	.....	49.2	0.067	434	20.0	63.5	6.9
26	Mar. 3	15:36	3,060	3,070	33	4.4	2	7.1	20	1	.....	.....	55.6	0.076	460	22.4	62.1	6.6
27	Apr. 1	17:35	2,950	2,960	37	.....	3	6.9	25	1	.....	.....	.....	.....	.....	.....	82.5	7.5
28	May 1	27:36	3,280	2,760	46	.....	3	6.8	35	4	.....	.....	.....	.....	.....	.....	56.7	5.9
29	June 2	3:10	2,160	1,840	56	6.3	1	7.3	20	1	.....	.....	59.2	0.081	346	25.2	67.2	7.9
30	July 2	14:40	2,050	1,770	66	.....	2	7.2	40	2	.....	.....	.....	.....	.....	.....	67.7	7.1
31	July 30	21:37	1,430	1,770	71	.....	5	6.8	35	0	.....	.....	.....	.....	.....	.....	66.0	7.4
32	Aug. 21	84:197	825	994	69	4.2	1	7.5 (7.4)	15 (35)	0	.....	.....	65.6	0.089	145	20.0	72.5	8.1
33	Sept. 2	16:190	1,130	1,350	64	3.6	4	7.0	20	0.8	.....	.....	69.8	0.095	213	24.2	77.6	8.9

See TableIII, Timagami, page 121

* At city tap
† Elevation in feet above mean at Father Point referred to IGLD (1955) at Port Arthur, Ont.

* At highway No. 539 bridge
† Discharge records above highway bridge at Lat. 46° 35' 46", Long. 80°11' 14"

* *See also* Water Survey Report No. 2
† Discharge records at Crystal Falls plant of the Hydro-Electric Power Commission of Ontario – Lat. 46°27' 00", Long. 79° 51' 41"; drainage area, 2,570 square miles.

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at PORT ARTHUR (concluded)																									
3.0	.....	0.02	0.00	0.03	Trace	0.00	1.2	0.5	0.0	0.0	50.2	3.5	1.4	0.0	0.8	2.2	<0.1	.....	4.1	45.3	50.1	5.4	−1.0	9.7	1
3.1	0.11	0.02	0.01	0.09	Trace	0.00	1.3	0.6	0.0	0.0	51.3	3.7	1.5	0.0	0.6	2.8	.....	.....	3.6	45.7	52.2	5.7	−1.1	9.7	2
3.1	0.09	0.02	0.00	0.07	Trace	0.00	1.5	0.7	0.2	0.0	52.1	4.6	1.8	0.0	0.4	3.1	.....	0.00	3.5	46.2	54.4	6.4	−1.1	9.7	3
3.6	0.06	0.01	0.00	0.02	0.05	0.0	1.2	0.4	.....	0.0	49.6	3.7	2.2	0.11	0.9	2.4	0.17	....	6.3	47.0	52.0	5.2	−1.9	11	4
at TIMAGAMI																									
2.1	.....	0.00	0.00	0.02	0.00	0.00	1.2	0.7	0.0	0.0 (0)	19.1 (24.2)	15.1	1.5	0.0	0.4	1.7	.....	....	13.9 (15.0)	29.6 (34.8)	40.5	7.9	−1.7	11	5
near RIVER VALLEY – Drainage area, 950 square miles																									
1.9	.....	0.02	0.00	0.00	0.00	0.00	0.7	0.5	0.05	0.0	18.2	13.8	0.6	0.0	0.15	.....	.....	...	9.1	24.0	33.2	5.8	−2.1	12	6
2.2	.....	0.03	0.00	0.00	0.00	0.03	1.1	0.6	0.1	0.0	16.9	14.5	0.7	0.0	0.3	0.4	.....	...	12.9	26.8	35.4	7.9	−2.1	11	7
2.1	.....	.....	.....	.....	.....	.....	0.7	0.5	0.05	0.0	14.7	15.2	0.8	.....	0.2	2.3	.....	...	13.8	25.9	36.0	5.4	−2.4	12	8 9
2.0	.....	0.02	0.00	0.03	0.00	0.00	1.0	0.4	0.1	0.0	14.6	14.5	0.9	0.0	0.4	4.7	.....	...	14.2	26.2	38.5	7.4	−2.3	12	10 11
2.1	.....	.....	.....	.....	0.00	.....	0.7	0.5	0.1	0.0	13.7	12.9	0.4	.....	0.3	3.5	.....	0.00	13.7	24.9	33.6	5.6	−2.3	12	12
2.1	.....	0.02	0.00	0.00	0.00	0.10	0.8	0.5	0.2	0.0	18.4	12.8	1.0	.....	0.5	2.8	.....	...	12.0	27.1	36.2	5.9	−2.0	11	13
2.4	.....	Trace	0.00	0.00	0.00	0.00	0.8	0.4	0.1	0.0 (0)	16.8 (17.9)	13.0	0.8	0.0	0.4	2.4	.....	...	13.8 (9.9)	27.6 (24.6)	35.6	5.8	−2.5	12	14
2.5	.....	0.02	Trace	0.01	0.00	0.05	0.9	0.5	0.05	0.0	18.5	13.0	0.7	0.0	0.3	2.1	Trace	0.05	13.8	29.0	36.7	6.2	−2.1	11	15
above STURGEON FALLS, *																									
3.0	0.28	.....	.....	.....	.....	....	2.0	0.5	.....	0.0	24.2	14.8	0.0	.....	0.8	4.8	.....	....	10.3	30.1	.....	.....	.....	.....	16
2.7	.....	0.20	.....	.....	.....	.....	1.7	0.5	.....	0.0	22.4	13.3	0.0	.....	0.2	2.1	.....	....	20.6	39.0	.....	.....	.....	.....	17
2.0	.....	0.26	0.05	0.00	Trace	0.00	0.7	0.4	0.1	0.0	9.9	15.1	3.7	0.0	0.15	2.8	.....	....	17.3	25.4	37.0	5.4	−2.8	12	18
																									19 20
1.9	.....	0.10	0.00	0.00	0.00	0.00	0.9	0.6	0.05	0.0	6.1	13.9	0.6	0.0	0.1	3.2	.....	....	12.1	25.3	36.3	6.9	−2.3	12	21
2.4	.....	.....	.....	.....	.....	.....	1.2	0.7	0.05	0.0	15.2	16.3	1.1	.....	0.2	4.4	.....	....	15.6	28.1	41.2	8.2	−2.3	12	22
2.1	.....	.....	.....	.....	.....	.....	1.4	0.5	0.1	0.0	13.0	16.5	1.2	.....	0.1	3.6	.....	....	15.2	25.9	38.8	10	−2.4	12	23
2.0	.....	0.06	0.00	0.00	0.00	0.00	0.8	0.5	0.0	0.0	11.8	15.5	0.8	0.0	0.2	3.4	.....	0.15	15.2	24.9	35.8	6.3	−2.6	12	24
2.0	.....	0.04	0.00	Trace	.....	.....	0.9	0.5	0.05	0.0	12.2	15.1	0.9	.....	0.8	3.5	.....	....	15.4	25.4	36.7	6.9	−2.4	12	25
1.9	.....	0.01	0.00	0.04	0.00	0.00	0.8	0.4	0.1	0.0	12.4	14.8	0.8	0.0	0.3	3.4	.....	....	14.1	24.3	35.4	6.4	−2.4	12	26
2.4	.....	.....	.....	.....	.....	.....	1.1	0.7	0.1	0.0	16.8	14.4	1.3	.....	1.0	3.9	.....	....	14.8	28.6	40.6	7.4	−2.5	12	27
2.0	.....	.....	.....	.....	.....	.....	0.9	0.6	0.15	0.0	10.4	13.0	0.6	.....	0.4	4.4	.....	....	14.4	22.9	32.9	7.6	−2.9	13	28
2.2	.....	0.04	0.03	0.00	0.00	0.00	1.0	0.6	0.1	0.0	18.4	13.8	0.5	0.0	0.1	3.7	.....	0.00	13.7	28.8	38.9	6.8	−1.9	11	29
2.4	.....	.....	.....	.....	.....	.....	1.0	0.5	0.2	0.0	18.2	13.5	0.8	.....	0.6	2.9	.....	....	12.7	27.6	37.7	7.2	−2.1	11	30
2.0	.....	.....	.....	.....	.....	.....	0.9	0.6	0.35	0.0	18.7	12.0	0.8	.....	0.6	3.0	.....	....	11.4	26.7	36.5	6.6	−2.5	12	31
2.7	.....	0.02	0.00	0.00	0.00	0.00	0.8	0.4	0.1	0.0 (0)	20.8 (21.5)	14.1	0.3	0.0	0.5	4.2	.....	....	14.2 (10.2)	31.3 (27.8)	41.4	5.2	−1.7	11	32
2.7	.....	0.02	0.00	0.02	0.00	0.05	1.4	0.6	0.05	0.0	23.2	14.3	0.6	0.0	0.4	4.8	0.03	0.05	14.3	33.3	45.2	8.2	−2.1	11	33

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 18 – STURGEON RIVER*
1	Sept. 22/59	196:210	2,140†	2,230†	61	.....	3	6.9 (7.1)	35	2	.....	.....	.....	.....	.....	.....	69.1	7.0
																		STATION NO. 19 – LAKE NIPISSING
			Water Level															
2	Sept. 23/55*	:10	640.91†	640.95†	.....	.....	.....	6.3	.....	2	Trace	.....	60	0.082	.....	.....	.....	7.2
3	May 6/62**	50:50	641.63†	641.78†	57	6.2	6	6.7	35	2	.....	.....	61.2	0.083	.....	26.0	66.6	6.0
																		STATION NO. 20 – LAKE NIPISSING
			Water Level															
4	Sept. 22/59	195:210	641.85†	642.15†	61	.....	2	7.3 (7.2)	15 (35)	3	.....	.....	.....	.....	.....	.....	78.3	7.9
																		STATION NO. 21 – LAKE NIPISSING (WEST ARM)*
			Water Level															
5	July 18/57	40:57	643.45†	643.38†	74	9.0	2	7.3 (7.1)	30 (40)	1	.....	.....	62.4	0.085	.....	32.8	73.2	7.3
																		STATION NO. 22 – FRENCH RIVER
6	July 18/57	22:57	12,100	12,100	68	6.0	2	7.1 (6.9)	20 (30)	0.3	.....	.....	58.4	0.079	1,893	23.6	67.9	7.0
7	Aug.	No sample taken		5,510														
8	Sept.	Nn sample taken		3,730														
9	Oct. 1	:62	4,910	6,370	61	6.3	2	7.2	20	1	.....	.....	106	0.144	1,400	46.0	68.0	6.9
10	Oct. 30	14:19	5,020	11,700	41	.....	2	7.2	20	0	.....	.....	.....	.....	.....	.....	70.0	7.2
11	Dec. 2	8:14	11,900	12,100	36	.....	1.5	7.3	25	1	.....	.....	.....	.....	.....	.....	69.3	7.0
12	Jan. 2/58	24:25	12,400	11,500	33	5.0	2	7.2	20	0.8	.....	.....	58.8	0.080	1,964	25.2	67.7	7.2
13	Feb. 3	21:49	11,100	10,400	34	.....	1.5	7.3	20	0.4	.....	.....	.....	.....	.....	.....	74.7	7.9
14	Mar. 3	15:36	9,020	7,650	34	5.6	2	7.1	25	1	.....	.....	60.0	0.082	1,464	29.2	73.3	7.9
15	Apr. 1	17:35	4,890	4,320	34	.....	1	7.4	30	1	.....	.....	.....	.....	.....	.....	74.3	7.9
16	May 6	22:30	2,560	2,310	47	.....	2	7.2	25	1	.....	.....	.....	.....	.....	.....	70.3	7.2
17	Juoe 4	16:28	1,990	1,960	60	7.1	0.9	7.5	25	0.8	.....	.....	56.0	0.076	299	20.0	70.8	7.3
18	July 7	21:49	2,080	2,530	68	.....	2	7.2	35	0.8	.....	.....	.....	.....	.....	.....	65.1	7.3
19	July 30	86:177	2,420	2,530	73	4.0	2	7.2 (7.4)	20 (25)	0	.....	.....	55.6	0.076	364	20.0	71.2	7.2
20	Aug. 7	26:42	2,100	1,950	72	.....	2	7.0	25	0.9	.....	.....	.....	.....	.....	.....	70.0	7.1
21	Sept. 9	9:183	1,820	1,910	64	4.9	2	7.2	25	0.7	.....	.....	49.2	0.067	241	24.0	67.8	6.9
																		STATION NO. 23 – FRENCH RIVER (PICKEREL RIVER)*
22	July 30/58	86:177	2,420†	2,530†	75	7.7	3	6.7 (7.0)	40 (50)	0	.....	.....	.....	.....	.....	.....	48.9	4.8
																		STATION NO. 24 – TOMIKO RIVER*
23	Aug. 15/57	84:95	.....	.....	67	.....	3	6.1	25	0	.....	.....	.....	.....	.....	.....	36.3	2.8

* About 2½ miles below mill, from private wharf.
† Discharge records at Crystal Falls plant of the Hydro-Electric Power Commission of Ontario. - Lat. 46°27' 00", Long. 79°51' 41"

* Near North Bay; analysis by Alchem Ltd., Burlington, Ont.
** At Callander wharf
† Level in feet at public wharf in North Bay above mean sea level based on Geodetic Survey of Canada Stations.
See also Station No. 167, page 66

† Level in feet at North Bay, – *see* Station No. 19

† Level in feet at North Bay – *see* Station No. 19
* At narrows

† Discharge records at French River Station gauge – *see* Station No. 22
* Sampled at highway No. 69 bridge

* Sampled frnm highway No. 11 bridge
See alsn Station No. 169, page 66

* Sampled at gauge on wharf below railway bridge near CPR station at French River, Lat. 46°01' 14", Lnng. 80°34' 23"

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
below STURGEON FALLS,																									
2.1	0.26	0.00	0.00	0.00	0.00	0.00	2.2	0.6	0.02	0.0	15.8	14.6	1.0	0.0	0.5	2.9	0.1	....	12.9	25.9	38.7	15	−2.7	12	1
at CALLANDER																									
3.4	0.00	.....	.....	0.00	0.10	.....	.....	.....	0.1	0.0	24.4	10.8	3.6	.....	.....	1.2	.....	.....	12.0	32.0	.....	.....	−2.6	12	2
3.6	0.20	0.03	0.00	0.00	Trace	0.00	2.1	1.1	.....	0.0	18.4	12.3	2.5	0.15	1.8	4.1	<0.1	.....	14.9	30.0	42.8	13	−2.7	12	3
near BEAUCAGE POINT																									
2.8	0.05	0.00	0.00	0.01	0.02	0.05	2.0	0.7	0.0	0.0	23.5	14.4	1.4	0.0	0.5	4.0	0.06	....	11.5	30.8	45.4	12	−1.9	11	4
near NOELVILLE																									
3.4	.....	0.02	Trace	0.00	Trace	0.00	1.2	0.9	0.2	0.0 (0)	25.1 (23.3)	13.6	1.1	0.0	0.6	1.7	.....	....	11.6 (10.8)	32.2 (29.9)	42.4	7.1	−1.9	11	5
at FRENCH RIVER STATION* – Drainage area, 5,370 square miles																									
2.3	.....	0.01	Trace	Trace	Trace	0.02	1.3	0.7	0.05	0.0 (0)	17.6 (18.0)	13.6	1.2	0.0	0.4	1.3	.....	.....	12.5 (9.7)	26.9 (24.5)	36.5	9.2	−2.2	12	6
																									7
																									8
2.6	Trace	.....	0.00	0.00	0.00	0.00	1.8	0.7	0.05	0.0	18.0	15.1	2.3	0.0	0.1	1.5	.....	.....	13.1	27.9	39.9	12	−2.1	11	9
2.5	.....	.....	.....	.....	.....	.....	1.7	0.7	0.1	0.0	19.1	15.0	1.3	.....	0.1	1.2	.....	.....	12.5	28.2	39.2	11	−2.1	11	10
2.5	.....	.....	.....	.....	.....	.....	1.7	0.6	0.05	0.0	18.4	15.7	1.4	.....	0.1	1.3	.....	.....	12.6	27.7	39.4	11	−2.0	11	11
2.4	.....	0.03	0.00	0.00	0.00	0.00	1.5	0.8	0.1	0.0	19.0	12.7	1.5	0.0	0.2	1.6	.....	0.05	12.0	27.8	37.5	10	−2.1	11	12
2.5	.....	.....	.....	.....	.....	.....	1.5	0.7	0.0	0.0	18.3	16.4	1.1	.....	0.5	2.1	.....	.....	15.0	30.0	41.7	9.5	−2.0	11	13
2.4	.....	0.02	0.00	0.00	0.00	0.00	1.4	0.7	0.1	0.0	18.5	15.9	1.4	0.0	0.4	2.5	.....	.....	14.4	29.6	41.8	9.0	−2.2	11	14
2.6	.....	.....	.....	.....	.....	.....	1.5	0.8	0.1	0.0	18.5	15.4	1.5	.....	0.5	2.7	.....	.....	15.2	30.4	42.1	9.3	−1.9	11	15
2.6	.....	.....	.....	....	0.00	.....	1.4	0.7	0.1	0.0	17.2	14.3	1.1	.....	0.4	3.4	.....	0.00	14.6	28.7	39.6	9.3	−2.2	12	16
2.3	.....	0.01	0.00	0.00	0.00	0.00	1.4	0.7	0.1	0.0	17.3	14.8	1.1	0.0	0.4	2.4	.....	.....	13.5	27.7	38.9	9.6	−1.8	11	17
2.3	.....	.....	.....	.....	.....	.....	1.4	0.6	0.15	0.0	18.3	13.7	1.0	.....	0.3	0.7	.....	.....	12.7	27.7	36.3	9.7	−2.1	11	18
2.5	.....	0.00	0.00	0.00	Trace	0.05	1.9	0.6	0.1	0.0	17.2	14.4	0.6	0.0	0.5	2.8	.....	.....	14.1	28.2 (28.9)	39.0	12	−2.1	11	19
2.3	.....	.....	.....	.....	.....	.....	1.4	0.7	0.15	0.0	16.6	14.1	1.0	.....	0.4	1.4	.....	.....	13.6	27.2	36.6	9.8	−2.3	12	20
2.4	.....	0.04	0.00	0.14	0.00	0.05	1.7	0.6	0.1	0.0	16.5	14.1	0.9	0.0	0.2	2.8	0.0	0.00	13.6	27.1	37.9	11	−2.2	12	21
near FRENCH RIVER																									
1.6	.....	.....	.....	.....	.....	.....	1.4	0.7	.....	0.0 (0)	8.5 (11.1)	12.6	1.7	.....	0.3	2.9	.....	.....	11.6 (11.2)	18.6 (20.3)	30.2	14	−3.1	13	22
north of NORTH BAY																									
1.2	.....	.....	.....	.....	.....	.....	1.1	1.2	0.0	0.0	2.7	10.7	1.2	.....	0.3	1.6	.....	.....	9.7	11.9	21.4	15	−4.4	15	23

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 25 – DUCHESNAY CREEK*																		
1	Oct. 1/59	186:214	133†	84†	55	.....	3	7.6	80	50	.....	.....	.....	.....	.....	.....	162	21.3
STATION NO. 26 – CREEK, east of RODGERS CREEK																		
2	Oct. 1/59	186:214	.....	.....	.....	.....	13	5.1	135	2	.....	.....	.....	.....	.....	.....	35.2	2.4
STATION NO. 27 – RODGERS CREEK*																		
3	Sept. 22/59	195:210	.....	.....	58	.....	5	6.6 (7.0)	100	3	.....	.....	.....	.....	.....	.....	50.5	5.4
STATION NO. 28 – LARONDE CREEK*																		
4	Sept. 22/59	195:210	.....	.....	59	.....	4	6.5 (6.4)	160	3	.....	.....	.....	.....	.....	.....	38.7	4.4
STATION NO. 29 – LITTLE STURGEON RIVER*																		
5	Sept. 22/59	195:210	.....	.....	61	.....	5	6.3 (6.0)	160	5	.....	.....	.....	.....	.....	.....	40.8	4.0
STATION NO. 30 – VEUVE RIVER*																		
6	Sept. 22/59	196:210	.....	.....	64	.....	3	7.2 (6.5)	90	6	.....	.....	.....	.....	.....	.....	116	12.0
STATION NO. 31 – VEUVE RIVER*																		
7	July 21/57	37:60	Low	.....	.....	16.1	12	6.8 (7.2)	140 (140)	6	17	11	113	0.154	.....	35.6	113	13.5
STATION NO. 32 – VEUVE RIVER*																		
8	Aug. 20/58	84:198	.....	.....	69	10.4	4	7.5 (6.7)	50 (90)	4	13	10	133	0.181	.....	36.0	158	18.8
STATION NO. 33 – WANAPITEI LAKE (BOWLANDS BAY)*																		
			Water Level															
9	July 22/57	38:67	.....†..	.....	69	5.9	0	8.2 (7.3)	20 (35)	0.8	.....	.....	52.0	0.071	.....	19.6	69.4	8.5
10	Oct. 3	8:19	Low	.....	55	5.8	1	7.4	25	0.3	.....	.....	67.2	0.091	.....	16.4	73.1	8.9
11	May 17/58	13:19	7 ft	.....	45	4.9	1	7.4	25	1	.....	.....	.....	.....	.....	.....	75.2	9.1

* Sampled at highway No. 17 bridge
† Discharge records, one-quarter mile below highway No. 17 bridge.
** Total

* Total

*About 7 miles east of Meadowside at highway No. 17 bridge

* Several miles east of Meadowside at highway No. 17 bridge
** Total

* Sampled at railway bridge
** Total

* Sampled from shore

* Sampled at highway No. 539 bridge

* Sampled at highway No. 64 bridge *see* also Table III

* From wharf
† Collector's estimate of water level

TABLEII – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near NORTH BAY – Drainage area, 37 square miles																									
0.7	3.6	0.21	1.2**	0.00	0.00	0.00	1.4	1.2	0.5	0.0	69.2	25.4	2.1	0.0	0.2	7.7	0.0	....	0.0	56.2	94.1	5.0	−0.8	8.8	1
near BEAUCAGE																									
1.1	1.1	0.28	0.05*	0.02	0.00	0.00	0.9	0.7	0.1	0.0	1.1	9.5	1.5	0.0	0.3	4.9	0.0	....	10.9	11.8	22.1	14	−5.9	16	2
near MEADOWSIDE																									
1.6	1.3	0.67	0.02	0.00	Trace	0.00	1.4	0.9	0.5	0.0	12.3	8.6	1.8	0.0	0.8	7.9	0.09	....	9.7	19.8	35.2	12	−3.0	13	3
near MEADOWSIDE																									
1.6	1.4	0.47	0.05**	0.00	Trace	0.00	1.0	0.4	0.5	0.0	7.7	6.3	1.7	0.0	0.4	4.4	0.11	....	11.1	17.4	24.5	10	−3.4	13	4
at MEADOWSIDE																									
1.6	1.5	0.38	0.05**	0.00	0.00	0.00	1.4	0.5	0.5	0.0	6.6	7.1	2.8	0.0	0.5	7.3	0.10	....	10.9	16.3	28.8	15	−3.7	14	5
near HAGAR																									
4.3	1.4	0.26	0.00	0.00	0.00	0.00	2.8	1.3	0.03	0.0	31.0	21.5	3.3	0.0	1.0	6.4	0.08	....	22.0	47.4	68.2	11	−1.7	11	6
at WARREN																									
4.5	.....	0.43	0.00	0.00	0.00	0.00	1.8	0.9	0.0	0.0	46.4	16.0	1.8	0.0	0.4	5.2	.....	....	14.1	52.2	67.4	6.7	−1.9	11	7
at VERNER																									
6.8	0.26	0.05	0.00	0.00	0.00	0.00	2.8	0.9	0.1	0.0 (0)	74.2 (73.9)	12.8	2.1	0.0	2.0	6.4	.....	....	14.0	74.9	89.2	7.4	−0.9	9.4	8
at BOWLANDS BAY																									
2.0	.....	0.03	0.00	0.00	0.00	0.00	1.0	0.5	0.05	0.0 (0)	16.9 (19)	16.0	0.7	0.0	0.4	4.4	.....	....	15.5 (16.5)	29.4 (32.4)	37.6	6.7	−1.1	10	9
2.1	.....	0.02	0.00	0.00	.....	.....	0.9	0.5	0.5	.....	18.5	16.0	1.1	0.0	0.2	3.9	.....	....	15.6	30.8	42.8	5.8	−1.8	11	10
2.2	.....	0.02	0.00	0.00	0.00	0.00	0.9	0.4	0.05	0.0	18.9	15.7	0.4	0.0	0.4	5.0	.....	0.00	16.3	31.8	43.4	5.7	−1.8	11	11

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 33 – WANAPITEI LAKE (BOWLANDS BAY)*																		
			Water Level															
1	June 21/58	20:27	7 ft	.....	49	.....	2	7.1	20	0	.....	.....	.....	.....	.....	.....	72.8	8.6
2	July 17	29:46	7 ft	.....	55	4.8	1	7.3	25	0	.....	.....	56.0	0.076	.....	22.0	73.5	8.6
3	Aug. 2	85:178	.....	.....	60	4.6	2	7.2 (7.4)	20 (25)	0	.....	.....	76.0	0.103	.....	31.6	91.9	10.2
4	Aug. 23	27:135	5 ft below normal		65	.....	1	7.4	20	0	.....	.....	.....	.....	.....	.....	76.0	8.7
5	Sept.	No sample taken																
6	Oct. 3	12:120	6 ft 6 in	.....	58	5.0	1	7.4	15	0	.....	.....	72.0	0.098	.....	16.0	76.0	9.2
STATION NO. 34 – WANAPITEI RIVER *																		
7	Sept. 22/59	196:224	586†	735†	64	.....	2.5	7.1	30	2	.....	.....	.....	.....	.....	.....	83.9	9.6
STATION NO. 35 – WANAPITEI RIVER*																		
8	July 22/57	28:67	1,190†	3,560†	71	6.1	0	8.2 (7.1)	25 (30)	0.8	.....	.....	57.6	0.078	184	19.6	72.3	8.6
9	Aug.	No sample taken		757														
10	Sept.	No sample taken		1,110														
11	Oct. 3	8:19	1,320	1,340	54	5.6	1	7.4	25	0.7	.....	.....	49.2	0.067	175	10.0	76.8	9.0
12	Nov. 6	7:26	1,380	1,790	44	.....	1	7.4	25	0.4	.....	.....	.....	.....	.....	.....	79.6	9.3
13	Dec. 6	7:24	1,360	1,590	34	.....	1	7.4	20	0.8	.....	.....	.....	.....	.....	.....	79.0	9.3
14	Jan. 3/58	23:24	1,390	1,330	32	5.2	1	7.4	25	0.3	.....	.....	60.8	0.083	228	22.4	77.4	9.0
15	Feb. 10	17:42	1,340	1,340	32	.....	0.9	7.5	25	0.4	.....	.....	.....	.....	.....	.....	77.7	9.2
16	Mar. 7	10:40	1,340	1,460	32	.....	1	7.5	25	0.3	.....	.....	.....	.....	.....	.....	81.6	9.2
17	Apr. 8	17:34	1,250	1,070	36	5.6	2	7.1	25	3	.....	.....	62.8	0.085	210	20.4	75.8	8.8
18	May 9	19:27	770	666	48	.....	1	7.3	25	0	.....	.....	.....	.....	.....	.....	79.2	9.2
19	June 5	15:27	372	402	58	.....	1	7.5	25	1	.....	.....	.....	.....	.....	.....	83.5	9.7
20	July 11	27:53	447	463	64	5.7	2	7.1	30	0.7	.....	.....	82.0	0.112	99.1	21.6	121	13.9
21	July 31*	86:177	384	463	70	5.4	2	7.1 (7.6)	25	1	.....	.....	68.0	0.092	69.6	20.4	84.7	9.7
22	Aug. 7	15:42	376	383	71	.....	2.5	7.1	25	10	.....	.....	.....	.....	.....	.....	78.0	9.3
23	Sept. 5	18:129	370	407	62	.....	2	7.3	15	0.8	.....	.....	.....	.....	.....	.....	77.2	9.1
STATION NO. 36 – WANAPITEI RIVER*																		
24	July 31/58	86:177	384†	463†	69	5.3	1	7.4 (7.1)	25 (35)	0	.....	.....	.....	.....	.....	.....	76.2	9.2
STATION NO. 37 – BOUCHER LAKE																		
25	Aug. 18/58	85:197	.....	.....	65	1.8	1	7.8 (7.2)	5	3	.....	.....	617	0.839	.....	84.0	817	100
26	Sept. 23/59	35:39	.....	.....	64	3.7	2.5	7.6 (8.2)	5	4	4.7	0.4	684	0.930	.....	92.4	882	113
STATION NO. 38 – RED PINE LAKE																		
27	Sept. 23/59	35:39	.....	.....	70	2.7	.....	3.2 (3.5)	0	2	.....	.....	214	0.291	.....	77.2	498	14.3

* From wharf
† Collector's estimate of water level.

† Discharge records at point about three miles south of village of Wanup; Drainage area 1,220 square miles; Lat. 46° 20' 40", Long. 80° 50' 24"

† Discharge records at point about three miles south of Wanup – *see* Station No. 34
* From highway No. 537 bridge.

† Discharge records at point about three miles south of Wanup – *see* Station No. 34
* Sampled at highway No. 69 bridge

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_3)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at BOWLANDS BAY – (concluded)																									
2.3	.....	.....	.....	.....	.....	.....	1.2	0.5	0.1	0.0	18.3	15.6	0.7	.....	0.3	4.8	.....	...	5.9	30.9	43.0	7.6	−2.1	11	1
2.1	.....	0.04	0.00	0.00	0.00	0.00	1.0	0.5	0.1	0.0	19.1	14.5	0.9	0.0	0.7	5.1	.....	...	14.4	30.1	42.9	6.6	−1.9	11	2
2.8	.....	0.00	0.02	0.00	Trace	0.10	1.7	0.7	0.1	0.0	19.3	21.4	0.6	0.0	1.0	5.1	.....	...	21.2	37.0	53.1	8.9	−1.9	11	3
										(0)	(21)								(18)	(39)					
2.6	.....	.....	.....	.....	.....	.....	1.8	0.4	0.1	0.0	18.2	16.9	0.9	.....	0.5	4.2	.....	0.00	17.5	32.4	44.9	11	−1.9	11	4
																									5
2.3	.....	0.02	0.00	0.02	Trace	0.05	2.2	0.5	0.1	0.0	18 5	15.9	1.0	0.0	0.3	7.3	0.0	...	17.2	32.4	47.9	13	−1.8	11	6
at WANAPITEI																									
2.6	0.27	0.05	Trace	0.00	0.06	0.03	1.5	0.6	0.1	0.0	19.5	21.6	1.5	0.1	0.3	5.7	Trace	...	18.6	34.6	55.3	8.4	−2.1	11	7
at dam below CONISTON																									
2.2	.....	Trace	0.00	0.00	0.00	0.02	1.0	0.5	0.05	0.0	18.2	16.9	0.2	0.0	0.8	4.1	.....	...	15.6	30.5	39.3	6.5	−1.1	10	8
										(0)	(20)														9
																									10
2.1	.....	0.04	0.00	0.03	0.00	0.00	1.0	0.5	0.05	0.0	17.7	18.4	0.8	0.0	0.2	4.2	.....	....	16.6	31.1	45.0	6.4	−1.9	11	11
2.3	.....	.....	.....	.....	.....	.....	1.3	0.6	0.05	0.0	17.1	20.4	0.7	.....	0.2	4.5	.....	....	18.7	32.7	47.8	7.8	−1.8	11	12
2.3	.....	.....	.....	.....	.....	.....	1.6	0.4	0.05	0.0	18.8	19.9	0.9	.....	0.2	5.8	.....	....	17.3	32.7	49.7	9.5	−1.8	11	13
2.4	.....	0.05	0.01	0.00	Trace	0.00	1.1	0.6	0.1	0.0	18.3	17.5	1.0	0.0	0.2	4.7	.....	0.03	17.3	32.3	45.7	6.8	−1.8	11	14
2.4	.....	.....	.....	.....	.....	.....	1.2	0.5	0.05	0.0	18.3	17.7	0.8	.....	0.6	5.3	.....	....	17.8	32.8	46.8	7.2	−1.7	11	15
2.6	.....	.....	.....	.....	.....	.....	1.3	0.6	0.1	0.0	18.4	19.4	0.8	.....	0.4	5.0	.....	....	18.5	33.6	48.5	7.5	−1.7	11	16
2.3	.....	0.07	0.00	0.06	0.00	0.00	1.4	0.7	0.1	0.0	14.1	20.0	0.9	0.2	0.8	5.5	.....	....	19.8	31.4	47.0	8.4	−2.4	12	17
2.3	.....	.....	.....	.....	0.00	.....	1.1	0.6	0.1	0.0	16.1	18.2	0.9	.....	0.3	5.0	.....	0.00	19.2	32.4	45.5	6.7	−2.0	11	18
2.4	.....	.....	.....	.....	.....	.....	1.7	0.5	0.1	0.0	20.8	18.3	0.6	.....	0.8	4.9	.....	....	17.0	34.1	49.2	9.6	−1.6	11	19
3.2	.....	0.07	0.00	Trace	0.00	0.00	2.5	0.8	0.3	0.0	19.1	34.2	0.7	0.0	0.6	5.5	.....	....	32.1	47.8	70.9	10.0	−1.9	11	20
2.7	.....	0.02	0.00	0.00	Trace	0.10	1.4	0.6	0.05	0.0	19.0	18.0	1.3	0.0	0.5	4.0	.....	....	19.7	35.3	47.7	7.7	−2.1	11	21
										(0)	(16)														
2.3	.....	.....	.....	.....	.....	.....	1.0	0.5	0.3	0.0	20.7	15.6	0.2	.....	0.2	4.2	.....	....	15.7	32.7	43.5	6.1	−2.1	11	22
2.5	.....	.....	.....	.....	.....	.....	1.0	0.4	.....	0.0	19.1	17.3	1.2	.....	0.3	4.5	.....	0.05	17.3	33.0	45.7	6.1	−1.9	11	23
near WANUP																									
2.5	.....	0.01	0.00	0.00	0.01	0.05	1.2	0.6	0.05	0.0	18.5	17.2	0.9	0.0	0.0	4.5	.....	....	18.0	33.2	45.8	7.1	−1.8	11	24
										(0)	(21)								(19.8)	(37.0)					
at FALCONBRIDGE																									
28.0	.....	0.01	0.00	0.05	0.00	0.00	30.0	3.1	.....	0.0	58.3	359	8.7	0.2	1.5	4.2	.....	....	317	365	564	15	0.0	7.8	25
										(0)	(59)														
33.2	0.15	0.02	0.00	0.06	Trace	0.10	29.0	3.1	0.05	0.0	63.4	389	10.8	0.05	2.0	4.0	0.15	.....	366	418	616	13	−0.1	7.8	26
Nickel - 0.35 ppm																									
at FALCONBRIDGE																									
5.5	1.6	0.38	0.47	6.9	1.2	0.2	1.5	1.2	1.0	0.0	0:0	142	1.3	0.05	0.0	11	0.01	.....	105	105	190	2.2	−7.0	17	27

Nickel - 3.0 ppm: Mineral acidity as $CaCO_3$ = 36.6 ppm

TABLE II - (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 39 – MURDOCK RIVER
1	July 31/58	85:176	.....	.....	69	7.8	3.5	6.9 (7.0)	20 (30)	0	.....	.....	64.4	0.087	.....	23.6	80.1	7.0
																		STATION NO. 40 – SPANISH RIVER
2	Oct. 8/57	3:14	1,480	1,570	63	8.2	2	7.0	50	0.8	.....	.....	51.6	0.070	205	19.2	48.2	5.5
3	Nov. 7	14:25	2,080	1,830	50	.....	2	7.1	35	1	.....	.....	.....	.....	.....	.....	48.1	5.4
4	Dec. 7	6:23	1,490	2,100	40	.....	1	7.2	30	1	.....	.....	.....	.....	.....	.....	48.2	5.1
5	Jan. 7/58	23:24	2,040	1,860	32	6.6	2	7.0	35	0.7	.....	.....	51.2	0.070	283	24.0	50.5	5.5
6	Feb. 7	20:45	2,200	1,880	.....	.....	2	7.0	40	0.4	.....	.....	.....	.....	.....	.....	50.8	5.5
7	Mar. 7	10:40	2,360	2,330	.....	.....	2	6.9	40	0.8	.....	.....	.....	.....	.....	.....	51.5	5.7
8	Apr. 7	15:35	2,620	2,490	36	7.7	2	7.1	40	0.4	.....	.....	49.6	0.067	348	27.6	53.7	6.2
9	May 7	21:29	2,130	1,910	45	.....	1	7.2	35	3	.....	.....	.....	.....	.....	.....	49.8	5.8
10	June 7	13:25	2,220	1,970	57	.....	1	7.1	25	0.8	.....	.....	.....	.....	.....	.....	47.5	5.0
11	July 25	25:39	1,850	2,130	65	7.6	2	7.0	35	0	.....	.....	45.2	0.061	223	26.8	48.3	5.5
12	Aug. 8	14:41	1,900	1,670	70	.....	2	6.9	25	0	.....	.....	.....	.....	.....	.....	48.3	5.2
13	Sept. 6	17:128	1,870	1,550	66	.....	2	6.9	25	0	.....	.....	.....	.....	.....	.....	51.8	5.1
																		STATION NO. 41 – SPANISH RIVER*
14	Aug. 15/58	85:192	1,800†	1,670†	70	5.7	2	7.1 (6.7)	25 (35)	0	.....	.....	56.4	0.077	274	13.2	49.2	5.5

† Discharge records at High Falls - *see* Station No. 40.
* Near creek mouth about 5 miles below Turbine

																		STATION NO. 42 – SPANISH RIVER*
15	July 23/57	.....	4,650†	9,790†	69	9.5	3	6.7 (6.6)	55 (65)	0.8	.....	.....	49.2	0.067	617	28.8	44.1	4.6
16	Sept. 23/59	195:223	2,870	2,450	65	.....	5	6.6 (6.8)	15	1.5	.....	.....	.....	.....	.....	.....	51.0	5.4

† Discharge records at Espanola - *see* Station No. 43.
* Sampled at highway No. 17 bridge

																		STATION NO. 43 – SPANISH RIVER
17	Dec. 9/53†	.....	1,880	2,000	.....	.....	.....	6.9	.....	3	.....	.....	48	0.065	242	.....	.....	.....
18	Mar. 11/55†	.....	4,080	3,860	.....	.....	.....	6.4	.....	2	Trace	.....	65	0.088	711	.....	.....	.....
19	Apr. 12/56†	.....	9,040	6,800	.....	.....	5	6.7	40	2	Trace	.....	88	0.120	2,148	.....	.....	14.4
20	Nov. 3/56†	.....	3,130	3,410	.....	.....	.....	7.9	40	2	Trace	.....	60	0.082	508	.....	.....	8.0
21	Sept. 17/57	17:22	2,140	2,070	72	8.8	3	7.0	40	0.8	.....	.....	62.8	0.085	360	34.0	68.2	7.3
22	Oct. 17	8:19	2,400	2,050	56	.....	2	7.0	40	0.9	.....	.....	.....	.....	.....	.....	63.2	6.8
23	Nov. 19	6:20	7,400	4,880	44	.....	1	7.4	30	1.5	.....	.....	.....	.....	.....	.....	121	11.9
24	Dec. 16	28:32	3,230	4,330	34	6.1	3	6.7	35	1	.....	.....	82.8	0.113	723	31.6	103	9.6
25	Jan. 15/58	28:40	3,490	3,240	32	.....	3	6.7	30	0.4	.....	.....	.....	.....	.....	.....	95.3	9.2
26	Feb. 12	24:40	3,320	2,650	32	.....	2	6.9	35	0.4	.....	.....	.....	.....	.....	.....	75.1	7.5
27	Mar. 17	4:45	3,210	3,250	35	7.5	3	6.9	35	0.3	.....	.....	66.4	0.090	572	27.6	70.4	7.1
28	Apr. 15	21:27	4,270	5,180	.....	.....	2	6.9	30	3	.....	.....	.....	.....	.....	.....	113	10.6
29	May 27	9:16	2,440	3,630	55	.....	2	6.9	30	0.9	.....	.....	.....	.....	.....	.....	65.0	6.6
30	June 16	9:22	2,340	2,580	59	6.0	2	6.9	30	0	.....	.....	54.8	0.075	348	24.4	61.8	6.4
31	July 16	22:40	3,860	3,180	67	.....	2	7.1	30	0	.....	.....	.....	.....	.....	.....	71.6	7.5
32	Aug. 18	21:35	2,250	2,170	69	.....	3	6.8	25	0	.....	.....	.....	.....	.....	.....	64.0	6.8
33	Mar. 18/59	19:29	3,530	3,010	32	5.9	2.5	6.9	25	1	.....	.....	67.6	0.092	643	17.6	85.7	8.7
34	Apr	No sample taken		10,200														
35	May	No sample taken		9,460														
36	June 17	7:15	3,420	3,090	66	.....	2.5	6.8	30	1	.....	.....	59.6	0.081	548	19.2	73.4	7.6
37	July 16	8:13	3,110	2,670	71	7.7	2	7.0	25	2	.....	.....	62.0	0.084	517	25.2	73.8	7.5

† Analysis submitted by Alchem Ltd., Burlington, Ont.

TABLE II -- (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Za)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near RUTTER																									
3.4	.....	Trace	0.00	0.00	Trace	0.00	2.1	0.8	0.1	0.0	15.8	16.8	3.3	0.0	0.5	1.8	.....	.....	18.4	31.4	43.5	12	−2.5	12	1
at HIGH FALLS – Drainage area, 2,560 square miles; 2,940 including Lake Oaaping Area																									
1.3	.....	0.09	0.00	0.00	.....	.....	0.9	0.4	0.0	0.0	12.6	9.9	0.8	0.0	0.2	3.6	.....	.....	8.8	19.1	29.8	9.0	−2.6	12	2
1.4	.....	.....	.....	.....	.....	.....	1.3	0.5	0.05	0.0	12.7	10.4	0.7	.....	0.2	3.8	.....	.....	8.8	19.2	30.0	12	−2.5	12	3
1.5	.....	.....	.....	.....	.....	.....	1.2	0.4	0.05	0.0	11.3	11.2	0.9	.....	0.3	4.0	.....	.....	9.6	18.9	30.2	12	−2.6	12	4
1.4	.....	0.08	0.00	0.00	Trace	0.00	1.1	0.5	0.1	0.0	11.0	11.0	1.0	0.0	0.2	5.2	.....	0.00	10.5	19.5	31.5	10	−2.7	12	5
1.6	.....	.....	.....	.....	.....	.....	1.2	0.4	0.05	0.0	10.5	11.9	0.9	.....	0.6	5.5	.....	.....	11.7	20.3	32.8	11	−2.6	12	6
1.5	.....	.....	.....	.....	.....	.....	1.1	0.4	0.0	0.0	11.7	10.5	0.8	.....	0.3	5.8	.....	.....	10.8	20.4	31.9	10	−2.7	12	7
1.6	.....	0.06	0.00	0.01	0.00	0.00	1.2	0.5	0.1	0.0	14.4	9.8	0.9	0.1	0.3	5.6	.....	.....	10.3	22.1	33.4	10	−2.4	12	8
1.4	.....	.....	.....	.....	0.00	.....	0.9	0.4	0.1	0.0	13.5	8.8	0.4	.....	0.4	5.2	.....	0.00	9.1	20.2	30.0	8.6	−2.3	12	9
1.5	.....	.....	.....	.....	.....	.....	1.0	0.4	0.1	0.0	10.8	9.4	0.6	.....	0.4	4.4	.....	.....	9.7	18.6	28.0	10	−2.6	12	10
1.2	.....	0.02	0.00	0.00	0.00	0.00	0.9	0.4	0.2	0.0	12.4	10.6	0.7	0.0	0.2	4.8	.....	.....	8.7	18.9	30.4	9.2	−2.6	12	11
1.5	.....	.....	.....	.....	.....	.....	1.0	0.4	0.3	0.0	12.2	10.0	0.1	.....	0.2	4.2	.....	.....	9.1	19.1	28.6	10	−2.7	12	12
1.6	.....	.....	.....	.....	.....	.....	1.0	0.4	0.1	0.0	11.3	10.2	0.7	.....	0.4	3.5	.....	0.05	10.0	19.3	28.5	9.9	−2.8	12	13
below TURBINE																									
1.4	.....	0.00	0.00	0.00	0.00	0.00	1.2	0.4	0.1	0.0 (0)	13.0 (13.1)	9.0	0.6	0.0	0.6	3.8	.....	...	8.8	19.5	29.0	12	−2.5	12	14
near MeKERROW																									
1.4	.....	0.04	0.00	0.00	Trace	0.00	1.0	0.4	0.15	0.0	8.9	11.1	0.7	0.0	0.8	.....	.....	...	10.5	17.2 (16.9)	24.6	11	−3.2	13	15
1.6	0.18	0.02	0.01	0.00	0.00	0.00	1.2	0.5	0.1	0.0	13.3	10.6	0.9	0.1	0.3	6.2	0.02		8.7	19.6 (19.6)	35.0	11	−3.0	13	16
at ESPANOLA – Drainage area, 4,660 square miles																									
14	0.6	.....	.....	0.00	.....	.....	.....	.....	0.0	0.0	14.6	22	0	.....	.....	5.2	.....	.....	22	34	.....	.....	.....	.....	17
10	Trace	.....	.....	0.00	.....	.....	.....	.....	0.1	0.0	12.2	22	4.9	.....	.....	4.2	.....	.....	20	30	.....	.....	.....	.....	18
4.4	0.3	.....	.....	0.00	.....	.....	.....	.....	0.4	0.0	24.4	29.7	4.9	.....	.....	5.5	.....	.....	34	54	.....	.....	−2.5	12	19
2.9	0.4	.....	.....	0.00	.....	.....	.....	.....	0.4	0.0	19.5	14.9	3.6	.....	.....	3.6	.....	.....	16	32	.....	.....	−1.6	11	20
1.9	.....	0.17	Trace	0.00	.....	.....	1.6	0.6	.....	0.0	14.5	15.9	1.6	0.0	0.0	3.9	.....	.....	14.1	26.0	40.1	11	−2.5	12	21
1.7	.....	.....	.....	.....	.....	.....	1.5	0.5	0.05	0.0	14.1	13.6	1.3	.....	0.1	3.8	.....	.....	12.4	24.0	36.3	12	−2.5	12	22
3.4	.....	.....	.....	.....	.....	.....	4.2	1.2	0.05	0.0	20.7	32.4	3.3	.....	0.6	4.2	.....	.....	26.7	43.7	71.5	17	−1.7	11	23
2.9	.....	0.05	Trace	0.07	Trace	0.05	3.1	0.9	0.05	0.0	10.0	28.6	2.9	0.0	1.0	4.7	.....	.....	27.7	35.9	58.8	15	−2.8	12	24
2.7	.....	.....	.....	.....	.....	.....	2.6	0.9	0.05	0.0	9.1	27.1	2.3	.....	0.9	5.6	.....	0.05	26.6	34.1	55.9	14	−1.9	12	25
2.1	.....	.....	.....	.....	.....	.....	2.0	0.6	0.10	0.0	11.0	20.5	1.5	.....	0.6	6.6	.....	.....	18.4	27.4	46.9	13	−2.6	12	26
2.0	.....	0.06	0.00	0.00	Trace	0.00	1.7	0.6	0.15	0.0	13.0	15.8	1.3	0.0	0.8	5.8	.....	.....	15.2	25.9	41.7	12	−2.6	12	27
2.9	.....	.....	.....	.....	.....	.....	3.9	1.1	1.0	0.0	11.1	31.6	2.8	.....	3.0	5.6	.....	.....	29.3	38.4	67.0	18	−2.4	12	28
2.0	.....	.....	.....	.....	.....	.....	1.5	0.6	.....	0.0	11.8	14.5	1.1	.....	0.4	4.5	.....	.....	15.0	24.7	37.0	11	−2.6	12	29
1.8	.....	0.04	0.00	0.00	0.00	0.00	1.6	0.5	0.1	0.0	11.8	15.3	0.9	0.0	0.3	5.0	.....	0.00	13.7	23.4	37.7	13	−2.7	12	30
2.1	.....	.....	.....	.....	.....	.....	1.9	0.5	0.25	.....	14.5	16.6	1.3	.....	0.5	3.8	.....	.....	15.5	27.4	41.3	13	−2.3	12	31
1.9	.....	.....	.....	.....	.....	.....	1.6	0.6	0.1	0.0	14.0	12.3	1.4	.....	0.4	3.5	.....	.....	13.3	24.8	35.4	12	−2.7	12	32
3.0	.....	0.07	0.01	0.00	0.00	0.00	2.2	0.8	0.05	0.0	14.0	22.8	2.3	0.0	1.0	5.8	0.0	.....	22.5	34.0	53.6	12	−2.5	12	33 34 35
2.3	0.19	0.06	0.00	0.00	Trace	0.05	2.0	0.6	0.1	0.0	11.5	19.1	1.8	0.0	0.4	3.7	0.03	.....	19.0	28.4	43.3	13	−2.7	12	36
2.1	0.13	0.09	0.00	0.05	Trace	0.00	1.9	0.7	0.1	0.0	14.4	17.7	1.4	0.0	0.2	3.5	.....	.....	15.6	27.4	42.2	13	−2.3	12	37

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TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 44 – SPANISH RIVER *
1	Sept. 30/59	187:215	2,740†	2,450†	62	.....	5	7.0	25	3	.....	.....	.....	.....	.....	.....	102	10.5
																		STATION NO. 45 – VERMILION RIVER
2	Aug. 15/58	85:200	450†	342†	70	2.4	2	7.3 (7.3)	10 (35)	1	.....	.....	66.8	0.091	81.1	23.2	94.3	10.1
																		STATION NO. 46 – VERMILION RIVER
3	July 5/53*	.....	.....	.....	.....	.....	3.5	7.0	.....	2	.....	.....	55	0.075	.....	.....	.....	8.0
4	Aug. 1/58	86:179	715†	342†	75	4.5	2	7.2 (7.4)	20 (35)	0.8	.....	.....	77.2	0.105	149	35.2	88.3	9.9
																		STATION NO. 47 – VERMILION RIVER
5	Aug. 3/58	85:183	300†	342†	74	4.2	1	7.3 (6.8)	20 (40)	0.9	.....	.....	114	0.155	92.0	31.2	170	15.2
																		STATION NO. 48 – JOHN CREEK
6	Aug. 15/58	85:200	.....	.....	71	2.5	0.8	7.5 (6.3)	10 (30)	0.8	.....	.....	75.2	0.102	.....	19.2	85.5	8.0
																		STATION NO. 49 – ROBERTS RIVER
7	Aug. 2/58	85:178	.....	.....	81	4.5	2	7.1 (7.3)	20 (35)	0	.....	.....	60.4	0.082	.....	30.0	61.6	6.7
																		STATION NO. 50 – ONAPING RIVER*
8	Aug. 20/58	84:98	.....	.....	64	3.4	0.7	7.5 (6.9)	15 (35)	0	.....	.....	47.2	0.064	.....	17.2	63.3	9.7
																		STATION NO. 51 – MOOSE LAKE*
9	Aug. 20/58	85:196	.....	.....	71	2.1	1.5	6.1 (5.7)	5 (15)	0	.....	.....	69.6	0.095	.....	20.8	85.2	8.1
																		STATION NO. 52 – GILL LAKE*
10	Aug. 20/58	80:199	.....	.....	69	3.7	2	7.5 (6.6)	15 (30)	0	.....	.....	132	0.180	.....	32.0	188	12.4
																		STATION NO. 53 – WINDY LAKE
11	Aug. 20/58	84:196	.....	.....	.....	2.2	1	6.9 (7.2)	5 (15)	0	.....	.....	40.0	0.054	.....	17.6	44.5	3.6

* At tap in C.P.R. system
† Discharge records at Espanola - *see* Station No. 43.

* 10 miles below Levack, Ont.
† Discharge records about 40 miles upstream at Lorne Falls; Lat. 46° 18' 55", Long. 81° 31' 18" – Drainage area, 1,570 square miles (excluding Onaping Lake)

*Analyses by Alchem Ltd., Burlington, Ont.
† Discharge records about 20 miles upstream at Lorne Falls - *see* Station No. 45

† Discharge records about 10 miles upstream at Lorne Falls – *see* Station No. 45

* From bridge near Levack

* Source of water for Fecunis Mine Townsite

* At Onaping Mine

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near SPANISH																									
2.6	0.50	0.11	0.01	0.00	0.40	0.30	4.8	0.8	0.3	0.0	31.2	16.5	5.3	0.0	0.2	4.2	0.0	...	10.8	36.4	61.0	21	−1.9	11	1
near LARCHWOOD*																									
3.1	.....	0.02	Trace	0.00	0.00	0.00	1.9	0.8	0.1	0.0 (0)	25.4 (25)	18.1	1.3	0.0	0.3	3.9	.....	...	17.1 (14)	37.9 (34)	52.0	9.6	−1.8	11	2
near CREIGHTON (Mines)																									
2.4	0.5	.....	.....	0.00	.....	.....	.....	.....	0.1	.....	24.4	24.3	2.4	....	.....	4.0	.....	...	10	30	.....	.....	−1.8	11	3
3.0	.....	Trace	0.00	0.00	0.00	0.00	1.5	0.7	0.1	0.0 (0)	21.6 (25)	18.6	0.8	0.0	0.6	4.4	.....	...	19.3 (20)	37.0 (40)	50.1	7.9	−1.9	11	4
below KUSK LAKE																									
4.4	.....	Trace	0.00	0.00	Trace	0.05	7.5	1.6	0.1	0.0	13.7	49.6	4.3	0.0	4.0	5.1	.....	...	44.8	56.0 (55.6)	98.5	22	−1.8	11	5
below CARTIER																									
2.2	.....	0.09	Trace	0.00	0.00	0.00	3.1	0.8	0.1	0.0 (0)	17.1 (18)	16.8	2.5	0.0	1.5	8.1	.....	...	15.0	29.0	51.5	18	−1.8	11	6
near MILNET																									
2.0	.....	0.00	0.00	0.00	0.00	0.00	1.4	0.5	0.1	0.0	15.1	12.8	0.1	0.0	0.6	4.5	.....	...	12.5	24.9 (26.8)	36.0	11	−2.3	12	7
near LEVACK																									
0.0	.....	0.05	0.00	0.00	0.00	0.05	1.5	0.5	0.05	0.0 (0)	13.7 (14)	13.9	0.6	0.0	0.8	6.0	.....	...	13.0	24.2	39.8	11	−1.8	12	8
near LEVACK																									
1.5	.....	Trace	0.00	0.25	0.60	0.40	2.0	1.5	0.1	0.0 (0)	1.1 (1.2)	29.8	1.3	0.0	0.3	2.0	.....	...	25.5 (23)	26.4 (24)	47.9	13	−4.4	15	9
near LEVACK																									
2.2	.....	0.01	0.00	0.00	0.00	0.05	15.5	7.3	0.05	0.0 (0)	36.9 (29.9)	22.2	19.2	0.0	1.0	4.5	.....	...	9.7 (9.7)	40.0 (34.2)	103	41	−1.4	10	10
near ONAPING																									
1.2	.....	0.02	0.00	0.02	0.00	0.20	1.1	0.4	0.05	0.0 (0)	3.4 (3.4)	12.5	0.8	0.0	0.3	3.9	.....	...	11.1 (11.1)	13.9 (13.9)	25.8	14	−3.4	14	11

96900—3½

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 54 – WHITSON LAKE
1	Mar. 11/54†						13	4.6		2			82	0.112				
2	Aug. 20/58	84:198			65	1.0		4.4 (4.8)	0 (10)	0			62.8	0.085		12.0	123	8.5
																		STATION NO. 55 – WHITSON RIVER
3	Aug. 18/58	10:197				5.8	3	7.9	35	0			185	0.252		36.4	282	38.5
																		STATION NO. 56 – RAMSAY LAKE
4	Mar. 4/53†							6.5					68	0.092				
5	Apr. 24/54†						3.5	6.6		3			94	0.128				11
6	July 15†						9	7.0		3			92	0.125				12
7	Aug. 18/58	82:197			67	2.1	0.9	7.2 (7.2)	10 (25)	0			87.4	0.119		22.6	151	13.2
																		STATION NO. 57 – LADY MAC DONALD LAKE*
8	Aug. 1/58	86:179			80	0.9		4.1 (4.0)	5 (15)	1			111	0.151		31.6	184	9.5
9	Sept. 30/59†	28:32			64	2.6		4.0	0	0.8			156	0.212		24.4	261	15.5
																		STATION NO. 58 – MEATBIRD LAKE
10	Mar. 5/53†						10	4.7		2.5			121	0.165				
11	Aug. 1/58††	110:113			72			4.0	0	0			384	0.522		44.8	560	31.5
12	Sept. 30/59†††	28:32				2.6		4.1	0	0			331	0.450		28.8	511	31.2
																		STATION NO. 59 – KELLEY LAKE*
13	Mar. 9/53†						12	6.5		5			252	0.343				28.8
14	Apr. 12/55†						28	4.3		2			235	0.320				32.0
15	Jan. 1/56†						4	6.3	0	4	Trace		500	0.680				80.0
16	Apr. 18/56†							3.7	0	3	Trace		335	0.456				36.8
17	May 1†							4.0	10	15	Trace		400	0.544				44.0
18	May 8†							3.9	20	2	Trace		550	0.748				64.0
19	Aug. 1/58††	110:113			77			4.4 (5.8)	15	3			724	0.985		82.0	1,029	86.1

† Analysis by Alchem Ltd., Burlington, Ont.
See also Table IV

† Analyses by Alchem Ltd., Burlington, Ont.
See also Table III

* At dam
† Nickel (Ni) - 4.7 ppm; Chromium (Cr) - 0.0 ppm

† Analysis by Alchem Ltd., Burlington, Ont.
†† Nickel (Ni) - 21 ppm; Chromium (Cr) - Trace
††† Nickel (Ni) - 12 ppm; Chromium (Cr) - 0.0 ppm

* At intake to International Nickel Co. Plant.
† Analyses by Alchem Ltd., Burlington, Ont.
†† Nickel (Ni) - 6 ppm; Chromium (Cr) - Trace

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near FROOD (Mine) at SUDBURY																									
18	0.5	.....	.....	0.2	.....	.....	.....	.....	0.8	0	2.4	39	6.1	.....	.....	5.7	.....	.....	42	44	.....	.....	.....	.....	1
2.6	.....	0.01	0.33	0.13	0.09	0.20	2.1	1.0	0.05	0.0	0.0	37.6	3.0	0.0	0.1	1.2	.....	.....	31.9	31.9	56.9	10	.....	.....	2
at CHELMSFORD																									
11.1	.....	0.02	0.00	0.03	0.00	0.05	3.0	0.8	0.15	0.0	133	30.2	2.8	0.1	0.3	12	.....	.....	32.8	142	165	4.4	+0.1	7.7	3
at SUDBURY																									
14	0.9	.....	.....	0.0	.....	.....	.....	.....	0.0	0	12.2	57	2	.....	.....	3.0	.....	.....	32	42	.....	.....	.....	.....	4
4.3	1.5	.....	.....	0.0	.....	.....	.....	.....	0.0	0	9.8	28.4	3.6	.....	.....	2.3	.....	.....	38	46	.....	.....	-2.8	12	5
3.4	0.5	.....	.....	0.0	.....	.....	.....	.....	0.1	0	12.2	35.2	6.1	.....	.....	1.4	.....	.....	34	44	.....	.....	-2.3	12	6
4.3	.....	Trace	0.00	Trace	0.00	0.00	5.2	1.6	0.05	0.0	9.5	43.1	7.7	0.1	0.3	1.9	.....	.....	42.8	50.6	82.1	18	-2.2	12	7
at COPPER CLIFF																									
3.6	.....	0.00	0.26	1.4	1.3	0.3	1.7	1.7	0.05	0.0	0.0**	64.4	1.5	0.0	1.5	1.6	.....	.....	38.5	38.5	88.8	5.1	.....	.....	8
3.7	0.04	0.04	0.55	3.4	2.4	0.2	3.7	2.2	0.1	0.0	0.0***	93.2	3.1	0.05	0.8	2.4	0.02	.....	53.9	53.9	131	7.9	.....	.....	9
near COPPER CLIFF																									
46	14	.....	.....	0.1	0.02	.....	.....	.....	0.1	0	2.4	123	0	.....	.....	3.6	0.4	.....	84	86	.....	.....	.....	.....	10
25.2	.....	0.09	0.97	0.04	1.0	0.3	12.0	4.5	.....	0.0	0.0*	238	8.6	0.2	1.0	3.7	0.4	.....	182	182	349	9.8	.....	.....	11
16.8	0.02	0.02	0.73	3.9	2.2	0.1	10.2	4.2	.....	0.0	0.0**	211	7.7	0.15	0.8	3.6	0.02	.....	147	147	293	9.7	.....	.....	12
near COPPER CLIFF																									
13.1	16	.....	.....	0.0	0.07	.....	.....	.....	0.6	0	9.8	150	0	.....	.....	6.4	0.4	.....	118	126	.....	.....	-2.3	12	13
9.7	2.8	.....	.....	.....	.....	.....	.....	.....	1	0	9.8	118	12.1	.....	.....	54	.....	.....	112	120	.....	.....	-4.9	14	14
24.3	0.6	.....	.....	0.0	0.3	.....	.....	.....	2.4	0	12.2	304	21.9	.....	.....	11	.....	.....	290	300	.....	.....	-2.2	11	15
23.8	3.0	.....	0.1	0.4	0.4	.....	.....	.....	2.4	0	0**	156	24.2	.....	.....	9.0	.....	.....	190	190	.....	.....	-2.3	11	16
34.0	0.8	.....	Trace	0.3	0.5	.....	.....	.....	2.5	0	0***	203	30.4	.....	.....	8.5	.....	.....	250	250	.....	.....	.....	.....	17
24.3	4.1	.....	Trace	0.5	1.0	.....	.....	.....	4.8	0	0****	257	36.4	.....	.....	13	.....	.....	260	260	.....	.....	.....	.....	18
24.0	0.80	0.08	0.66	0.26	0.60	0.30	60.0	16.4	.....	0.0 (0)	0.0[a] (4.9)	426	36.2	0.5	8.0	10	0.6	.....	314	314	676	26	.....	.....	19

* Mineral acidity - 11.5 ppm as $CaCO_3$
** Mineral acidity - 5.3 ppm as $CaCO_3$

** Mineral acidity as $CaCO_3$ - 17.9 ppm
*** Mineral Acidity as $CaCO_3$ - 4.9 ppm

** Mineral acidity as $CaCO_3$ - 6 ppm
*** Mineral acidity as $CaCO_3$ - 20 ppm
**** Mineral acidity as $CaCO_3$ - 44 ppm
[a] Mineral acidity as $CaCO_3$ - 22 ppm

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 60 – KELLEY LAKE																		
1	Sept. 30/59	28:32	.....	.....	65	4.5	24	5.3	5	2	.....	.....	672	0.914	.....	50.4	1,040	86.8
STATION NO. 61 – SIMON LAKE																		
2	Aug. 15/58	85:200	.....	.....	73	3.7	.....	4.6 (5.7)	10 (25)	1	.....	.....	678	0.922	.....	73.6	992	70.5
STATION NO. 62 – CLEAR LAKE																		
3	Aug. 2/58	85:134	.....	.....	.....	0.8	.....	4.4	0	0.8	.....	.....	52.4	0.071	.....	11.2	91.5	6.3
STATION NO. 63 – LONG LAKE																		
4	Aug. 20/58	84:198	.....	.....	.....	2.6	2	6.8 (7.2)	5 (25)	0	.....	.....	68.4	0.093	.....	20.8	108	10.2
STATION NO. 64 – LAKE PANACHE																		
5	Aug. 3/58	84:183	.....	.....	74	3.1	1	7.0 (6.8)	10 (20)	1	.....	.....	59.2	0.081	.....	36.4	74.9	7.0
STATION NO. 65 – LILY LAKE *																		
6	Sept. 30/59	188:215	.....	.....	62	.....	4	6.7	90	4	.....	.....	.....	.....	.....	.....	43.2	3.1
STATION NO. 66 – AUX SABLES RIVER																		
7	Aug. 5/58	84:185	224	173	76	2.8	0.9	7.2 (7.0)	15 (35)	10	.....	.....	36.0	0.049	21.7	18.0	40.4	3.8
STATION NO. 67 – SILVER LAKE*																		
8	Aug. 3/58	85:186	.....	.....	80	3.3	2	8.0 (8.4)	5	5	11	4.4	183	0.249	.....	36.4	296	32.4
STATION NO. 68 – ICE LAKE *																		
9	Aug. 4/58	84:185	.....	.....	75	5.3	2	8.1 (8.5)	10 (15)	0	.....	.....	206	0.280	.....	4.4	335	37.6
STATION NO. 69 – KAGAWONG LAKE*																		
10	Aug. 4/58	84:185	.....	.....	75	3.3	1	8.2 (8.5)	5 (8)	0	.....	.....	171	0.232	.....	37.2	285	34.1
STATION NO. 70 – KAGAWONG RIVER																		
		Water Level																
11	July 24/57	42:83	.....	.....	69	3.2	3	7.8 (7.2)	3	0.3	.....	.....	168	0.228	.....	34.8	283	33.0
12	Aug.	No sample taken																
13	Sept.	No sample taken																

* At tap of C.P.Ry. system in village.

* Sampled from shore.

* Sampled from shore

* Sampled from a wharf

See also Table III

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at outlet near COPPER CLIFF																									
25.2	0.03	0.03	0.74	0.65	1.85	0.10	69.0	14.8	.....	0.0	3.0	432	37.9	0.5	6.0	11	0.04	....	318	320	692	30	-3.8	13	1
Nickel (Ni) - 4.7 ppm – Chromium (Cr) - 0 ppm																									
near NAUGHTON																									
23.6	.....	0.12	0.65	0.15	0.07	0.30	72.0	13.0	.....	0.0† (0)	0.0† (2.4)	389	43.8	0.4	6.0	8.6	.....	.....	273	273	628	34	.....	.....	2
† Mineral acidity ($CaCO_3$) – 12.4 ppm																									
near SUDBURY																									
2.0	.....	0.01	0.46	0.18	0.97	0.10	1.0	0.7	0.05	0.0†	0.0†	29.2	0.3	0.0	0.1	3.2	.....	.....	23.9	23.9	44.4	7.1	.....	.....	3
† Mineral acidity ($CaCO_3$) – 5.6 ppm																									
near SUDBURY																									
3.3	.....	Trace	0.00	0.00	Trace	0.05	2.2	0.9	0.05	0.0	8.2	32.1	2.5	0.0	1.0	3.4	.....	.....	32.3	39.0 (33.2)	59.7	11	-2.8	12	4
at LAKE PANACHE																									
2.4	.....	0.00	0.01	0.01	0.00	0.10	1.4	0.7	0.05	0.0	6.1	22.4	0.7	0.0	0.6	1.6	.....	.....	22.3	27.3 (32.1)	39.9	9.7	-2.7	12	5
near WEBBWOOD																									
1.0	3.50	1.32	Trace	0.03	0.00	0.40	1.2	0.8	0.3	0.0	13.9	7.3	0.9	0.0	0.8	4.0	0.0	.....	0.5	11.9	27.2	14	-3.0	13	6
above MASSEY – Drainage area 524 square miles																									
1.3	.....	0.02	0.00	0.00	0.00	0.05	1.3	0.4	0.1	0.0	9.5	6.9	0.5	0.0	0.6	6.3	.....	.....	7.0	14.8 (17.1)	24.9	16	-2.6	12	7
near SHESHEGWANING, MANITOULIN ISLAND																									
19.3	0.03	Trace	0.00	0.06	Trace	0.05	1.3	0.6	0.1	0.0	175	15.7	1.4	0.0	1.5	7.2	.....	.....	16.8	160 (167)	166	1.7	+0.3	7.4	8
near GORE BAY, MANITOULIN ISLAND																									
20.2	.....	Trace	0.00	0.04	0.00	0.00	1.7	0.7	0.1	0.0 (0)	166 (153)	36.8	3.3	0.0	2.0	4.4	.....	.....	40.6	177.	189	2.0	+0.4	7.3	9
oear KAGAWONG, MANITOULIN ISLAND																									
15.8	.....	0.00	0.00	0.03	0.00	0.00	1.1	0.8	0.1	0.0 (8)	146 (135)	26.9	2.6	0.0	1.0	2.4	.....	.....	30.2 (37)	150 (154)	157	1.6	+0.4	7.4	10
at KAGAWONG, MANITOULIN ISLAND																									
15.5	.....	0.02	0.00	0.09	.....	.....	0.9	0.7	.....	0.0 (0)	145 (149)	26.9	2.8	0.2	0.6	1.6	.....	.....	12.7 (23.4)	146 (145)	153	1.3	0	7.8	11 12 13

TABLE II – (continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance K × 10⁶ at 25°C.	Calcium (Ca)
																		STATION NO. 70 – KAGAWONG RIVER
1	Oct. 7/57	4:15	Water Level 195.75	.....	57	3.1	2	8.1	10	0.8	.....	.....	184	0.250	.....	33.6	283	33.7
2	Nov. 7	6:15	195.55	.....	44	.....	1	8.2	5	0	.....	.....	.....	.....	.....	.....	288	34.9
3	Dec.	No sample taken																
4	Jan. 9/58	17:18	197.15	.....	35	4.3	2	8.2	15	0.3	.....	.....	188	0.256	.....	47.8	294	35.8
5	Feb. 7	17:45	197.10	.....	33	.....	1	8.3	10	0	.....	.....	.....	.....	.....	.....	300	36.9
6	Mar. 7	10:40	196.85	.....	33	.....	1	8.3	10	0.4	.....	.....	.....	.....	.....	.....	304	37.1
7	Apr. 7	11:35	196.5	.....	34	6.3	1	8.3	10	0.4	.....	.....	168	0.228	.....	25.6	285	35.2
8	May 7	21:29	197.18	.....	47	.....	1	8.3	10	0.4	.....	.....	.....	.....	.....	.....	277	33.8
9	June 6	14:26	196.5	.....	55	.....	1.5	8.2	5	0	.....	.....	.....	.....	.....	.....	294	36.0
10	July 7	21:49	196.35	.....	63	3.2	2	8.0	5	0.8	.....	.....	175	0.238	.....	31.6	280	36.0
11	Aug.	No sample taken																
12	Sept. 8	16:128	195.0	.....	64	.....	2	8.0	10	0.9	.....	.....	.....	.....	.....	.....	273	31.7
13	Sept.29	18:117	195.3	.....	56	.....	2	8.1	5	0	.....	.....	.....	.....	.....	.....	277	31.6
																		STATION NO. 71 – MINDEMOYA LAKE*
14	Aug. 4/58	84:185	.....	.....	79	2.9	1.5	8.2 (8.5)	5 (10)	0.9	.....	.....	220	0.299	.....	67.6	335	38.2
																		STATION NO. 72 – MINDEMOYA LAKE
15	July 23/57	43:84	.....	.....	72	3.0	4.	7.7	0	4	5.0	4.8	207	0.282	.....	32.8	323	37.5
																		STATION NO. 73 – MANITOU LAKE
16	July 23/57	.....	.....	.....	71	2.8	2	8.1 (8.3)	3	0.3	.....	.....	164	0.223	.....	37.3	269	32.0
17	Aug. 4/58	85:185	.....	.....	73	1.7	1	8.2 (8.5)	5 (5)	0	.....	.....	162	0.220	.....	38.4	266	32.1
																		STATION NO. 74 – DUNLOP LAKE
18	Sept.24/59	186:197	.....	.....	70	.....	3	6.5 (6.7)	0	0	.....	.....	.....	.....	.....	.....	32.9	3.9
																		STATION NO. 75 – CREEK
19	Sept.29/59	183:203	.....	.....	65	.....	8.5	5.6	10	4	.....	.....	.....	.....	.....	.....	1,150	178
																		STATION NO. 76 – QUIRKE LAKE*
20	Sept.25/59	185:196	.....	.....	70	.....	3	6.6 (6.4)	0	0.4	.....	.....	.....	.....	.....	.....	242	28.9
																		STATION NO. 77 – QUIRKE LAKE*
21	Sept.29/59	183:203	.....	.....	68	.....	3	6.4	5	2	.....	.....	.....	.....	.....	.....	281	33.9
																		STATION NO. 78 – PECORS LAKE
22	June 13/56	7:14	.....	.....	.....	.....	.....	7.2	.....	.....	.....	.....	.....	.....	.....	.....	49.7	6.7

† Collector's report of river level in feet.

* Sampled from shore

* From plant tap
See also Table III

* From plant tap

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at KAGAWONG, MANITOULIN ISLAND (concluded)																									
15.6	.....	0.00	0.00	0.04	.....	.....	0.9	0.8	.....	0.0	147	27.2	3.4	0.0	0.3	3.0	.....	.....	27.7	148	157	1.3	+0.2	7.7	1
15.6	.....	.....	.....	.....	.....	.....	1.2	0.9	0.0	0.0	152	27.6	3.6	.....	0.1	3.6	.....	.....	26.9	151	162	1.7	+0.4	7.4	2
																									3
15.8	.....	0.01	0.00	0.02	0.00	0.00	0.9	0.8	0.0	0.0	152	27.6	3.3	0.0	0.1	0.8	.....	0.00	29.3	154	160	1.2	+0.4	7.4	4
16.0	.....	.....	.....	.....	.....	.....	1.2	0.7	0.0	0.0	155	28.9	3.3	.....	0.4	2.1	.....	.....	30.7	158	166	1.6	+0.5	7.3	5
16.5	.....	.....	.....	.....	.....	.....	1.2	0.8	0.1	0.0	158	29.1	3.1	.....	0.1	2.5	.....	.....	31.0	160	168	1.6	+0.5	7.3	6
15.3	.....	Trace	0.00	0.11	0.00	0.00	1.0	0.8	.....	0.0	147	25.7	3.5	0.0	0.2	1.8	.....	.....	29.8	151	156	1.4	+0.5	7.3	7
14.8	.....	.....	.....	.....	0.00	.....	0.9	0.7	.....	0.0	144	24.8	2.7	.....	0.4	2.3	.....	0.00	27.0	145	151	1.3	+0.4	7.5	8
15.3	.....	.....	.....	.....	.....	.....	0.9	0.7	.....	0.0	151	23.8	2.9	.....	0.4	1.5	.....	.....	28.7	153	156	1.3	+0.4	7.4	9
15.7	.....	0.00	0.00	0.00	0.00	0.00	1.1	0.7	0.05	0.0	151	25.7	3.4	0.0	0.4	2.7	.....	.....	30.9	154	160	1.5	+0.2	7.6	10
																									11
15.5	.....	.....	.....	.....	.....	.....	0.9	0.7	0.05	0.0	134	27.5	4.4	.....	0.8	3.1	.....	0.00	33.0	143	151	1.3	0.0	8.0	12
16.0	.....	.....	.....	.....	.....	.....	1.0	0.7	.....	0.0	133	29.9	6.6	.....	0.1	3.1	.....	.....	35.2	145	155	1.5	+0.2	7.7	13
near WEST BAY, MANITOULIN ISLAND																									
19.7	.....	0.00	0.00	0.04	0.00	0.00	1.4	0.9	0.1	0.0 (20.2)	163.2 (93)	38.8	3.6	0.0	0.8	3.8	.....	.....	42.4 (63)	176 (176)	188	1.7	+0.4	7.4	14
at outlet, MANITOULIN ISLAND																									
17.3	.....	Trace	0.00	0.04	.....	.....	1.1	0.9	.....	0.0	158	35.7	3.4	0.0	1.0	3.6	.....	.....	35.3	165	178	1.4	–0.1	7.9	15
at outlet, MANITOULIN ISLAND																									
15.0	.....	Trace	0.00	0.07	Trace	0.00	0.9	0.7	0.0	0.0	140	23.3	3.7	0.0	0.4	3.0	.....	.....	24.3	139	148	1.4	+0.3	7.5	16
14.6	.....	0.00	0.00	0.04	0.00	0.05	1.1	0.7	0.1	0.0	137	23.2	3.1	0.0	0.6	3.6	.....	.....	27.5	140 (143)	147	1.7	+0.4	7.4	17
near ELLIOT LAKE																									
0.6	0.04	0.00	0.00	Trace	0.00	0.00	0.8	0.5	0.0	0.0	6.8 (0)	6.8 (6.1)	0.2	0.0	0.1	1.5	0.0	....	6.5	12.1	17.8	12	–2.7	12	18
inflow to QUIRKE LAKE																									
16.3	0.52	0.07	0.80	0.14	0.00	0.05	27.5	29.5	0.2	0.0	2.2	495	28.2	....	72	4.4	0.0	....	505	507	852	9.8	–3.3	12	19
near the STANROCK URANIUM MINE, ELLIOT LAKE																									
3.5	0.13	0.17	0.10†	0.00	Trace	0.05	6.2	3.9	0.0	0.0 (0)	7.1 (6.8)	77.2	7.9	0.0	6.0	3.2	.....	.....	79.7	85.5	141	13	–2.6	12	20
† Total																									
at the CONSOLIDATED DENISON MINE, ELLIOT LAKE																									
3.4	0.25	0.12	0.12†	0.00	Trace	0.00	6.6	4.6	0.2	0.0	4.4	90.7	8.9	0.15	0.6	2.4	0.0	....	94.0	97.6	154	12	–2.9	12	21
† Total																									
near ALGOM-NORDIC MINE, ELLIOT LAKE																									
0.7	.....	.....	.....	.....	.....	.....	1.3	0.4	.....	0.0	16.5	7.8	....	....	.....	.....	.....	.....	6.1	19.6	.....	.....	–2.2	12	22

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 78 – PECORS LAKE																		
1	Aug. 13/56†	.....	.....	.....	.....	.....	4	7.2	5	2	Trace	.....	35	0.048	.....	.....	.....	5.6
2	Oct.	.....	.....	.....	.....	6.5	2	7.1	10	.....	.....	.....	.....	.....	.....	.....	51.9	6.6
3	Sept. 25/59	185:196	.....	.....	70	.....	2.5	6.8 (6.6)	0	1	.....	.....	.....	.....	.....	.....	225	26.6
STATION NO. 79 – SERPENT (KENNEBEC) RIVER*																		
4	Aug. 5/54	11:12	.....	.....	65	.....	2	7.0	10	.....	.....	.....	30.8	0.042	.....	12.4	32.1	3.8
5	Aug. 6/58	85:184	.....	.....	76	3.5	2	6.7 (7.2)	15 (20)	1	.....	.....	38.2	0.052	.....	20.2	44.5	6.4
6	Sept. 29/59	188:216	.....	.....	66	.....	4	6.6	0	0.8	.....	.....	.....	.....	.....	.....	94.6	10.0
STATION NO. 80 – HORNE LAKE																		
7	Sept. 29/59	188:216	.....	.....	64	.....	3	7.3	10	4	.....	.....	.....	.....	.....	.....	242	20.6
STATION NO. 81 – ELLIOT LAKE																		
8	Aug. 14/58	86:193	.....	.....	.....	3.4	1.5	7.0	10 (25)	1	.....	.....	81.2	0.110	.....	22.8	98.7	10.2
9	Sept. 25/59	185:196	.....	.....	67	.....	2	7.0 (6.6)	5	1	.....	.....	.....	.....	.....	.....	142	14.4
STATION NO. 82 – WESTNER LAKE*																		
10	Sept. 25/59	185:196	.....	.....	70	.....	2	7.0 (7.3)	0 (35)	2	.....	.....	.....	.....	.....	.....	267	30.3
STATION NO. 83 – STROUTH LAKE																		
11	Sept. 25/59	185:196	.....	.....	65	.....	1.5	6.3 (6.4)	10 (35)	0.8	.....	.....	.....	.....	.....	.....	30.7	2.5
STATION NO. 84 – DEPOT LAKE*																		
12	Sept. 25/59	187:207	.....	.....	64	.....	3	6.7 (6.4)	5	0.4	.....	.....	.....	.....	.....	.....	202	22.7
STATION NO. 85 – RYAN LAKE																		
13	Sept. 25/59	187:196	.....	.....	63	.....	2	7.0 (6.2)	0	0.8	.....	.....	.....	.....	.....	.....	48.7	5.6
STATION NO. 86 – LAUZON LAKE*																		
14	Aug. 5/54	11:12	Normal†	.....	65	.....	.....	7.1	10	.....	.....	.....	36.2	0.049	.....	14.8	39.4	3.8
15	Mar. 5/55	13:18	Normal	.....	33	4.6	.....	6.8	15	0	.....	.....	38.0	0.052	.....	20.0	45.1	4.5
16	Mar. 20	5:18	Normal	.....	33	.....	.....	6.7	10	0	.....	.....	33.2	0.045	.....	13.6	42.8	4.0
17	Sept. 16/55	5:19	.....	.....	73	.....	.....	6.9	10	0	.....	.....	.....	.....	.....	.....	42.7	5.3

† Analysis by Alchem Ltd., Burlington, Ont.

* Sampled at highway No. 17 bridge.
See also Station No. 170, page 66

See also Table IV

* From Stanleigh Mine plant tap

* Sampled at lake outlet from highway No. 108 bridge
See also Station No. 171, page 66

* At mine tap prior to mining
† Collector's estimate of stream discharge

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near ALGOM-NORDIC MINE - (concluded)																									
1.0	0.1	.....	.....	0.0	.....	.....	.....	.....	0.2	0.0	19.5	5.4	2.4	.....	.....	2.2	.....	.....	2	18	.....	.....	.....	.....	1
1.1	.....	0.02	0.00	0.01	0.00	0.00	0.6	0.3	0.1	0.0	16.1	8.0	0.1	.....	3.2	2.3	.....	.....	7.8	21.0	30.2	5.7	-2.3	12	2
4.4	0.23	0.00	0.10*	0.00	0.00	0.00	5.2	2.6	0.0	0.0 (0)	10.2 (9.2)	75.9	6.0	0.0	1.0	3.0	0.0	.....	75.5	83.9	130	11	-2.2	11	3
* total																									
near CUTLER																									
0.6	.....	0.08	0.00	.....	.....	.....	0.6	0.3	.....	0.0	12.3	6.7	0.5	0.0	0.4	1.4	.....	.....	1.9	12.0	20.5	9.5	-2.7	12	4
0.3	.....	Trace	0.00	0.01	0.00	0.05	0.8	0.3	0.1	0.0 (0)	7.6 (9.9)	10.1	0.3	0.0	0.6	1.7	.....	.....	11.0 (11.7)	17.2 (19.8)	24.3	8.9	-3.0	13	5
2.0	0.07	Trace	0.00	0.00	0.00	0.00	2.6	1.2	0.1	0.0	9.5	27.8	3.8	0.0	0.5	2.8	0.0	.....	25.2	33.0	55.4	14	-2.9	12	6
at ELLIOT LAKE																									
3.7	0.14	0.01	0.10†	0.0	0.00	0.00	17.6	4.8	0.2	0.0	34.3	38.1	28.5	0.0	2.0	6.1	0.0	.....	37.9	66.0	138	35	-1.4	10	7
† Total																									
at ELLIOT LAKE																									
1.6	.....	0.03	0.01	0.01	0.07	0.00	3.6	1.1	0.1	0.0 (0)	9.8 (8.9)	24.0	5.0	0.0	1.5	2.1	.....	.....	24.0	32.0	54.1	20	-2.4	11	8
2.4	0.07	0.00	Trace	Trace	0.09	0.10	6.1	1.9	0.0	0.0 (0)	11.3 (9.8)	34.6	9.4	0.0	0.8	2.5	0.0	.....	36.0	45.3	77.9	22	-2.2	11	9
near ELLIOT LAKE																									
5.8	0.37	0.00	0.10†	0.0	0.00	0.00	7.0	3.8	0.0	0.0	14.1	91.7	8.2	0.0	1.5	4.4	0.0	.....	87.3	98.9	160	13	-1.8	11	10
† total																									
near the STANLEIGH URANIUM MINE, ELLIOT LAKE																									
0.8	0.07	0.00	0.02†	0.0	0.00	0.00	0.8	0.7	0.0	0.0	2.0	7.7	1.0	0.0	0.5	0.9	0.0	.....	7.8	9.4	15.9	14	-4.8	16	11
† total																									
near ELLIOT LAKE																									
4.0	0.05	0.00	0.00	0.0	0.00	0.00	6.0	2.9	0.0	0.0 (0)	9.9 (9.8)	65.0	6.4	0.1	2.5	1.6	0.0	.....	64.5	72.6	126	15	-2.4	12	12
near ALGOM-NORDIC MINE, ELLIOT LAKE																									
1.1	0.10	0.01	0.02†	0.0	0.02	0.00	0.8	0.6	0.3	0.0	11.6	7.1	3.5	0.0	0.0	2.0	0.0	.....	9.1	18.6	26.4	8.3	-2.6	12	13
† total																									
at PRONTO URANIUM MINES, near SPRAGGE																									
1.3	.....	0.08	.....	.....	.....	.....	1.1	0.5	.....	0.0	13.5	8.3	0.7	.....	0.2	1.7	.....	.....	3.7	14.8	25.0	9.5	-2.6	13	14
0.9	.....	0.01	0.00	0.17	0.00	.....	0.8	0.5	.....	0.0	8.4	8.8	1.0	0.15	Trace	1.1	.....	.....	8.0	14.9	22.0	13	-3.1	13	15
1.1	.....	0.01	.....	0.04	0.00	.....	0.8	0.6	.....	0.0	8.3	8.0	1.2	0.05	0.2	2.0	.....	.....	7.7	14.5	22.0	10	-3.3	13	16
0.3	.....	.....	.....	.....	.....	0.00	1.0	0.6	0.0	0.0	9.0	7.5	1.5	.....	0.2	1.7	.....	.....	7.1	14.5	22.5	13	-2.9	13	17

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 86 – LAUZON LAKE*
1	Oct. 9/55	6:13	.....	.....	72	9.4	2	6.7	5	0	.....	.....	50.4	0.069	.....	15.2	65.3	6.7
2	Nov.	.....	.....	.....	.....	.....	19	5.0	5	2	.....	.....	.....	.....	.....	.....	95.2	9.2
3	Sept. 29/59**	183:203	.....	.....	.....	.....	3	6.4	0	0.8	.....	.....	.....	.....	.....	.....	459	38.6
																		STATION NO. 87 – LAUZON LAKE *
4	Aug. 6/58	85:184	.....	.....	76	1.7	1	6.8 (7.5)	5 (15)	0	.....	.....	58.8	0.080	.....	13.2	69.7	6.7
5	Sept. 25/59	187:207	.....	.....	67	.....	2	6.8 (6.5)	0	2	.....	.....	.....	.....	.....	.....	96.7	9.3
																		STATION NO. 88 – MATINENDA LAKE*
6	Aug. 6/58	92:184	.....	.....	73	2.3	0.7	7.1 (6.7)	5	0	.....	.....	44.0	0.060	.....	13.2	35.2	3.5
																		STATION NO. 89 – BLIND RIVER
7	Sept. 25/59	187:207	.....	.....	66	.....	2	7.1 (7.2)	5	1	.....	.....	.....	.....	.....	.....	51.9	5.6
																		STATION NO. 90 – BURYING LAKE*
8	Aug. 8/58	90:187	.....	.....	65	3.6	3	7.7 (7.8)	25 (50)	2	.....	.....	113	0.154	.....	18.8	146	22.8
																		STATION NO. 91 – WENEBEGON RIVER
9	Aug. 8/59	90:187	.....	.....	68	5.9	2	7.7 (7.7)	30 (45)	0.8	.....	.....	80.8	0.110	.....	18.0	98.7	13.8
																		STATION NO. 92 – ROCKY ISLAND LAKE*
			Water Level†															
10	Oct. 10/57	11:18	1,334.7	.....	57	8.4	2	7.3	40	0.9	.....	.....	42.8	0.058	.....	26.4	43.6	6.3
11	Jan. 9/58	21:35	1,336.4	.....	35	8.3	1	7.3	30	0.7	.....	.....	45.2	0.061	.....	18.8	44.0	5.1
12	Apr. 10/58	15:32	1,302.4	.....	38	7.5	3	6.9	35	1	.....	.....	50.4	0.069	.....	21.2	50.5	5.9
13	July 16/58	30:40	1,320.2	.....	67	.....	2	7.1	40	0	.....	.....	.....	.....	.....	.....	45.4	5.0
																		STATION NO. 93 – WENEBEGON (MISSISSAGI) RIVER*
14	Aug. 7/58	91:88	.....	.....	73	6.7	0.6	8.1 (7.9)	25 (55)	0	.....	.....	76.0	0.103	.....	36.4	96.2	13.3
																		STATION NO. 94 – MISSISSAGI RIVER at GRAND FALLS DAM
15	Oct. 8/57	9:14	2,160†	1,730†	58	6.4	1	7.5	25	0.8	.....	.....	52.8	0.072	308	12.8	65.4	8.2
16	Nov. 7	6:15	1,560	1,680	47	.....	2	7.3	35	0.4	.....	.....	.....	.....	.....	.....	57.8	6.9

* At mine tap prior to mining
** At mine mill tap

* Sampled from highway No. 17 bridge

* From wharf

See also Station No. 172, page 66

* Sampled at highway No. 129 bridge

* Sampled at bridge on road to Peshu Lake

* Sampled at outlet dam
† Collector's report of lake level in feet

* Sampled at highway No. 129 bridge.

† Discharge records at the George Rayner plant, Ontario Hydro Electric Power Commission; Lat. 46°26' 05", Long. 83°23' 05". Drainage area 2,700 square miles

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	
at PRONTO URANIUM MINES, near SPRAGGE - (concluded)																									
1.4	.....	0.04	0.00	0.15	0.00	0.00	1.3	0.7	0.0	0.0	5.2	20.1	1.3	0.05	1.2	1.8	.....	.....	18.2	22.5	37.4	10	−0.5	10	
1.9	.....	0.07	.....	0.34	0.01	0.00	1.2	0.9	0.0	0.0	1.2	34.0	1.4	.....	0.8	2.2	.....	.....	29.8	30.8	52.6	7.1	−5.4	16	
18.2	0.31	0.11	0.07†	Trace	0.00	0.00	16.6	4.4	0.0	0.0	5.6	167	26.9	0.1	0.3	2.9	0.0	.....	166	170	278	17	−2.7	12	
† Total																									
near ALGOMA (Mills)																									
1.8	.....	Trace	0.00	0.03	0.00	0.05	1.7	0.7	0.05	0.0	5.7	18.7	1.8	0.0	0.6	1.6	.....	.....	19.4	24.1 (23.5)	36.4	13	−3.0	13	4
2.3	0.08	0.00	0.00	0.00	0.00	0.00	3.3	1.1	0.0	0.0 (0)	7.3 (8.5)	24.9	5.1	0.1	0.3	2.6	0.0	.....	26.3	32.3	52.6	17	−2.8	12	5
at outlet, near BLIND RIVER																									
0.9	.....	Trace	0.00	0.02	0.00	0.00	1.1	0.3	0.1	0.0 (0)	6.1 (8.3)	8.3	0.5	0.0	0.4	4.0	.....	.....	7.4 (7.1)	12.4 (13.9)	22.0	16	−3.0	13	6
at BLIND RIVER																									
1.5	0.14	0.00	0.00	0.00	0.00	0.00	1.4	0.5	0.0	0.0	15.0	8.1	1.1	0.1	0.3	3.0	0.0	.....	7.9	20.2	29.0	13	−2.4	12	7
north of AUBREY FALLS																									
4.2	0.33	0.02	0.00	0.00	0.00	0.05	1.2	0.6	0.1	0.0	83.1	4.9	0.7	0.0	1.0	8.6	.....	.....	1.0	69.2 (64.2)	85.0	3.4	−0.5	8.7	8
near . AUBREY FALLS																									
3.6	.....	0.01	0.00	0.00	0.00	0.00	1.1	0.5	0.2	0.0 (0)	51.6 (50.5)	6.6	0.8	0.0	0.6	5.3	.....	.....	6.9 (10)	49.2 (51.4)	57.7	4.6	−1.0	9.7	9
near AUBREY FALLS																									
1.9	.....	0.02	0.00	0.00	0.00	0.00	0.9	0.5	0.0	0.0	20.6	7.4	0.7	0.0	1.0	3.2	.....	.....	6.6	23.5	32.1	7.5	−2.1	12	10
1.4	.....	0.07	0.00	0.00	0.00	0.00	0.8	0.5	0.1	0.0	14.0	7.9	0.6	0.0	Trace	3.0	.....	0.00	7.0	18.5	26.4	8.2	−2.4	12	11
1.8	.....	0.06	0.00	0.02	0.00	0.00	1.1	0.5	0.1	0.0	16.2	8.0	0.6	.....	0.5	3.8	.....	0.00	8.8	22.1	30.3	9.4	−2.7	12	12
1.6	.....	0.03	0.00	0.00	0.00	0.00	1.1	0.4	0.15	0.0	14.9	7.6	0.6	0.0	0.2	2.6	.....	.....	6.9	19.1	26.4	11	−2.4	12	13
below AUBREY FALLS																									
3.2	.....	0.01	0.00	0.00	0.00	0.00	1.2	0.4	0.1	0.0	48.3	6.8	1.0	0.0	1.0	5.6	.....	.....	6.7	46.3 (49.2)	56.3	5.3	−0.6	9.3	14
near THESSALON																									
2.0	.....	0.05	0.00	0.00	0.00	0.00	0.9	0.5	0.0	0.0	27.1	7.3	0.8	0.0	0.2	3.8	.....	.....	6.5	28.7	37.1	6.2	−1.6	11	
2.0	.....	.....	.....	.....	.....	.....	1.2	0.6	0.05	0.0	23.6	8.0	0.7	....	0.3	3.5	.....	.....	6.0	25.4	34.9	9.0	−1.9	11	

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance K × 10⁶ at 25°C.	Calcium (Ca)
																		STATION NO. 94 – MISSISSAGI RIVER
1	Dec. 10/57	30:38	1,730†	1,580†	34	.....	0.6	7.4	30	0.3	.....	.....	.....	.....	.....	.....	60.6	7.5
2	Jan. 10/58	20:34	2,280	2,390	33	7.6	3	7.2	30	0.3	.....	.....	52.0	0.071	320	17.6	64.6	8.4
3	Feb. 11	16:41	2,960	2,950	34	.....	1	7.4	35	0.4	.....	.....	.....	.....	.....	.....	56.1	6.7
4	Mar. 11	6:44	2,960	2,950	33	.....	1	7.4	40	0.3	.....	.....	.....	.....	.....	.....	56.8	6.5
5	Apr. 8	14:34	2,540	2,600	35	7.2	4	7.2	35	0.4	.....	.....	49.6	0.067	337	21.2	57.1	6.8
6	May 13	17:23	2,970	2,410	50	.....	2	7.2	40	0.4	.....	.....	.....	.....	.....	.....	56.5	7.0
7	June 10	17:30	2,050	1,690	48	.....	1	7.4	30	0	.....	.....	.....	.....	.....	.....	60.4	7.5
8	July 8	20:48	1,600	1,370	64	6.9	1	7.5	30	0.7	.....	.....	54.0	0.073	231	18.8	59.8	7.9
9	Aug. 12	21:41	1,010	672	74	.....	3	7.1	25	0.	.....	.....	.....	.....	.....	.....	69.5	8.5
10	Sept. 9	15:127	711	525	67	.....	2	7.3	20	0.8	.....	.....	.....	.....	.....	.....	70.2	9.0

† Discharge records at the George Rayner plant, Ontario Hydro Electric Power Commission, Lat. 46°26' 05", Long. 83°23' 05". Drainage area 2,700 square miles

																		STATION NO. 95 – MISSISSAGI RIVER*
11	July 25/57	53:82	2,540†	3,890†	69	7.6	2	7.2 (7.1)	35 (65)	1	.....	.....	54.0	0.073	367	18.4	62.3	7.9
12	Aug. 8/58	90:187	1,340	672	69	5.4	0.9	7.7 (7.4)	25 (35)	0.8	.....	.....	62.4	0.085	226	22.4	67.5	8.5

* Sampled at highway No. 129 bridge.
† Discharge records at Rayner Generating Station - *See* Station No. 94

																		STATION NO. 96 – MISSISSAGI RIVER*
13	Aug. 14/58	86:193	1,060†	672	70	6.4	2	7.4 (7.1)	25	10	16	13	68.8	0.094	195	20.4	66.1	8.3
14	Sept. 28/59	190:218	1,600	515	66	.....	4	7.1 (7.9)	25	2	.....	.....	.....	.....	.....	.....	77.8	9.1
15	May 7/62	45:49	9,490	6,530	45	5.6	4	6.7	30	6	11	6.4	44.4	0.060	1,127	23.6	45.1	4.5

† Discharge records at Rayner Generating Station- *see* Station No. 94, also Station No. 173, page 66
* Sampled at bridge on road to Dean Lake.

																		STATION NO. 97 – RAPID RIVER*
16	Aug. 7/58	91:180	.....	.....	73	5.2	1.5	7.6	20	0	.....	.....	77.6	0.106	.....	37.6	84.5	11.4

* Sampled near mouth at highway No. 129 bridge

																		STATION NO. 98 – JOBAMMAGEESHIG LAKE
17	Aug. 8/59	90:187	.....	.....	75	2.3	2	6.7 (7.9)	5 (15)	0	.....	.....	28.4	0.039	.....	10.4	36.1	3.2

																		STATION NO. 99 – LITTLE WHITE RIVER
18	Oct. 9/57	8:13	190	343	57	4.0	1	7.5	20	0.9	.....	.....	56.4	0.077	29.0	12.8	61.2	6.6
19	Nov. 11	2:21	600	960	40	.....	1	7.2	35	2	.....	.....	.....	.....	.....	.....	51.5	5.5
20	Dec. 9	4:21	734	1,010	31	.....	2	7.0	25	0.9	.....	.....	.....	.....	.....	.....	49.2	5.5
21	Jan. 9/58	21:35	992	757	33	5.3	2	7.0	25	0.6	.....	.....	55.2	0.075	147	17.6	49.3	5.5
22	Feb.	No sample taken		362														
23	Mar. 17	17:45	344	389	35	.....	4	6.9	15	2	.....	.....	.....	.....	.....	.....	59.8	6.4
24	Apr. 10	15:40	1,000	1,310	.....	5.0	2	7.0	20	2	.....	.....	46.8	0.064	127	10.0	46.3	5.1
25	May 10	5:18	1,200	1,110	45	.....	1.5	7.1	20	1	.....	.....	.....	.....	.....	.....	45.2	4.8
26	June 9	16:23	273	317	61	.....	2	7.2	20	1	.....	.....	.....	.....	.....	.....	58.4	6.6
27	July 11	27:45	890	590	62	3.8	1	7.3	20	0.8	.....	.....	44.0	0.060	106	14.8	56.6	6.0
28	Aug. 7	91:183	263	218	71	3.4	0.8	7.6 (7.3)	15 (25)	0.8	.....	.....	48.4	0.066	34.4	15.6	59.0	7.1
29	Aug. 11	22:38	222	218	70	.....	5	7.0	15	0	.....	.....	.....	.....	.....	.....	58.8	6.9
30	Sept. 10	14:126	263	193	67	.....	2	7.2	15	0	.....	.....	.....	.....	.....	.....	58.3	6.8

																		STATION NO. 100 – WAKWEKOBI (BIG BASSWOOD) LAKE*
31	Aug. 14/58	85:193	.....	.....	.....	1.2	1	7.0 (7.7)	5 (<5)	0	.....	.....	53.6	0.073	.....	30.8	32.0	3.0

* Sampled from wharf at Melwell Lodge

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at GRAND FALLS DAM near THESSALON - (concluded)																									
2.0	.....	.....	.....	.....	.....	.....	0.9	0.4	0.05	0.0	23.4	8.1	1.4	.....	0.2	4.8	.....	....	7.7	26.9	36.9	6.6	−1.8	11	1
2.2	.....	0.09	0.00	0.00	0.00	0.00	0.9	0.4	0.05	0.0	26.5	8.6	1.0	0.0	0.3	5.8	.....	0.00	8.3	30.0	40.8	6.0	−2.0	11	2
1.8	.....	.....	.....	.....	.....	.....	1.0	0.4	0.05	0.0	19.1	8.7	0.9	.....	0.5	3.9	.....	.....	8.4	24.1	33.4	8.1	−1.9	11	3
1.9	.....	.....	.....	.....	.....	.....	1.2	0.5	0.1	0.0	20.0	8.4	0.8	.....	0.3	4.9	.....	.....	7.6	24.0	34.3	9.5	−2.0	11	4
1.8	.....	0.06	0.00	0.01	0.00	0.00	1.0	0.5	0.1	0.0	20.1	8.1	0.8	0.0	0.2	4.3	.....	.....	7.9	24.4	33.6	7.9	−2.1	11	5
1.8	.....	.....	.....	.....	.....	.....	0.9	0.4	0.1	0.0	21.2	7.1	0.4	.....	0.4	5.1	.....	0.00	7.5	24.9	33.5	7.2	−2.1	11	6
1.9	.....	.....	.....	.....	.....	.....	1.0	0.4	0.05	0.0	22.9	8.9	0.7	.....	0.4	4.7	.....	.....	7.7	26.5	36.8	7.2	−1.6	11	7
1.9	.....	0.02	0.00	0.00	0.00	0.00	1.1	0.4	0.15	0.0	25.1	7.1	1.0	0.0	0.4	5.5	.....	.....	6.9	27.5	37.7	7.8	−1.6	11	8
2.3	.....	.....	.....	.....	.....	.....	1.1	0.5	0.1	0.0	27.9	8.1	1.1	.....	0.3	5.1	.....	.....	7.8	30.7	40.7	7.1	−2.0	11	9
2.2	.....	.....	.....	.....	.....	.....	1.2	0.5	0.1	0.0	29.4	6.7	1.4	.....	1.0	6.2	.....	0.00	7.4	31.5	42.7	7.5	−1.7	11	10
below GRAND FALLS DAM																									
1.8	.....	0.07	Trace	0.0 0	Trace	0.05	0.9	0.6	0.05	0.0 (0)	23.4 (23)	8.2	0.7	0.3	0.5	4.8	.....	.....	7.9 (8.8)	27.1 (27.9)	37.4	6.5	−2.0	11	11
2.3	.....	0.02	0.00	0.00	Trace	0.00	1.3	0.4	0.1	0.0	28.6	6.7	0.6	0.0	0.6	5.2	.....	.....	7.2	30.7 (32.1)	39.7	8.3	−1.4	11	12
near DEAN LAKE																									
2.2	2.3	0.04	0.00	Trace	0.00	0.00	1.1	0.6	0.05	0.0 (0)	28.0 (28.6)	7.7	0.5	0.0	0.6	5.3	.....	.....	6.8	29.8	40.2	7.2	−1.7	11	13
2.3	0.24	0.05	0.01	0.00	0.06	0.05	2.0	1.1	0.5	0.0	29.3	9.3	2.0	0.1	1.0	6.9	0.04	.....	8.2	32.2	52.4	11	−1.9	11	14
1.8	0.33	0.03	0.00	0.00	0.02	0.00	0.7	0.4	.....	0.0	12.6	8.0	0.5	0.1	1.1	4.9	0.30††	.....	8.5	18.8	28.5	7.3	−3.0	13	15
†† Total																									
south of AUBREY FALLS																									
2.8	.....	0.00	0.00	0.00	0.00	0.00	1.3	0.5	0.1	0.0	39.9	6.8	0.6	0.0	0.7	7.3	.....	.....	7.3	40.0	51.0	6.5	−1.2	10	16
near THESSALON																									
1.0	.....	0.00	0.00	0.00	0.00	0.00	1.3	0.3	0.05	0.0	5.2	7.5	0.6	0.0	0.9	1.1	.....	.....	7.8	12.1	18.5	19	−3.5	14	17
near BELLINGHAM, Lat 46° 23' 38", Long 83° 17' 10" - Drainnge aren 780 square miles (revised October 1953)																									
1.7	.....	0.08	0.00	0.01	0.00	0.05	1.1	0.5	0.0	0.0	20.8	9.7	0.8	0.0	0.1	9.4	.....	.....	6.4	23.5	40.3	8.9	−1.8	11	18
1.6	.....	.....	.....	.....	.....	.....	1.6	0.5	.....	0.0	15.1	10.0	1.0	.....	0.1	6.0	.....	.....	7.9	20.3	31.2	14	−2.3	12	19
1.4	.....	.....	.....	.....	.....	.....	1.2	0.4	0.0	0.0	13.4	10.4	0.9	.....	0.3	5.4	.....	.....	8.5	19.5	32.1	11	−2.6	12	20
1.4	.....	0.04	0.00	0.00	0.00	0.00	0.9	0.4	0.05	0.0	13.5	9.8	0.8	0.0	0.1	6.5	.....	0.05	8.4	19.5	32.2	8.8	−2.7	12	21 22
1.6	.....	.....	.....	.....	.....	.....	1.4	0.8	0.1	0.0	19.1	8.7	1.1	.....	0.9	6.9	.....	.....	6.9	22.6	37.3	11	−2.4	12	23
1.2	.....	0.05	0.00	0.00	0.00	0.00	1.0	0.5	0.15	0.0	11.5	8.1	0.6	0.0	0.6	6.0	.....	.....	8.3	17.7	28.7	11	−2.7	12	24
1.3	.....	.....	.....	.....	.....	.....	0.8	0.4	0.1	0.0	11.7	8.7	0.6	.....	0.4	4.4	.....	0.00	7.7	17.3	27.2	8.9	−2.5	12	25
1.8	.....	.....	.....	.....	.....	.....	1.2	0.5	0.1	0.0	20.7	7.9	0.6	.....	0.0	5.9	.....	.....	6.9	23.9	34.7	9.6	−2.1	11	26
1.3	.....	0.02	0.00	0.00	0.00	0.10	1.1	0.4	0.25	0.0	17.7	8.1	0.7	0.0	0.6	5.0	.....	.....	4.4	20.3	32.0	10	−2.1	12	27
1.8	.....	0.03	0.00	0.02	Trace	0.00	1.3	0.4	0.1	0.0	21.8	8.3	0.6	0.0	0.2	5.7	.....	.....	7.2	25.1	36.2	9.9	−1.6	11	28
1.8	.....	.....	.....	.....	.....	.....	1.2	0.5	0.1	0.0	21.6	8.8	0.6	.....	0.4	5.6	.....	.....	6.9	24.6	36.4	9.3	−2.3	12	29
1.7	.....	.....	.....	.....	.....	.....	1.2	0.5	0.05	0.0	20.8	8.0	1.2	.....	0.8	5.5	.....	0.00	6.9	24.0	36.0	9.5	−2.1	11	30
near IRON BRIDGE																									
1.0	.....	0.00	0.00	0.03	0.00	0.00	0.6	0.4	0.1	0.0 (0)	6.5 (7.2)	6.3	0.4	0.0	1.0	0.7	.....	.....	6.3	11.6	16.7	9.6	−3.1	13	31

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 101 – THESSALON RIVER *
1	Aug. 14/58	85:193	.....	.....	68	4.1	1	7.7 (7.3)	20 (40)	4	5.9	2.9	83.2	0.113	.....	27.2	97.2	12.1
	* Sampled from road bridge																	
																		STATION NO. 102 – CASKAWAN RIVER
2	Aug. 13/58	86:194	.....	.....	72	6.3	1	8.3 (7.5)	35 (35)	0	.....	.....	155	0.211	.....	23.6	250	31.9
																		STATION NO. 103 – GARDEN RIVER*
3	Aug. 12/58	87:190	.....	.....	71	2.9	0.9	7.7 (7.3)	15 (25)	0.8	.....	.....	60.8	0.083	.....	14.4	66.8	8.0
	* Sampled from highway No. 17 bridge																	
																		STATION NO. 104 – GOULAIS RIVER
4	Aug. 12/58	87:190	.....	.....	69	3.3	1	7.4 (6.8)	15 (30)	2	.....	.....	51.2	0.070	.....	9.6	55.4	6.7
																		STATION NO. 105 – GOULAIS RIVER*
5	Aug. 11/58	8:191	.....	.....	75	4.9	2	7.3	25	0.8	.....	.....	74.4	0.101	.....	24.8	63.3	8.0
6	May 26/62	23:26	.....	.....	59	6.2	4	6.7	35	2	.....	.....	50.8	0.069	.....	24.4	44.0	4.8
	* Sampled from highway No. 17 bridge																	
																		STATION NO. 106 – HARMONY RIVER*
7	Aug. 11/58	8:191	.....	.....	75	3.4	2	7.4	25	0.8	.....	.....	55.6	0.076	.....	11.2	75.2	9.5
	* Sampled at highway No. 17 bridge.																	
																		STATION NO. 107 – BATCHAWANA RIVER*
8	Aug. 11/58	8:191	.....	.....	74	5.1	3	7.2	35	3	11	8.2	56.4	0.077	.....	13.2	61.6	8.3
	* Sampled from highway No. 17 bridge: due to on-shore wind could be a mixture of lake and river water.																	
																		STATION NO. 108 – PANCAKE RIVER*
9	Aug. 11/58	87:191	.....	.....	71	4.2	1	7.4 (7.2)	20 (40)	4	9.8	6.3	49.2	0.067	.....	12.4	52.8	4.5
	* Sampled from highway No. 17 bridge																	
																		STATION NO. 109 – MONTREAL RIVER
10	Oct. 12/57	11:16	1,140†	1,220†	50	11.9	2	7.3	65	0.3	.....	.....	53.2	0.072	163	39.2	53.5	7.2
11	Nov. 12	13:27	1,240	1,070	45	.....	1	7.4	60	0.3	.....	.....	.....	.....	.....	.....	53.9	7.2
12	Dec. 12	32:36	1,260	1,220	35	.....	0.9	7.6	70	0.8	.....	.....	.....	.....	.....	.....	55.7	7.2
13	Jan. 14/58	16:30	1,390	1,290	34	11.8	2	7.2	70	0.3	.....	.....	55.6	0.076	209	30.8	52.3	6.9
14	Feb. 13	29:39	1,690	1,280	33	.....	1	7.5	70	0.4	.....	.....	.....	.....	.....	.....	54.2	7.0
15	Mar. 12	9:43	1,290	1,250	32	.....	0.7	7.1	60	0.8	.....	.....	.....	.....	.....	.....	45.7	5.6
16	Apr. 11	14:39	1,580	1,030	35	11.9	3	7.1	60	2	.....	.....	.....	.....	.....	.....	61.2	8.5
17	May 14	16:22	1,320	1,200	44	.....	2	7.3	70	0.8	.....	.....	.....	.....	.....	.....	61.2	8.4
18	June 12	13:26	1,140	1,270	51	.....	2	7.2	55	0	.....	.....	.....	.....	.....	.....	58.8	7.9
19	July 12	26:52	1,300	1,080	53	8.1	2	7.2	65	0.6	.....	.....	53.2	0.072	185	23.2	59.8	8.1
20	Aug. 12	27:47	590	1,150	.....	.....	5	6.9	55	0	.....	.....	.....	.....	.....	.....	57.8	7.8
21	Sept. 19	6:123	936	1,080	.....	.....	0.9	7.6	55	0	.....	.....	.....	.....	.....	.....	57.7	7.6

† Discharge records at Algoma Central and Hudson Bay Railway Bridge near Great Lakes Power Company's plant; Drainage area 1,100 square miles.
See also Station No. 174, page 68

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
above THESSALON																									
3.5	0.58	0.02	0.00	0.01	0.00	0.05	1.6	0.7	0.05	0.0 (0)	46.1 (45.4)	8.1	0.6	0.0	0.7	6.5	.....	.....	6.8	44.6	56.6	7.1	−1.0	9.7	1
near MILFORD HAVEN, ST. JOSEPH ISLAND																									
12.4	.....	Trace	0.00	0.02	0.00	0.00	2.4	1.0	0.0	0.0	152	7.5	0.9	0.0	2.0	9.7	.....	.....	5.7	131 (128)	143	3.8	+0.5	7.3	2
at GARDEN RIVER																									
2.3	.....	0.04	0.00	Trace	Trace	0.05	1.3	0.5	0.05	0.0 (0)	28.9 (29.1)	8.3	0.6	0.0	0.6	7.4	.....	.....	5.7 (7.6)	29.4 (30.6)	43.3	8.6	−1.3	10	3
near SEARCHMONT																									
1.7	.....	Trace	0.00	0.00	0.00	0.05	1.1	0.4	0.05	0.0 (0)	21.2 (21.4)	6.1	0.4	0.0	1.0	5.7	.....	.....	6.3 (7.0)	23.7 (24.6)	33.6	9.0	−1.8	11	4
near GOULAIS RIVER																									
1.6	.....	Trace	0.00	0.00	0.00	0.00	1.4	0.6	0.2	0.0	27.7	6.7	0.5	0.0	1.5	6.4	.....	.....	3.8	26.5	40.3	10	−1.9	11	5
1.2	0.17	0.05	0.00	0.00	0.03	0.00	1.1	1.7	0.2	0.0	11.7	7.6	1.3	0.12	1.9	4.9	<0.1	.....	7.0	16.9	29.4	12	−2.0	13	6
near BATCHAWANA																									
1.8	.....	0.01	0.00	0.02	0.00	0.00	2.2	0.4	0.2	0.0	30.2	5.3	3.6	0.0	1.5	6.8	.....	.....	6.3	31.1	46.0	13	−1.7	11	7
near BATCHAWANA																									
1.3	0.06	0.02	0.00	Trace	0.00	0.00	1.2	0.4	0.2	0.0	27.1	6.4	0.5	0.0	0.8	6.1	.....	.....	3.9	26.1	38.3	8.9	−1.9	11	8
near BATCHAWANA																									
2.5	0.13	0.07	0.00	Trace	0.00	0.00	1.2	0.3	0.1	0.0 (0)	18.7 (19.0)	5.6	1.3	0.0	0.8	5.3	.....	.....	6.2 (7.9)	21.5 (23.5)	30.8	11	−2.1	12	9
at MONTREAL FALLS																									
1.5	.....	0.05	0.00	0.00	0.00	0.00	0.6	0.8	0.0	0.0	21.7	6.6	1.0	0.0	0.1	2.9	.....	.....	6.3	24.1	31.5	4.9	−1.9	11	10
1.7	.....	.....	.....	.....	.....	.....	1.1	0.8	0.0	0.0	22.3	6.4	1.0	0.0	0.4	3.0	.....	.....	6.7	25.0	32.6	8.4	−1.8	11	11
1.7	.....	.....	.....	.....	.....	.....	0.8	0.6	0.15	0.0	21.3	6.1	1.0	.....	1.5	3.8	.....	.....	7.5	25.0	33.4	6.2	−1.7	11	12
1.8	.....	0.09	0.00	0.00	0.00	0.00	0.6	0.6	0.1	0.0	20.8	8.0	0.9	0.0	0.2	0.6	.....	0.00	7.5	24.6	30.1	4.8	−2.2	12	13
1.7	.....	.....	.....	.....	.....	.....	1.2	0.5	0.15	0.0	20.1	7.7	1.2	.....	0.8	5.1	.....	.....	8.0	24.5	35.3	9.3	−1.8	11	14
1.4	.....	.....	.....	.....	.....	.....	0.7	0.5	0.1	0.0	14.0	7.6	1.0	.....	0.6	5.2	.....	.....	8.2	19.7	29.4	6.9	−2.8	13	15
2.0	.....	0.17	0.00	0.00	0.00	0.00	0.8	0.5	0.2	0.0	23.9	7.5	0.9	0.25	0.6	5.5	.....	.....	9.8	29.4	38.5	5.4	−2.1	11	16
1.9	.....	.....	.....	.....	.....	.....	0.9	0.5	0.05	0.0	28.1	5.8	0.6	.....	0.6	4.4	.....	.....	5.8	28.8	36.9	6.2	−1.8	11	17
1.9	.....	.....	.....	.....	.....	.....	0.8	0.6	0.1	0.0	25.7	6.2	0.7	.....	0.6	4.8	.....	0.00	6.4	27.5	36.2	5.8	−1.9	11	18
1.8	.....	0.08	0.00	0.00	0.00	0.20	0.8	0.6	0.2	0.0	25.8	6.1	0.9	0.0	0.8	5.6	.....	.....	6.4	27.6	37.7	5.7	−1.9	11	19
1.9	.....	.....	.....	.....	.....	.....	0.9	0.7	0.15	0.0	23.3	6.6	1.3	.....	0.8	4.9	.....	.....	8.2	27.3	36.4	6.5	−2.3	11	20
1.9	.....	.....	.....	.....	.....	.....	1.0	0.6	0.1	0.0	23.4	8.1	0.8	.....	0.5	3.8	.....	0.00	7.6	26.8	35.8	7.3	−1.6	11	21

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TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 110 – MONTREAL RIVER																		
1	Aug. 11/58	87:191	391†	1,150†	65	9.0	1	7.6 (7.1)	50 (70)	0.8	.....	.....	57.6	0.078	60.4	19.2	60.6	8.0
† Records at Algoma Central and Hudson Bay Railway Bridge – *see* Station No. 109																		
STATION NO. 111 – UNEGAM LAKE *																		
2	Aug. 7/58	91:188	.....	.....	77	3.6	0.8	7.3 (7.3)	5 (25)	0	.....	.....	38.0	0.052	.....	29.2	34.4	3.8
* Sampled at highway No. 129 bridge																		
STATION NO. 112 – AGAWA RIVER*																		
3	Aug. 11/58	87:184	.....	.....	70	4.2	1.5	7.2 (7.4)	20 (30)	1	.....	.....	45.2	0.061	.....	16.8	46.5	5.2
* Sampled at highway No. 17 bridge																		
STATION NO. 113 – COLDWATER RIVER*																		
4	May 26/62	19:38	.....	.....	55	4.4	4	6.3	20	0	.....	.....	31.6	0.043	.....	18.4	31.1	2.6
* Sampled from shore at highway No. 17 bridge.																		
STATION NO. 114 – SOUTH BRANCH BALDHEAD RIVER*																		
5	May 26/62	19:38	.....	.....	58	11.1	4	6.6	40	0	.....	.....	40.8	0.056	.....	25.2	35.5	3.4
* Sampled from shore at highway No. 17 bridge.																		
STATION NO. 115 – OLD WOMAN RIVER*																		
6	May 26/62	19:38	.....	.....	56	5.6	6	6.6	30	0	.....	.....	46.8	0.064	.....	27.2	50.2	5.3
* Sampled from shore at highway No. 17 bridge *See* also Station No. 175, page 68																		
STATION NO. 116 – MICHIPICOTEN RIVER																		
7	Oct. 12/57	11:16	2,040	1,850	53	6.0	0.9	7.8	25	0.3	.....	.....	62.8	0.085	343	29.6	84.4	12.4
8	Nov. 9	16:23	2,010	2,110	36	.....	1.5	7.5	25	0.8	.....	.....	.....	.....	.....	.....	65.1	8.8
9	Dec. 14	30:34	1,530	1,720	34	.....	2	7.3	40	0.3	.....	.....	.....	.....	.....	.....	54.5	6.9
10	Jan. 11/58	19:33	1,770	1,870	33	7.7	1	7.7	30	0.3	.....	.....	52.8	0.072	252	16.0	64.4	8.7
11	Feb. 15	27:44	1,670	1,940	33	.....	1	7.7	30	0.4	.....	.....	.....	.....	.....	.....	86.9	12.2
12	Mar. 15	6:47	1,620	1,730	34	.....	1	7.7	25	0.3	.....	.....	.....	.....	.....	.....	89.8	13.1
13	Apr. 12	13:38	2,130	2,580	.....	6.1	2	7.5	25	1	.....	.....	64.8	0.088	371	17.6	85.0	12.4
14	May 10	20:26	2,000	2,000	46	.....	2	7.3	45	0.8	.....	.....	.....	.....	.....	.....	50.8	6.6
15	June 14	26:34	1,620	1,580	58	.....	2	7.3	40	2	.....	.....	.....	.....	.....	.....	57.6	7.4
16	July 14	31:50	1,720	1,610	62	6.1	3	7.2	40	0	.....	.....	52.8	0.072	245	31.2	65.5	8.8
17	Aug. 14	25:43	1,210	1,310	70	.....	4	7.1	25	0	.....	.....	.....	.....	.....	.....	75.2	10.5
18	Sept. 13	12:129	2,000	1,840	58	.....	2	7.6	25	0	.....	.....	.....	.....	.....	.....	83.7	11.8
19	May 26/62*	19:38	1,580	3,670	54	7.0	6	6.8	35	0.4	.....	.....	53.2	0.072	225	27.6	59.9	7.9
* At highway No. 17 bridge sampled from shore r *See* also Station No. 176, page 68																		
STATION NO. 117 – MAGPIE RIVER*																		
20	Oct. 12/57	11:16	482†	570†	49	6.7	1	7.9	30	0.8	.....	.....	80.4	0.109	104	32.4	121	17.9
21	Nov. 9	16:23	706	1,080	35	.....	2	7.6	25	0.9	.....	.....	.....	.....	.....	.....	122	17.4
22	Dec. 14	30:34	606	734	34	.....	2	7.7	35	0.8	.....	.....	.....	.....	.....	.....	109	16.1
23	Jan. 11/58	19:33	650	618	33	7.8	2	7.8	30	0.3	.....	.....	85.6	0.116	149	33.6	113	17.3
24	Feb. 15	27:44	462	465	33	.....	2	7.7	30	15	.....	.....	.....	.....	.....	.....	192	28.1
25	Mar. 15	6:47	364	366	34	.....	1	7.9	25	0.3	.....	.....	.....	.....	.....	.....	132	19.4
26	Apr. 12	13:38	650	1,600	40	5.7	2	7.7	25	0.4	.....	.....	93.2	0.127	163	31.6	119	17.8
* At highway No. 17 bridge, northwest of Wawa. † Discharge records at township road bridge near mouth of river, one half mile north of village of Michipicoten, Lat 47° 56' 10", Long. 84° 50' 00"																		

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at mouth at MONTREAL RIVER																									
1.9	.....	0.02	0.00	0.00	0.00	0.00	0.9	0.7	0.1	0.0 (0)	26.1 (26.2)	5.6	0.4	0.0	1.0	4.3	.....	.....	6.4	27.8	35.6	6.3	−1.6	11	1
north of AUBREY FALLS																									
1.1	.....	Trace	0.00	0.00	0.00	0.10	0.7	0.5	0.05	0.0	12.3	4.4	0.3	0.0	1.5	1.4	.....	.....	5.5	14.0	19.5	9.3	−2.5	12	2
near AGAWA																									
1.5	.....	0.20	0.00	0.00	0.00	0.00	1.2	0.3	0.1	0.0 (0)	16.6 (16.7)	7.2	0.6	0.0	0.6	4.9	.....	.....	5.5	19.1	29.7	12	−2.3	12	3
north of AGAWA																									
1.1	0.05	Trace	0.00	0.00	0.03	0.00	0.7	0.3	.....	0.0	4.9	7.3	0.9	0.06	2.1	4.2	<0.1	.....	7.1	11.1	21.7	12	−4.0	14	4
north of AGAWA																									
1.4	0.09	0.02	0.00	0.00	0.03	0.00	0.6	0.3	.....	0.0	8.0	6.8	1.1	0.12	1.2	3.3	.....	.....	7.6	14.2	22.2	8.2	−3.4	13	5
south of MICHIPICOTEN HARBOUR																									
1.9	0.05	0.02	0.00	0.00	0.05	0.00	0.8	0.5	.....	0.0	13.7	8.5	0.8	0.12	2.5	4.7	<0.1	.....	9.8	21.0	31.9	7.4	−3.0	13	6
at HIGH FALLS, Lat. 47°54', Long. 84°43' – Drainage area 2,070 square miles (Revised October 1951)																									
2.1	.....	Trace	0.00	0.04	0.00	0.00	0.7	0.5	0.0	0.0	40.5	6.8	0.9	0.0	0.2	3.1	.....	.....	6.4	39.6	46.7	3.6	−0.9	9.6	7
2.0	.....	.....	.....	.....	.....	.....	0.8	0.5	0.05	0.0	29.6	6.3	0.8	.....	0.1	4.5	.....	.....	5.9	30.2	38.4	5.2	−1.5	11	8
1.7	.....	.....	.....	.....	.....	.....	0.8	0.4	0.05	0.0	21.8	6.1	0.9	.....	0.2	4.8	.....	.....	6.3	24.2	32.6	6.5	−2.0	11	9
2.0	.....	1.2	0.00	0.00	0.00	0.00	1.1	0.5	0.05	0.0	28.9	8.1	0.7	0.0	0.2	6.0	.....	.....	6.2	29.9	42.7	6.8	−1.5	11	10
2.6	.....	.....	.....	.....	.....	.....	1.0	0.5	0.0	0.0	40.1	8.0	0.9	.....	0.4	4.3	.....	.....	8.2	41.1	49.6	4.9	−1.1	9.9	11
2.2	.....	.....	.....	.....	.....	.....	0.9	0.6	0.1	0.0	41.2	9.1	0.6	.....	0.4	4.3	.....	.....	7.9	41.7	51.6	4.4	−1.1	9.9	12
2.5	.....	0.04	0.00	0.00	0.00	0.00	0.9	0.5	0.1	0.0	40.0	8.1	0.6	0.0	0.2	5.1	.....	.....	8.4	41.2	50.0	4.5	−1.4	10	13
1.5	.....	.....	.....	.....	.....	.....	0.8	0.5	0.1	0.0	20.4	5.5	0.4	.....	0.3	4.7	.....	0.00	5.9	22.6	30.3	7.0	−2.0	11	14
1.8	.....	.....	.....	.....	.....	.....	1.0	0.5	0.1	0.0	24.5	7.1	0.3	.....	0.3	4.3	.....	.....	5.8	25.9	34.8	7.6	−1.9	11	15
1.7	.....	0.01	0.00	0.00	0.00	0.00	0.8	0.5	0.4	0.0	28.5	6.3	0.8	0.0	1.0	4.9	.....	.....	5.5	28.9	38.9	5.6	−1.8	11	16
2.2	.....	.....	.....	.....	.....	.....	0.9	0.5	0.1	0.0	33.6	6.1	1.2	.....	0.4	3.4	.....	.....	7.6	35.2	40.8	5.2	−1.8	11	17
2.6	.....	.....	.....	.....	.....	.....	1.1	0.6	0.0	0.0	38.8	7.2	1.0	.....	0.5	4.5	.....	0.00	8.3	40.1	48.4	5.5	−1.2	10	18
1.9	0.08	0.02	0.00	0.00	0.02	0.00	0.7	0.5	.....	0.0	23.4	7.5	0.9	0.12	2.0	3.9	<0.1	.....	8.3	27.5	37.0	5.1	−2.3	11	19
near MICHIPICOTEN HARBOUR																									
3.3	.....	Trace	0.00	0.02	0.00	0.00	0.8	0.7	0.0	0.0	56.3	12.6	0.7	0.0	0.8	4.0	.....	.....	12.0	58.2	68.6	2.9	−0.5	8.9	20
3.8	.....	.....	.....	.....	.....	.....	0.9	0.6	0.05	0.0	45.7	21.1	0.8	.....	0.4	3.8	.....	.....	21.5	59.0	71.5	3.2	+1.0	9.6	21
3.0	.....	.....	.....	.....	.....	.....	0.8	0.5	0.05	0.0	48.9	11.8	0.8	.....	0.3	4.2	.....	.....	12.4	52.5	61.6	3.2	−0.9	9.5	22
3.0	.....	0.02	0.00	0.00	0.00	0.00	1.1	0.6	0.05	0.0	53.9	12.6	0.8	0.0	0.2	7.0	.....	0.00	11.3	55.5	69.2	4.0	−0.9	9.6	23
4.0	.....	.....	.....	.....	.....	.....	1.7	1.1	0.05	0.0	60.6	13.8	18.5	.....	1.4	5.4	.....	.....	36.9	86.6	104	4.0	−0.6	8.9	24
3.7	.....	.....	.....	.....	.....	.....	1.1	0.7	0.05	0.0	59.9	13.9	0.6	.....	0.7	5.7	.....	.....	14.5	63.6	75.3	3.6	−0.5	8.9	25
3.1	.....	0.04	0.00	0.01	0.00	0.00	0.9	0.7	0.1	0.0	53.4	14.8	0.7	0.05	0.6	5.2	.....	.....	13.4	57.2	70.2	3.3	−0.9	9.5	26

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TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 117 – MAGPIE RIVER*
1	May 15/58	15:21	1,210	1,480	45	.....	2	7.6	40	0.8	.....	.....	.....	.....	.....	.....	87.7	13.0
2	June 14	26:34	1,360	1,300	58	.....	2	7.5	40	0.9	.....	.....	.....	.....	.....	.....	96.5	13.9
3	July 14	31:50	1,330	1,180	66	6.3	2	7.5	35	0	.....	.....	74.4	0.101	266	30.0	100	14.6
4	Aug. 13	26:45	520	530	70	.....	2	7.6	25	0	.....	.....	.....	.....	.....	.....	117	17.2
5	Sept. 13	12:129	784	786	57	.....	1	7.9	25	0	.....	.....	.....	.....	.....	.....	118	17.4
6	May 26/62	20:38	1,820e	2,710	55	7.3	4	7.1	35	0	.....	.....	48.8	0.066	238e	2.4	82.2	11.5

* At highway No. 17 bridge, northwest of Wawa.
† Discharge records at township road bridge near mouth of river, one half mile north of village of Michipicoten, Lat. 47°56' 10", Loog. 84°50' 00"
e estimated
See also Station No. 177, page 68

																		STATION NO. 118 – CATFISH CREEK*
7	May 26/62	30:32	.....	.....	55	.....	9.	6.8	55	0	.....	.....	.....	.....	.....	.....	61.8	8.9

* Sampled from shore at highway No. 17 bridge

																		STATION NO. 119 – KABENUNG LAKE
8	May 26/62	20:38	.....	.....	57	13.0	6	6.4	80	0	.....	.....	48.4	0.066	.....	26.4	38.9	4.2

																		STATION NO. 120 – SOUTH WHITE RIVER*
9	May 26/62	30:32	.....	.....	50	.....	6	7.1	35	0	.....	.....	.....	.....	.....	.....	78.5	10.3

* Sampled at highway No. 17 bridge

																		STATION NO. 121 – DEPEW CREEK*
10	May 26/62	20:38	.....	.....	52.5	6.1	5.	7.3	25	0	.....	.....	80.8	0.110	.....	20.0	112	16.2

* Sampled at highway No. 17 bridge

																		STATION NO. 122 – WEST WHITE RIVER*
11	May 25/62	21:39	.....	.....	57	8.7	3.5	7.4	40	0	.....	.....	77.2	0.105	.....	27.2	97.6	13.3

See also Station No. 178, page 68
* Sampled at highway No. 17 bridge

																		STATION NO. 123 – WHITE RIVER*
12	Nov. 16/57	9:44	724†	697†	35	7.4	2	7.8	25	0.9	.....	.....	91.2	0.124	178	23.6	136	20.7
13	Dec. 15	25:33	611	674	33	.....	2	7.8	30	0.8	.....	.....	.....	.....	.....	.....	124	18.6
14	Jan. 19/58	24:36	397	437	33	.....	5	7.4	30	0.4	.....	.....	.....	.....	.....	.....	133	19.9
15	Feb.	No sample taken		287														
16	Mar. 15	6:24	224	230	35	6.1	2	7.8	25	0.3	.....	.....	106	0.144	63.9	36.0	151	23.4
17	Apr. 15	21:27	820	1,780	35	.....	2	7.7	30	0.4	.....	.....	.....	.....	.....	.....	121	18.4
18	May 23	13:20	1,060	1,580	51	.....	2	7.6	35	0.9	.....	.....	.....	.....	.....	.....	109	16.4
19	June 15	10:23	2,490	1,740	59	10.5	2	7.7	50	0	.....	.....	81.6	0.111	547	29.2	106	16.1
20	July 25	25:39	.....	.....	71	.....	3	7.8	40	0	.....	.....	.....	.....	.....	.....	123	19.1
21	Aug. 23	27:121	.....	.....	65	.....	3	7.7	20	0	.....	.....	.....	.....	.....	.....	147	22.2
22	Sept. 17	13:180	.....	.....	57	10.8	1	7.9	45	0.8	.....	.....	83.6	0.114	.....	25.2	119	17.8

† Discharge records at the Canadian Pacific Railway Station at Bertrand, Lat. 48°42' 00", Loag. 85°35' 00". Drainage area 928 square miles.
* From bridge on private highway, ¾ mile east of Regan

																		STATION NO. 124 – WHITE LAKE*
23	May 25/62	24:27	5,520†	4,950†	.....	8.6	5	7.4	35	0	.....	.....	108	0.147	1,607	34.8	139	21.3

* Sampled at highway No. 17 bridge
† Discharge records below White Lake dam
See also Station No. 179, page 68

																		STATION NO. 125 – WABIKOBA CREEK*
24	May 25/62	31:33	.....	.....	57	.....	5	7.3	55	0	.....	.....	.....	.....	.....	.....	102	15.6

* Sampled at highway No. 17 bridge

																		STATION NO. 126 – CEDAR CREEK*
25	May 25/62	20:24	High†	.....	57	13.7	10	7.0	80	0	.....	.....	96.4	0.131	.....	56.4	109	16.0

† Collector's estimate of river level or discharge
* Sampled at highway No. 17 bridge

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near MICHIPICOTEN HARBOUR – (concluded)																									
2.5	.....	.....	.....	.....	.....	.....	0.8	0.4	0.1	0.0	38.9	9.5	0.4	.....	0.3	4.0	.....	.....	10.8	42.7	50.0	3.9	−1.2	10	1
2.9	.....	.....	.....	.....	.....	.....	1.1	0.6	0.1	0.0	46.1	10.7	0.3	.....	0.3	4.2	.....	.....	8.8	46.6	56.7	4.8	−1.2	9.9	2
2.6	.....	0.01	0.00	0.00	0.00	0.00	0.8	0.5	0.5	0.0	47.8	9.5	0.6	0.0	0.5	5.1	.....	.....	7.9	47.1	57.7	3.5	−1.1	9.7	3
3.6	.....	.....	.....	.....	.....	.....	0.9	0.6	0.1	0.0	56.4	10.1	1.0	.....	0.3	3.7	.....	.....	11.4	57.7	65.2	3.2	−0.9	9.4	4
3.6	.....	.....	.....	.....	.....	.....	0.9	0.6	.....	0.0	55.6	11.4	1.4	.....	0.5	3.8	.....	0.00	12.6	58.2	67.0	3.2	−0.5	8.9	5
2.9	0.04	0.02	0.00	0.00	0.00	0.00	0.6	0.5	.....	0.0	34.1	10.4	0.6	0.18	0.4	3.2	<0.1	.....	12.4	40.4	47.1	3.1	−1.8	10	6
north of WAWA																									
1.6	0.10	0.03	0.00	0.00	0.00	0.00	0.6	0.7	.....	0.0	19.6	9.5	1.4	0.17	0.3	1.8	0.16†	.....	12.7	28.8	34.8	4.2	−3.1	12	7
† Total																									
north of WAWA																									
1.8	0.19	0.03	0.00	0.00	0.03	0.00	0.6	0.4	.....	0.0	9.2	7.4	0.8	0.2	0.6	1.9	<0.1	.....	10.1	17.7	22.8	6.7	−3.4	13	8
southeast of WHITE RIVER																									
3.4	0.15	0.01	0.00	0.00	0.00	0.00	0.8	0.3	.....	0.0	38.2	6.8	0.9	0.11	0.2	2.5	0.14†	.....	8.3	39.6	44.2	4.2	−1.7	11	9
† Total																									
southeast of WHITE RIVER																									
3.8	0.02	Trace	0.00	0.00	0.00	0.00	0.6	0.4	.....	0.0	61.8	5.4	0.5	0.12	0.0	3.1	<0.1	.....	5.5	56.2	60.7	2.3	−2.1	9.7	10
northwest of WHITE RIVER.																									
3.9	0.07	0.03	Trace	0.00	0.03	0.00	0.7	0.4	.....	0.0	51.8	6.2	1.4	0.18	Trace	3.2	<0.1	.....	6.6	49.1	54.8	3.0	−1.0	9.4	11
near REGAN																									
4.4	.....	0.02	0.00	0.01	0.00	0.00	0.9	0.3	0.05	0.0	77.0	6.9	0.5	0.0	0.3	4.0	.....	.....	6.5	69.7	76.0	2.7	−0.5	8.8	12
3.8	.....	.....	.....	.....	.....	.....	0.8	0.3	0.0	0.0	69.1	6.3	0.9	.....	0.2	4.6	.....	.....	5.3	62.0	69.5	2.7	−0.6	9.0	13
4.3	.....	.....	.....	.....	.....	.....	1.0	0.5	0.05	0.0	73.3	6.5	0.9	.....	0.4	5.4	.....	.....	7.2	67.3	75.0	3.1	−1.0	9.4	14
4.4	.....	0.02	0.00	0.02	0.00	0.00	1.0	0.5	0.1	0.0	85.9	6.8	1.0	0.0	0.8	6.5	.....	.....	6.0	76.5	86.8	2.7	−0.4	8.6	15 16
3.8	.....	.....	.....	.....	.....	.....	0.9	0.4	0.05	0.0	67.2	5.7	0.7	.....	0.6	5.1	.....	0.00	6.4	61.5	68.7	3.1	−0.7	9.1	17
3.5	.....	.....	.....	.....	.....	.....	0.8	0.4	0.01	0.0	62.8	5.4	0.6	.....	0.1	3.7	.....	.....	4.6	56.1	61.8	3.0	−0.8	9.2	18
3.5	.....	0.04	0.00	0.00	0.00	0.00	0.8	0.3	0.15	0.0	57.8	7.4	0.8	0.0	0.1	3.8	.....	.....	7.2	54.6	61.3	3.1	−0.9	9.5	19
3.8	.....	.....	.....	.....	.....	.....	0.8	0.4	0.2	0.0	71.3	5.5	1.1	.....	1.5	4.5	.....	.....	4.8	63.3	71.8	2.7	−0.6	9.0	20
4.8	.....	.....	.....	.....	.....	.....	1.1	0.4	0.05	0.0	82.3	6.4	1.0	.....	0.3	4.6	.....	0.00	7.6	75.1	81.3	3.1	−0.6	8.9	21
4.1	.....	0.05	0.00	0.00	0.00	0.00	1.2	0.4	0.2	0.0	65.2	6.0	1.0	0.0	0.5	9.0	0.0	.....	7.8	61.3	72.2	4.0	−0.5	8.9	22
at NARROWS near REGAN																									
5.3	0.03	0.02	0.00	0.00	0.02	0.00	0.6	0.5	0.1	0.0	82.6	5.8	1.0	0.18	0.4	3.4	<0.1	.....	7.2	75.0	78.9	1.7	−0.8	9.0	23
west of REGAN																									
4.1	0.06	0.03	0.00	0.00	0.00	0.00	0.6	0.5	.....	0.0	58.6	6.2	1.1	0.17	0.2	2.9	0.12	.....	7.8	55.9	60.4	2.3	−1.2	9.7	24
west of REGAN																									
4.4	0.06	0.03	0.00	0.00	0.02	0.00	0.6	0.5	.....	0.0	59.1	5.5	1.4	0.18	0.8	2.9	<0.1	.....	9.5	58.0	61.5	2.2	−1.5	10	25

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																STATION NO. 127 – WOWUN LAKE		
1	Aug. 15/59	31:54	.....	.....	63	13.7	4	7.6 (8.0)	55 (200)	0.4 (3)	.....	.....	148	0.201	.....	24.4	223	29.9
																STATION NO. 128 – BLACK RIVER*		
2	Aug. 5/57	92:105	.....	.....	69	11.4	5	7.6 (7.4)	50 (80)	3	.....	.....	147	0.200	.....	44.4	219	34.2
3	May 25/62	22:25	High†	.....	55	13.4	4	7.5	80	25	84	80	120	0.163	.....	42.0	152	24.1
																STATION NO. 129 – BLACK RIVER*		
4	Nov. 1/57	12:59	Medium†	.....	40	12.1	2	8.0	60	4	5.6	1.9	137	0.186	.....	27.2	207	32.4
5	Dec. 1	12:29	Normal	.....	47	.....	3	7.7	75	2	.....	.....	.....	.....	.....	.....	160	25.6
6	Jan. 3/58	14:24	Normal	.....	37	.....	2	8.1	60	2	.....	.....	.....	.....	.....	.....	189	29.3
7	Feb. 1	17:23	Normal	.....	35	11.3	2	8.1	45	2	.....	.....	153	0.208	.....	75.2	215	34.2
8	Mar. 1	16:46	Normal	.....	36	.....	3	7.8	45	0.9	.....	.....	.....	.....	.....	.....	225	36.0
9	Apr. 1	17:35	Normal	.....	39	.....	3	7.9	40	3	.....	.....	.....	.....	.....	.....	243	38.6
10	May 1	27:36	Normal	.....	46	14.0	3	7.6	80	12	37	35	113	0.154	.....	51.6	136	22.0
11	June 2	18:30	3.5 ft below normal		53	.....	3	7.7	90	9	.....	.....	.....	.....	.....	.....	139	21.7
12	July 2	26:40	3 ft below normal		60	.....	.....	7.9	110	30	.....	.....	.....	.....	.....	.....	148	25.4
13	Aug. 1	19:30	Normal	.....	67	12.9	5	7.6	80	11	25	22	135	0.184	.....	37.6	189	30.9
14	Sept. 2	21:132	High	.....	54	.....	3	7.7	100	16	.....	.....	.....	.....	.....	.....	152	24.1
15	Oct. 2	14:117	Normal	.....	47	.....	2	7.9	90	1	.....	.....	.....	.....	.....	.....	176	28.0
																STATION NO. 130 – PIC RIVER*		
16	Aug. 5/57	92:105	.....	.....	68	9.9	3	7.9 (7.8)	40	9	19	8.7	141	0.192	.....	37.6	210	32.2
17	Aug. 15/59	31:67	.....	.....	65	15.5	3	7.9 (7.5)	80	17 (50)	33	27	127	0.173	.....	35.2	178	29.2
																STATION NO. 131 – PIC RIVER*		
18	Nov. 11/57	12:59	Medium†	.....	40	10.7	2	8.0	55	6	13	6.8	139	0.189	.....	29.6	217	34.7
19	Dec. 1	12:29	Normal	.....	34	.....	3	7.8	65	5	.....	.....	.....	.....	.....	.....	184	31.1
20	Jan. 3/58	14:24	Normal	.....	34	.....	2	8.1	50	5	.....	.....	.....	.....	.....	.....	207	32.8
21	Feb. 1	17:23	Normal	.....	34	9.7	2	8.1	35	4	6.9	3.1	163	0.222	.....	76.8	234	37.4
22	Mar. 1	16:46	Normal	.....	36	.....	4	7.8	40	3	.....	.....	.....	.....	.....	.....	243	38.9
23	Apr. 1	17:35	Normal	.....	35	.....	1.5	8.2	40	15	.....	.....	.....	.....	.....	.....	252	41.5
24	May 1	22:27	Normal	.....	.....	14.0	2	7.9	100	50	100	87	144	0.196	.....	46.0	149	26.0
25	June 2	16:30	1 ft below normal		52	.....	2	8.0	80	20	.....	.....	.....	.....	.....	.....	165	27.2
26	July 2	26:40	4 ft below normal		58	.....	2	8.0	180	300	398	392	.....	.....	.....	.....	155	28.0
27	Aug. 1	19:30	Normal	.....	65	11.0	3	7.8	80	14	15	15	134	0.182	.....	49.6	196	31.3
28	Sept. 2	21:132	High	.....	53	.....	3	7.8	220	27	.....	.....	.....	.....	.....	.....	190	31.7
29	Oct. 2	14:117	Below normal		51	.....	2	8.0	65	15	.....	.....	.....	.....	.....	.....	202	32.7
																STATION NO. 132 – LITTLE PIC RIVER*		
30	May 25/62	21:39	.....	.....	51	13.0	3	7.7	70	60	158	153	130	0.177	.....	33.2	157	26.5
																STATION NO. 133 – RIPPLE LAKE*		
31	Aug. 15/59	33:67	.....	.....	59	10.0	4	7.3 (7.8)	35 (140)	6 (30)	70	62	94.8	0.129	.....	29.6	114	17.1

* Sampled at highway No. 17 bridge. *See* also Station No. 180, page 68
† Collector's estimate

* From powerhouse tap
† Collector's estimate of river level or discharge

* Sampled at No. 17 highway bridge. *See* also Station No. 181, page 68

* From townsite pumphouse tap
† Collector's estimate of river level or discharge.

* Sampled at highway No. 17 bridge

* Sampled from shore

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at MANITOUWADGE																									
5.7	0.10	0.07	0.00	0.00	Trace	0.00	7.5	1.0	0.2	0.0 (0)	94.5 (97.6)	32.1	3.5	0.0	1.5	3.0	0.04	.....	20.5 (20)	98.0 (100)	131	14	−0.6	8.8	1
above HERON BAY SOUTH																									
6.5	.....	0.02	0.00	0.00	0.00	0.05	1.1	0.8	0.1	0.0	132	4.9	1.0	0.0	0.5	5.4	.....	.....	3.6	112 (113)	120	2.1	−0.3	8.2	2
4.0	0.74	0.05	0.00	0.00	0.05	0.00	2.3	0.7	0.3	0.0	79.7	10.5	1.0	0.24	1.0	3.2	<0.1	.....	11.1	76.6	86.4	6.1	−0.7	8.9	3
near HERON BAY SOUTH																									
7.0	.....	0.04	0.00	0.00	Trace	0.00	1.4	0.6	0.1	0.0	130	5.3	1.1	0.0	0.2	5.3	.....	.....	3.1	110	117	2.7	+0.1	7.8	4
5.1	.....	.....	.....	.....	.....	.....	0.9	0.5	0.1	0.0	94.6	6.6	1.3	.....	0.2	5.1	.....	.....	7.2	84.8	92.0	2.2	−0.5	8.7	5
6.6	.....	.....	.....	.....	.....	.....	1.0	0.6	0.0	0.0	115	5.0	1.1	.....	0.3	5.7	.....	0.00	5.9	100	106	2.1	+0.1	7.9	6
7.4	.....	0.10	0.00	0.00	0.00	0.00	1.0	0.7	0.05	0.0	131	6.9	1.4	0.0	0.3	5.9	.....	.....	8.4	116	122	1.8	+0.2	7.7	7
7.9	.....	.....	.....	.....	.....	.....	1.2	0.7	.....	0.0	142	6.6	1.0	.....	0.2	6.9	.....	.....	6.0	122	130	2.1	0.0	7.8	8
8.0	.....	.....	.....	.....	.....	.....	1.2	0.7	.....	0.0	149	5.8	1.5	.....	0.8	6.7	.....	.....	7.0	129	137	2.0	+0.1	7.7	9
3.8	0.19	0.12	0.00	0.00	0.00	0.00	1.4	0.7	0.1	0.0	75.7	8.6	0.8	0.0	0.5	4.9	.....	0.06	8.4	70.5	80.1	4.1	−0.7	9.0	10
4.0	.....	.....	.....	.....	.....	.....	1.3	0.5	0.05	0.0	80.5	5.3	0.9	.....	1.2	3.6	.....	.....	4.6	70.6	78.1	3.8	−0.5	8.7	11
4.2	.....	.....	.....	.....	.....	.....	1.4	0.5	.....	0.0	88.9	6.9	1.3	.....	0.3	3.9	.....	.....	7.7	80.6	87.6	3.6	−0.2	8.3	12
5.7	0.84	0.05	0.00	0.00	0.00	0.00	1.2	0.6	0.15	0.0	117	5.6	1.0	0.0	0.3	7.1	.....	.....	4.3	101	110	2.5	−0.4	8.4	13
5.3	.....	.....	.....	.....	.....	.....	0.3	0.5	0.05	0.0	87.8	5.4	0.9	.....	0.5	4.2	.....	0.00	9.9	81.9	84.9	2.1	−0.5	8.7	14
5.7	.....	.....	.....	.....	.....	.....	1.2	0.5	0.1	0.0	99.1	4.0	0.6	.....	0.8	4.7	.....	.....	12.0	92.3	94.3	2.7	−0.1	8.1	15
above HERON BAY SOUTH																									
6.2	.....	0.02	0.00	0.00	0.00	0.20	1.3	0.8	0.05	0.0	126	4.8	0.9	0.0	0.5	4.9	.....	.....	2.8	106 (104)	114	2.6	0.0	7.9	16
5.9	0.73	0.07	0.00	0.00	Trace	0.00	0.9	0.5	0.2	0.0 (0)	111 (110)	3.2	1.1	0.0	0.3	5.3	.....	.....	6.2	97.1	101	2.0	−0.2	8.3	17
near HERON BAY SOUTH																									
6.9	.....	0.05	0.00	0.00	0.00	0.00	1.4	0.8	0.0	0.0	137	6.4	1.2	0.0	0.2	5.6	.....	.....	2.7	115	125	2.6	+0.1	7.8	18
5.2	.....	.....	.....	.....	.....	.....	1.7	0.7	0.0	0.0	116	7.1	1.4	.....	0.2	5.9	.....	.....	4.1	99.0	110	3.6	−0.2	8.2	19
6.9	.....	.....	.....	.....	.....	.....	1.0	0.7	0.0	0.0	128	4.7	1.3	.....	0.3	5.6	.....	0.05	5.2	110	116	1.9	+0.1	7.9	20
8.0	.....	0.01	0.00	0.00	0.00	0.00	1.4	0.8	0.0	0.0	146	5.7	1.3	0.0	0.3	6.6	.....	.....	6.3	126	134	2.3	+0.2	7.7	21
8.1	.....	.....	.....	.....	.....	.....	1.4	0.9	0.1	0.0	152	5.5	1.0	.....	0.3	6.7	.....	.....	6.1	130	138	2.3	0.0	7.8	22
7.7	.....	.....	.....	.....	.....	.....	1.4	1.0	0.0	0.0	158	7.1	1.3	.....	0.6	6.4	.....	.....	6.1	135	145	2.2	+0.4	7.4	23
3.7	1.1	0.08	0.00	0.00	0.00	0.00	0.7	0.7	.....	0.0	87.4	8.4	0.8	0.0	0.4	4.5	.....	.....	8.4	80.1	88.3	1.8	−0.3	8.5	24
4.4	.....	.....	.....	.....	.....	.....	0.9	0.7	.....	0.0	99.5	3.5	0.9	.....	0.8	4.2	.....	0.00	4.4	86.0	91.6	2.2	−0.1	8.2	25
4.0	3.8	.....	.....	.....	.....	.....	0.8	0.9	.....	0.0	95.6	6.9	1.4	.....	0.3	4.3	.....	.....	7.9	86.3	93.6	2.0	−0.0	8.0	26
6.5	0.93	0.05	0.00	0.00	0.00	0.00	0.9	0.7	0.15	0.0	120	4.0	0.8	0.0	0.3	6.2	.....	.....	6.0	105	110	1.8	−0.1	8.0	27
6.1	.....	.....	.....	.....	.....	.....	1.0	0.6	0.1	0.0	113	5.9	1.1	.....	0.5	6.1	.....	0.00	11.3	104	109	2.0	−0.2	8.2	28
6.9	.....	.....	.....	.....	.....	.....	1.1	0.6	.....	0.0	119	5.5	0.7	.....	0.3	5.9	.....	.....	12.4	110	112	2.1	+0.1	7.8	29
west of MARATHON																									
4.7	2.0	0.10	0.00	0.00	0.00	0.00	0.8	0.7	.....	0.0	91.3	7.3	0.5	0.18	1.5	3.8	<0.1	.....	10.5	85.4	93.0	2.0	−0.4	8.5	30
west of MARATHON																									
3.3	2.7	0.04	0.00	0.00	Trace	0.00	1.5	0.4	0.3	0.0 (0)	55.1 (48)	10.4	2.4	0.0	0.4	2.8	.....	.....	11.0 (19)	56.2 (59)	65.5	5.4	−1.2	9.7	31

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 134 – PRAIRIE RIVER*																		
1	Aug. 15/59	33:54	.....	.....	59	10.7	1	8.1 (8.0)	50 (90)	3 (3)	.....	.....	120	0.163	.....	28.0	177	29.9
STATION NO. 135 – BLACK FOX LAKE*																		
2	Aug. 15/59	33:54	.....	.....	59	5.6	5	7.4 (7.1)	15 (40)	2 (2)	.....	.....	104	0.141	.....	24.0	159	25.7
STATION NO. 136 – STEELE RIVER*																		
3	Aug. 14/59	31:55	.....	.....	61	14.7	2	7.7 (7.5)	55 (120)	0 (2)	.....	.....	80.8	0.110	.....	20.8	107	16.5
STATION NO. 137 – AGUASABON RIVER																		
4	Aug. 5/57	92:109	Water Level	.....	67	.....	1	7.9 (7.7)	35	0	.....	.....	.....	.....	.....	.....	122	18.6
5	Sept.	No sample taken																
6	Oct. 16	9:20	600.1†	.....	52	9.7	2	7.8	40	0.8	.....	.....	78.4	0.107	.....	32.8	122	19.0
7	Nov. 19	14:20	900.0	.....	37	.....	2	7.7	40	0.9	.....	.....	.....	.....	.....	.....	121	18.9
8	Dec. 13	31:35	898.9	.....	35	.....	2	7.8	40	0.8	.....	.....	.....	.....	.....	.....	123	19.0
9	Jan. 20/58	23:35	899.4	.....	33	8.1	2	7.8	35	0.4	.....	.....	111	0.151	.....	71.2	133	20.7
10	Feb. 17	25:47	599.7	.....	32	.....	1	8.0	40	0	.....	.....	.....	.....	.....	.....	134	21.1
11	Mar. 17	17:45	599.7	.....	33	.....	2	7.8	35	0	.....	.....	.....	.....	.....	.....	139	21.8
12	Apr. 16	20:34	599.6	.....	35	8.6	2	7.8	30	0.4	.....	.....	91.6	0.124	.....	32.0	135	21.1
13	May 16	20:27	599.4	.....	46	.....	2	7.6	45	0.8	.....	.....	.....	.....	.....	.....	87.2	13.3
14	June 16	24:32	599.6	.....	54	.....	1	7.9	45	0.8	.....	.....	.....	.....	.....	.....	111	17.1
15	July	No sample taken																
16	Aug. 18	21:148	599.9	.....	65	.....	4	7.5	40	0	.....	.....	98.4	0.134	.....	22.8	126	19.8
17	Sept. 15	10:127	600.4	.....	55	.....	2	7.8	40	0	.....	.....	.....	.....	.....	.....	128	20.9
18	Oct. 22/58	12:103	600.4	.....	49	.....	2	7.8	40	0	.....	.....	.....	.....	.....	.....	126	19.8
19	Aug. 15/59*	33:54	.....	.....	61	6.3	3	8.0 (7.7)	20 (65)	1 (2)	.....	.....	178	0.242	.....	28.0	289	44.6
STATION NO. 138 – WALKER LAKE																		
20	Aug. 15/59	33:54	.....	.....	61	6.4	3	6.7 (6.5)	25 (70)	1 (5)	.....	.....	32.8	0.045	.....	20.4	35.5	4.1
STATION NO. 139 – PAYS PLAT RIVER																		
21	Aug. 14/59	31:55	.....	.....	64	9.8	3	7.1 (7.0)	50 (100)	0.8 (1)	.....	.....	35.6	0.048	.....	10.8	42.6	5.6
22	May 25/62	24:27	Med. high	.....	49	11.0	3	6.8	80	0	.....	.....	.....	.....	.....	.....	33.3	3.5
STATION NO. 140 – GRAVEL RIVER																		
23	May 25/62	21:39	.....	.....	50	11.8	3	7.3	80	12	48	45	72.4	0.098	.....	32.4	75.6	11.6

* Sampled at highway No. 17 bridge

* Sampled at highway No. 17 bridge

* Sampled at highway No. 17 bridge

* From highway No. 17 bridge
† Collectors report of river level in feet

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
east of JACKFISH																									
5.3	0.38	0.08	0.00	0.00	0.00	0.00	1.1	0.6	0.2	0.0	105	8.0	0.9	0.0	0.4	5.9	0.0	.....	10.3	96.4	104	2.4	+0.1	7.9	1
east of JACKFISH																									
3.3	0.36	0.02	0.00	0.00	0.00	0.00	1.6	0.4	0.1	0.0	80.3	9.5	3.0	0.0	0.8	4.5	0.0	.....	11.8	77.7 (70)	88.4	4.3	−0.8	9.0	2
east of JACKFISH																									
3.4	0.09	0.07	0.00	0.00	0.00	0.00	0.7	0.7	0.1	0.0 (0)	60.8 (61)	7.3	0.6	0.0	0.6	4.5	0.0	.....	5.3	55.2	64.3	2.6	−0.9	9.5	3
at TERRACE BAY																									
3.6	.....	.....	.....	.....	.....	.....	0.9	0.6	0.0	0.0	69.2	5.3	1.0	.....	0.2	4.6	.....	.....	4.4	61.2	68.9	3.1	−0.4	8.7	4
																									5
3.9	0.03	.....	0.00	0.00	0.00	0.00	0.8	0.7	0.0	0.0	70.8	5.4	1.1	0.0	0.2	4.0	.....	.....	5.3	63.4	70.0	2.6	−0.6	9.0	6
3.7	.....	.....	.....	.....	.....	.....	0.9	0.7	0.0	0.0	69.0	5.8	1.5	.....	0.2	3.6	.....	.....	5.8	62.4	69.3	3.0	−0.7	9.1	7
4.1	.....	.....	.....	.....	.....	.....	0.7	0.6	0.05	0.0	70.8	5.0	1.0	.....	0.2	3.8	.....	0.00	6.2	64.3	69.3	2.3	−0.6	9.0	8
4.2	.....	0.04	0.00	0.00	Trace	0.05	0.7	0.6	0.05	0.0	75.6	5.7	1.3	0.0	0.4	3.6	.....	.....	6.9	68.9	74.5	2.1	−0.6	9.0	9
4.2	.....	.....	.....	.....	.....	.....	0.8	0.6	0.05	0.0	77.2	6.0	1.3	.....	0.6	4.2	.....	.....	6.6	69.9	76.8	2.4	−0.3	8.6	10
3.9	.....	.....	.....	.....	.....	.....	0.8	0.7	0.1	0.0	79.6	5.0	0.8	.....	0.6	4.5	.....	.....	5.1	70.4	77.4	2.4	−0.4	8.6	11
4.2	.....	0.03	0.00	Trace	0.00	0.00	0.7	0.6	0.05	0.0	77.3	4.7	1.0	0.0	0.5	4.0	.....	.....	6.5	69.9	74.9	2.1	−0.5	8.8	12
2.9	.....	.....	.....	.....	.....	.....	0.7	0.5	0.15	0.0	46.6	4.8	1.1	.....	0.4	3.8	.....	0.00	6.9	45.1	50.4	3.2	−1.0	9.6	13
3.3	.....	.....	.....	.....	.....	.....	0.7	0.5	0.1	0.0	62.8	5.3	0.6	.....	0.6	3.7	.....	.....	4.7	56.2	62.7	2.6	−0.5	8.9	14
																									15
3.9	.....	0.01	0.00	0.00	0.00	0.00	1.2	0.6	0.1	0.0	73.7	6.2	1.1	0.0	0.5	6.6	.....	0.00	4.9	65.4	76.2	3.8	−0.9	9.3	16
3.3	.....	.....	.....	.....	.....	.....	1.4	0.6	0.0	0.0	75.2	5.6	1.0	.....	0.5	6.4	.....	.....	4.0	65.7	76.7	4.4	−0.5	8.8	17
4.0	.....	.....	.....	.....	.....	.....	0.8	0.7	0.0	0.0	71.6	3.8	0.8	.....	0.7	4.0	.....	.....	7.2	65.9	69.8	2.5	−0.6	9.0	18
6.7	0.19	0.02	0.00	0.00	0.00	0.00	6.8	1.5	0.1	0.0	171	10.1	2.6	0.0	0.8	7.5	0.0	.....	0.0	139 (140)	165	9.5	+0.4	7.2	19
near SCHREIBER																									
0.6	0.12	0.02	0.0	0.00	0.00	0.00	1.1	0.3	0.2	0.0	10.1	7.2	1.1	0.0	0.1	1.8	0.0	.....	4.4	12.7 (15)	21.3	15	−3.1	13	20
west nf ROSSPORT																									
1.2	0.14	0.11	0.00	0.00	0.00	0.00	0.7	0.5	0.3	0.0	17.7	6.1	1.0	0.0	0.4	3.7	0.0	.....	4.4	18.9	28.0	7.1	−2.4	12	21
1.7	0.10	0.03	0.00	0.03	0.02	0.00	0.5	0.5	0.2	0.0	11.0	7.1	0.9	0.24	0.6	3.7	<0.1	.....	6.7	15.7	24.3	6.1	−3.1	12	22
west of CAVERS																									
2.6	0.42	0.07	0.00	0.00	0.00	0.00	0.5	0.4	.....	0.0	38.3	5.6	0.8	0.21	0.3	3.2	<0.1	.....	8.2	39.6	44.6	2.6	−1.5	10	23

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 141 – LITTLE GRAVEL RIVER																		
1	Aug. 14/59	31:55	.....	.....	61	7.6	4	7.2 (7.0)	30 (80)	2 (2)	.....	.....	57.6	0.078	.....	16.4	73.9	10.2
2	May 25/62	32:33	.....	.....	50	.....	14	6.4	80	2	.....	.....	.....	.....	.....	.....	36.6	4.0
STATION NO. 142 – CYPRESS RIVER*																		
3	Aug. 14/59	31:55	.....	.....	59	10.1	4	7.1 (7.4)	50 (120)	0.4 (1)	.....	.....	55.6	0.076	.....	17.6	69.4	9.2
4	May 25/62	24:27	fast	.....	50	14.3	2.5	6.6	90	0.8	.....	.....	.....	.....	.....	.....	25.9	2.5
STATION NO. 143 – JACKPINE RIVER†																		
5	Aug. 15/59	33:39	Very low*	.....	61	.....	.....	7.6	35	.....	.....	.....	.....	.....	.....	.....	136	.....
6	May 25/62	32:33	High**	.....	52	.....	6	6.8	100	0	.....	.....	.....	.....	.....	.....	38.8	4.3
STATION NO. 144 – JACKFISH RIVER*																		
7	Aug. 14/59	31:55	.....	.....	66	12.5	3.5	7.7 (7.9)	50 (90)	1 (7)	.....	.....	120	0.163	.....	31.6	182	26.0
8	May 25/62	23:26	High	.....	49	18.5	5.	7.2	120	Turbid	.....	.....	.....	.....	.....	.....	83.0	12.8
STATION NO. 145 – MOJIKIT LAKE (OGOKI RIVER)																		
			Water Level															
9	July 17/59	13:25	1,072.67†	.....	50	9.5	2	7.3	40	0.8	.....	.....	56.4	0.077	.....	31.2	52.3	7.6
10	Aug. 24	10:11	1,070.44	.....	62	.....	2	7.4	45	0.8	.....	.....	.....	.....	.....	.....	51.8	7.5
11	Sept.	No sample taken																
12	Oct. 15	18:140	1,069.28	.....	50	12.1	3	7.2	35	2	.....	.....	.....	.....	.....	.....	64.3	9.8
STATION NO. 146 – MOJIKIT LAKE																		
			Water Level															
13	July 17/59	13:25	1,071.0†	.....	50	10.4	2	7.2	45	2	.....	.....	56.0	0.076	.....	33.6	46.9	6.7
14	Aug. 21	13:14	1,067.0	.....	61	.....	2.5	7.2	55	0.8	.....	.....	.....	.....	.....	.....	50.9	7.6
15	Sept.	No sample taken																
16	Oct. 14	19:41	1,066.21	.....	50	10.3	2	7.3	45	3	.....	.....	.....	.....	.....	.....	56.5	8.7
17	Aug. 20/61	30:51	1,065.4	.....	.....	7.2	3	7.3	35	0.8	.....	.....	59.2	0.080	.....	26.4	64.3	8.5
STATION NO. 147 – LAKE NIPIGON																		
			Water Level															
18	Aug. 14/59	26:40	453.73†	853.77†	66	5.6	2	7.8 (7.6)	15 (20)	0.8 (2)	.....	.....	108	0.147	.....	24.8	149	23.3
STATION NO. 148 – NIPIGON RIVER																		
19	Aug. /29*		Monthly composite – year minimum		.....	.....		8.1	.....	.....	.....	.....	106	0.144	.....	51.0	.....	27.8
20	Feb. /30*		Monthly composite – year maximum		.....	.....		7.6	.....	.....	.....	.....	110	0.150	.....	50.0	.....	32.1

† Sampled at highway No. 17 bridge
* River so low difficult to obtain a sample
** Collector's estimate of river level and discharge

† Level in feet above mean sea level based on Geodetic Survey of Canada Datum

* Sampled at highway No. 17 bridge

† Collector's report of lake level in feet

† Level in feet above mean sea level based on Geodetic Survey of Canada Datum

* Data supplied by Ontario Hydro Electric Power Commission

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
west of CAVERS																									
2.3	0.20	0.05	0.00	0.00	Trace	0.00	1.3	0.5	0.1	0.0	37.1	6.6	1.0	0.0	0.1	4.7	0.0	.....	4.5	34.9	45.0	7.3	−1.7	11	1
1.7	0.21	0.05	0.00	0.02	0.00	0.00	0.7	0.3	.....	0.0	10.4	6.8	1.3	0.22	0.2	4.6	<0.1	.....	8.3	16.8	25.0	8.0	−3.1	13	2
near NIPIGON																									
2.5	0.42	0.10	0.00	0.00	0.00	0.05	1.0	0.4	0.2	0.0	33.5	6.0	0.9	0.0	0.4	3.9	.....	.....	5.7	33.2	41.0	6.0	−2.0	11	3
1.4	0.20	0.06	0.00	0.05	0.03	0.00	0.5	0.4	0.2	0.0	6.0	7.0	0.8	0.21	0.6	3.6	0.17†	.....	7.3	12.2	16.1	7.6	−3.6	14	4
† Total																									
near NIPIGON																									
...	.....	0.02	.....	.....	.....	.....	.....	.....	.....	0.0	62.5	13.6	1.3	.....	.....	.....	.....	.....	13.6	64.9	.....	.....	.....	.....	5
1.9	0.13	0.10	0.00	Trace	0.00	0.00	0.6	0.4	.....	0.0	13.4	6.4	0.9	0.22	1.0	3.3	0.12††	.....	7.5	18.5	25.8	6.4	−2.6	12	6
†† Total																									
near NIPIGON																									
7.5	0.30	0.05	0.00	0.00	0.00	0.00	2.2	0.7	0.1	0.0 (0)	108 (110)	4.8	3.6	0.0	0.1	5.0	0.0	.....	7.1	95.7	103	4.7	−0.4	8.5	7
4.4	0.60	0.13	0.00	0.00	0.03	0.00	0.8	0.5	0.1	0.0	48.9	8.6	1.4	0.33	0.8	3.7	0.14†	.....	9.9	50.0	57.7	3.3	−1.5	10	8
† Total																									
at WABOOSE DAM																									
1.6	0.16	0.09	0.00	0.04	0.00	0.00	0.9	0.4	0.1	0.0	27.3	2.1	1.5	0.0	0.2	3.3	0.04	.....	3.1	25.5	31.2	6.8	−1.7	11	9
1.6	0.12	.....	.....	.....	.....	.....	0.6	0.5	0.2	0.0	28.0	2.1	0.8	....	0.0	2.2	.....	.....	2.3	25.3	29.2	4.8	−1.6	11	10
1.9	0.33	0.03	0.00	0.00	0.00	0.00	0.8	0.5	0.1	0.0	33.5	2.2	0.6	0.0	0.4	4.0	0.03	....	4.8	32.3	36.7	5.0	−1.7	11	11 12
at SUMMIT DAM																									
1.6	0.18	0.07	0.00	0.04	0.00	0.00	0.8	0.4	0.2	0.0	23.8	2.0	1.9	0.0	0.2	3.3	0.01	.....	3.8	23.3	28.7	6.7	−1.9	11	13
1.5	.....	.....	.....	.....	.....	.....	0.6	0.5	0.2	0.0	26.3	3.0	1.3	....	0.2	2.6	.....	.....	3.5	25.1	30.3	4.8	−1.9	11	14 15
1.8	0.21	0.02	0.00	0.00	0.00	0.00	0.8	0.4	0.1	0.0	28.3	2.3	0.6	0.0	0.6	4.0	.....	.....	5.9	29.1	33.1	5.5	−1.7	11	16
1.9	0.16	0.00	0.00	0.00	0.00	0.00	1.4	0.5	0.2	0.0	33.3	1.6	0.6	0.16	0.4	6.8	<0.1	.....	1.7	29.0	38.3	9.3	−1.7	11	17
at ORIENT BAY																									
3.9	0.10	0.02	0.00	0.01	0.00	0.00	1.5	0.7	0.0	0.0	86.7	3.8	1.6	0.0	0.3	7.8	.....	...	3.1	74.2	85.6	4.2	−0.3	8.4	18
at CAMERON FALLS																									
1.2	.....	.....	.....	.....	.....	.....	3.0	0.8	.....	0.0	68.0	0	0	....	.....	2.5	.....	.....	18.6	74.4	.....	.....	.....	.....	19
3.6	.....	.....	.....	.....	.....	.....	1.5	0.8	.....	2.0	75.0	9.6	0	....	.....	4.5	.....	.....	30.2	95.1	.....	.....	.....	.....	20

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
																		STATION NO. 148 – NIPIGON RIVER
1	Aug. /29 to June /30*	Yearly average	.....	.....	.....	.....	.....	7.8	.....	.....	.....	.....	113	0.154	.....	53.5	.....	29.1
2	Aug. 3/57	94:111	12,500†	11,460†	63	.....	2	7.8 (7.8)	15 (40)	1	.....	.....	.....	.....	.....	.....	153	23.9
3	Sept.	No sample taken		12,200														
4	Oct. 22	3:41	12,200	11,780	51	4.8	1	8.0	15	0.3	.....	.....	104	0.141	3,406	26.4	148	23.9
5	Nov. 18	7:21	11,000	13,580	41	.....	1	8.1	10	0.9	.....	.....	.....	.....	.....	.....	149	24.2
6	Dec. 20	24:28	14,100	13,010	34	3.5	0.9	8.3	15	0.8	.....	.....	103	0.140	3,909	26.0	150	24.4
7	Jan. 22/58	21:33	17,800	13,550	32	.....	1	8.1	15	0.4	.....	.....	.....	.....	.....	.....	152	24.9
8	Feb. 20	18:20	14,800	13,720	32	.....	1	8.2	15	0.3	.....	.....	.....	.....	.....	.....	164	24.8
9	Mar. 17	4:45	11,000	11,660	32	4.4	1	8.1	10	0.3	.....	.....	111	0.151	3,289	27.6	154	24.9
10	Apr. 17	19:25	9,570	9,480	35	.....	0.9	8.2	15	0.4	.....	.....	.....	.....	.....	.....	153	24.6
11	May 21	15:22	12,600	11,240	42	.....	1	8.1	15	0.9	.....	.....	.....	.....	.....	.....	149	24.1
12	June 18	22:30	14,200	12,150	48	5.6	0.7	8.3	20	3	9.3	1.6	105	0.143	4,021	24.4	148	24.1
13	July 18	28:38	16,200	13,640	55	.....	3	7.7	15	0	.....	.....	.....	.....	.....	.....	147	24.0
14	Aug. 27	27:131	14,200	14,580	59	.....	2	7.9	10	0	.....	.....	.....	.....	.....	.....	145	23.7
15	Sept.	No sample taken		12,720														
16	Oct. 6/58	16:117	10,300	12,480	52	3.5	1	8.0	10	0	.....	.....	98.8	0.134	2,733	19.2	148	23.8

† Discharge records at Pine Portage plant of Hydro Electric Power Commission, Lat. 49°19' 00", Lnng. 88°17' 36" - Drainage area 9,485 square miles (exclusive of Ogoki River Diversion)

* Data supplied by Ontario Hydro-Electric Power Commission.

																		STATION NO. 149 – NIPIGON RIVER (HELEN LAKE)
17	Aug. 16/59	32:53	7,040†	11,700†	57	4.7	2	7.8	10 (10)	0.8 (2)	.....	.....	92.8	0.126	1,756	25.2	152	24.0
18	May 25/62*	31:33	.....	.....	48	.....	3	7.8	35	3.	.....	.....	.....	.....	.....	.....	159	23.9

* From town tap

† Discharge records at Pine Portage plant, *see* Station No. 148.

																		STATION NO. 150 – STURGEON (NAMEWAMINIKAN) RIVER
19	Aug. 14/59	26:40	.....	.....	61	10.6	4	7.3 (7.0)	40 (65)	0.8 (1)	.....	.....	78.0	0.106	.....	22.8	98.0	14.3
																		STATION NO. 151 – ROLLAND LAKE
20	Aug. 16/59	33:53	.....	.....	63	7.3	1	8.2	10 (10)	0.8 (1)	.....	.....	134	0.182	.....	29.6	206	34.6
																		STATION NO. 152 – BLACKWATER RIVER
21	Aug. 14/59	26:40	.....	.....	61	11.0	1	8.2 (8.0)	50 (50)	0.8 (< 1)	.....	.....	131	0.178	.....	31.2	180	30.0
																		STATION NO. 153 – LEONARD LAKE
22	Aug. 14/59	26:68	.....	.....	66	10.9	6	7.4 (8.1)	25 (50)	6 (25)	15	3.3	135	0.184	.....	40.0	201	25.2
																		STATION NO. 154 – BLACK STURGEON RIVER*
23	Aug. 3/57	95:104	.....	.....	74	11.8	3	7.5 (7.4)	50 (75)	2	.....	.....	117	0.159	.....	30.0	165	15.2

* Sampled at highway No. 17 bridge

																		STATION NO. 155 – WOLF RIVER *
24	May 25/62	24:27	High†	.....	55	11.4	5	7.7	20	3	.....	.....	.....	.....	.....	.....	127.	17.1

* Sampled at highway No. 17 bridge

† Collector's estimate of river level or discharge

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at CAMERON FALLS (concluded)																									
3.2	.....	.....	.....	.....	.....	.....	2.1	1.7	.....	17.0	36.0	2.4	0	.....	.....	4.8	.....	.....	18.0	85.9	.....	.....	.....	.....	1
3.8	.....	.....	.....	.....	.....	.....	2.4	0.8	0.0	0.0 (0)	90.8 (92)	3.5	2.1	.....	0.5	5.3	.....	.....	0.8 (0)	75.3 (74)	87.0	6.4	−0.3	8.4	2
3.9	.....	0.03	Trace	0.00	.....	.....	1.5	0.6	.....	0.0	88.3	3.4	2.7	0.0	0.1	4.6	.....	.....	3.4	75.7	84.1	4.1	−0.2	8.4	3 4
3.7	.....	.....	.....	.....	.....	.....	1.7	0.5	0.0	0.0	89.7	2.9	1.6	.....	0.2	4.7	.....	.....	2.0	75.6	83.7	4.6	−0.1	8.3	5
3.9	.....	0.01	0.00	0.01	0.00	0.00	1.3	0.5	0.0	0.0	90.2	3.4	2.0	0.0	0.3	5.4	.....	.....	2.9	76.9	85.6	3.5	+0.1	8.1	6
3.8	.....	.....	.....	.....	.....	.....	1.2	0.6	0.0	0.0	90.9	4.1	1.6	.....	0.1	5.2	.....	0.00	3.2	77.8	86.3	3.1	−0.1	8.3	7
3.9	.....	.....	.....	.....	.....	.....	1.2	0.6	0.05	0.0	92.4	3.0	1.2	.....	0.4	4.8	.....	.....	2.1	77.9	85.4	3.2	0	8.2	8
3.6	.....	0.00	0.00	0.04	0.00	0.00	1.4	0.6	0.05	0.0	90.6	2.9	1.3	0.0	0.3	6.0	.....	.....	2.6	76.9	85.7	3.8	0.0	8.1	9
3.9	.....	.....	.....	.....	.....	.....	1.2	0.6	0.1	0.0	90.3	2.7	1.4	.....	0.3	5.3	.....	.....	3.3	77.4	84.6	3.2	+0.1	8.0	10
3.6	.....	.....	.....	.....	.....	.....	1.3	0.6	0.1	0.0	88.5	2.9	1.3	.....	0.2	5.1	.....	0.00	2.3	74.9	82.7	3.6	0.0	8.1	11
3.6	0.51	0.02	0.00	0.06	0.00	0.00	1.3	0.6	0.05	0.0	88.7	3.0	1.0	0.0	0.2	7.1	.....	.....	2.1	74.9	83.7	3.6	+0.1	8.1	12
3.4	.....	.....	.....	.....	.....	.....	1.3	0.5	0.05	0.0	89.8	3.3	1.4	.....	0.2	.....	.....	.....	0.2	73.9	82.9	3.7	−0.4	8.5	13
3.8	.....	.....	.....	.....	.....	.....	1.3	0.6	0.1	0.0	85.5	4.6	1.7	.....	0.2	6.7	.....	0.00	4.7	74.8	84.7	3.6	−0.3	8.5	14 15
4.0	.....	Trace	0.00	0.02	0.00	0.00	1.8	0.5	0.1	0.0	88.5	2.3	1.5	0.0	0.2	6.4	0.0	.....	3.2	75.8	84.1	4.9	−0.2	8.4	16
near NIPIGON																									
3.9	0.10	0.01	0.00	0.01	0.00	0.00	1.5	0.6	0.0	0.0	90.6	6.2	1.3	0.0	0.4	5.5	0.0	.....	1.6	75.9	88.0	4.1	−0.4	8.6	17
5.0	0.40	0.03	0.00	0.00	0.00	0.00	2.0	0.6	0.2	0.0	92.5	5.2	1.9	0.17	0.1	3.9	0.2 †	.....	4.5	80.4	88.5	5.1	−0.4	8.6	18
† Total																									
near GERALDTON																									
3.2	0.13	0.03	0.00	0.08	0.00	0.00	0.7	0.6	0.1	0.0	53.8	4.0	0.8	0.0	0.0	3.4	.....	.....	4.7	48.8	53.6	3.0	−1.3	9.9	19
near JELLICOE																									
6.0	0.05	0.03	0.00	0.00	0.00	0.00	1.3	0.7	0.1	0.0	129	8.9	1.8	0.0	0.4	7.0	0.0	.....	5.3	111	124	2.5	+0.4	7.4	20
at BEARDMORE																									
5.1	0.10	0.04	0.00	0.00	0.00	0.00	1.0	0.8	0.1	0.0 (0)	109 (112)	4.6	1.0	0.0	0.1	5.4	.....	.....	6.8	95.8	101	2.2	+0.2	7.8	21
near BEARDMORE																									
6.5	0.20	0.03	0.00	0.00	Trace	0.00	5.0	1.4	0.0	0.0 (0)	96.9 (101)	6.9	9.6	0.0	3.0	7.3	.....	.....	10.1	89.6	113	11	−0.7	8.8	22
near EVERARD																									
4.9	.....	0.06	0.00	0.00	0.00	0.05	11.5	0.8	0.1	0.0	66.9	7.1	15.7	0.0	0.4	8.4	.....	.....	3.2	58.1	97.2	30	−1.0	9.5	23
near HURKETT																									
7.6	0.27	0.05	0.00	0.00	0.01	0.00	0.9	0.6	0.1	0.0	81.2	6.7	1.3	0.21	0.5	5.2	0.27†	.....	7.4	74.0	80.7	1.7	−0.6	8.9	24
† Total																									

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet): On sampling date	Stream discharge (Second-feet): Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter: Dried at 105°C.	Suspended matter: Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids): P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids): Tons per day	Loss on ignition at 550°C.	Specific conductance K × 10⁶ at 25°C.	Calcium (Ca)
																		STATION NO. 156 – CURRENT RIVER
1	Oct. 17/57	8:19	.....	.....	47	9.7	2	7.5	65	3	4.8	1.3	58.8	0.080	.....	35.6	83.5	10.3
2	Dec. 19	29:39	.....	.....	33	.....	2	7.6	70	0.8	.....	.....	.....	.....	.....	.....	80.2	9.6
3	Feb. 19/58	22:48	.....	.....	35	10.7	3	7.4	70	0.2	.....	.....	68.8	0.094	.....	41.2	79.3	9.3
4	Apr. 18	18:24	High	.....	39	.....	1	7.4	70	1	.....	.....	.....	.....	.....	.....	51.1	5.5
5	June 19	22:29	.....	.....	63	12.8	2	7.3	70	0.8	.....	.....	66.4	0.090	.....	43.2	50.7	5.8
6	Aug. 19	24:125	.....	.....	65	.....	8	6.9	55	0	.....	.....	.....	.....	.....	.....	74.5	9.3
																		STATION NO. 157 – LOCH LOMOND
7	Sept. 7/50	-:34	.....	.....	.....	.....	5	7.0	35	3	.....	.....	56.8	0.077	.....	19.6	56.8	5.8
8	Mar. 11/53†	.....	.....	.....	.....	.....	0.4	7.7	.....	3	.....	.....	56	0.076	.....	.....	.....	5.6
9	June 17/53†	.....	.....	.....	.....	.....	3	7.1	.....	2	.....	.....	60	0.082	.....	.....	.....	6.0
10	June 8/61	6:6	.....	.....	.....	.....	4	7.0	15	.....	.....	.....	.....	.....	.....	.....	51.8	4.9
11	May 24/62*	32:34	.....	.....	50	.....	7	6.7	25	.....	.....	.....	.....	.....	.....	.....	53.7	6.2
																		STATION NO. 158 – DOG LAKE
12	July 31/57	92:106	.....	.....	.....	13.0	3	7.2 (7.2)	60 (75)	0.9	.....	.....	68.8	0.094	.....	39.2	63.0	6.9
																		STATION NO. 159 – KAMINISTIKWIA RIVER
13	Aug. 2/57	95:102	1,530	1,310	.....	.....	2.5	7.3 (7.3)	50 (80)	2	.....	.....	.....	.....	.....	.....	63.1	7.8
																		STATION NO. 160 – KAMINISTIKWIA RIVER
14	Oct. 17/57	7:18	1,530†	1,360†	50	12.8	1	7.6	70	2	.....	.....	72.0	0.098	297	42.0	66.3	8.7
15	Nov. 18	15:21	1,640	1,550	36	.....	2	7.6	90	5	.....	.....	.....	.....	.....	.....	78.7	10.6
16	Dec.	No sample taken		1,490														
17	Jan. 17/58	8:38	1,410	1,530	.....	10.0	2	7.5	55	1	.....	.....	74.4	0.101	282	39.2	71.1	9.9
18	Feb. 18	24:41	1,540	1,570	33	.....	1	7.6	70	0.3	.....	.....	.....	.....	.....	.....	67.2	8.7
19	Mar. 18	7:44	1,400	1,470	33	.....	0.8	7.8	50	0.8	.....	.....	.....	.....	.....	.....	73.4	9.0
20	Apr. 18	18:32	1,770	1,420	46	19.3	2	7.4	110	7	.....	.....	96.4	0.131	459	50.0	68.0	8.5
21	May 20	16:23	1,040	1,110	54	.....	3	7.4	75	4	.....	.....	.....	.....	.....	.....	79.8	10.8
22	June 18	22:30	1,060	1,420	61	.....	2	7.5	120	4	.....	.....	.....	.....	.....	.....	66.4	10.0
23	July 18	28:46	1,540	1,610	66	11.9	3	7.3	90	4	3.2	2.5	78.4	0.107	326	30.8	66.9	9.2
24	Aug. 18	21:45	1,700	1,670	.....	.....	5	7.2	75	2	.....	.....	.....	.....	.....	.....	68.0	9.0
25	Sept. 18	7:124	1,230	1,370	56	.....	1	7.7	90	2	.....	.....	.....	.....	.....	.....	68.8	8.9
26	May 24/62	32:34	2,270	2,070	57	.....	8	7.0	90	5	.....	.....	.....	.....	.....	.....	93.5	11.5
																		STATION NO. 161 – SHEBANDOWAN LAKE
27	Aug. 2/57	90:104	.....	.....	80	7.2	4	7.0 (7.3)	20	5	16	4.5	53.6	0.073	.....	23.2	56.2	7.0
																		STATION NO. 162 – SHEBANDOWAN RIVER*
28	Aug. 2/57	90:104	489†	315†	80	9.2	1	7.5 (7.7)	50	1	.....	.....	59.6	0.081	78.4	25.6	64.5	8.2
29	Sept.	No sample taken		339														

† Analyses by Alchem Ltd., Burlington, Ont.
* At city tap
See also Table III, page 89

† Discharge records at bridge on highway No. 17A at Kaministikwia, Lat. 48°31' 58", Long. 89°35' 39" - Drainage area 2,500 square miles.
See also Station No. 182, page 68

* Locally known as Matawin River; sampled from highway No. 17 bridge.
† Discharge data for Aug. 2/57 recorded at Glenwater; remaining data recorded at highway No. 17 bridge near Sunshine.

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at PORT ARTHUR																									
3.5	.....	0.25	0.01	0.00	0.00	0.00	1.0	0.7	0.0	0.0	43.3	4.1	1.3	0.75	0.1	5.5	.....	.....	4.6	40.1	48.9	5.0	−1.3	10	1
3.3	.....	.....	.....	.....	.....	.....	1.2	0.6	0.1	0.0	38.5	6.0	1.0	....	0.4	7.8	.....	0.00	5.9	37.5	49.0	6.3	−1.3	10	2
3.5	.....	0.17	Trace	0.00	0.00	0.00	1.0	0.7	0.15	0.0	37.7	6.2	1.3	0.0	0.8	7.8	.....	.....	6.7	37.6	49.5	5.3	−1.5	10	3
2.4	.....	.....	.....	.....	.....	.....	0.8	0.5	0.2	0.0	23.3	4.6	0.8	.....	0.9	6.8	.....	0.00	4.5	23.6	33.8	6.7	−1.9	11	4
2.4	.....	0.11	0.00	0.00	0.00	0.00	0.9	0.5	0.1	0.0	23.8	5.1	0.4	0.0	0.3	5.5	.....	.....	4.8	24.3	32.3	7.2	−2.0	11	5
3.3	.....	.....	.....	.....	.....	.....	1.0	0.6	0.1	0.0	37.2	5.0	0.7	....	0.3	5.6	.....	0.00	6.3	36.8	44.1	5.5	−2.1	11	6
at FORT WILLIAM																									
1.9	.....	0.16	.....	.....	.....	.....	2.9	0.4	.....	0.0	29.2	5.9	0	0.20	0.0	4.2	.....	.....	0	22.3	35.9	22	−2.3	12	7
2.4	0.1	.....	.....	0.00	.....	.....	.....	.....	0.0	0	19.5	6.8	0	.....	.....	4.9	.....	.....	8	24	.....	.....	−1.7	11	8
1.2	0.2	.....	.....	0.00	.....	.....	.....	.....	0.0	0	30.5	8.1	0	.....	.....	4.1	.....	.....	0	20	.....	.....	−2.1	11	9
2.7	.....	.....	.....	.....	.....	.....	1.0	0.6	0.1	0.0	20.8	.....	0.9	0.06	.....	.....	.....	.....	6.4	23.5	.....	.....	.....	.....	10
2.5	0.01	0.01	0.00	0.00	0.30	Trace	0.9	0.5	.....	0.0	21.2	7.1	0.9	0.11	0.1	3.7	.....	.....	8.4	25.8	29.2	6.8	−2.6	12	11
at dam, north of KAMINISTIKWIA																									
2.5	.....	0.12	0.00	0.00	0.00	0.00	1.4	1.1	0.15	0.0	27.7	4.1	1.6	0.0	1.2	6.1	.....	.....	4.8	27.5	38.9	9.3	−2.0	11	12
at KAMINISTIKWIA																									
2.4	.....	.....	.....	.....	.....	.....	1.3	0.8	0.0	0.0	31.7	4.9	0.9	.....	0.2	6.0	.....	.....	3.3	29.3	39.9	8.5	−1.7	11	13
at KAKABEKA FALLS																									
2.6	.....	0.06	0.00	0.00	0.00	0.00	1.0	0.7	0.1	0.0	33.8	4.9	1.2	0.0	0.7	6.7	.....	.....	4.7	32.4	40.7	6.1	−1.4	10	14
3.2	.....	.....	.....	.....	.....	.....	1.4	0.9	0.0	0.0	40.8	5.2	1.9	.....	0.4	8.1	.....	.....	6.1	39.6	51.8	7.0	−1.3	10	15 16
2.7	.....	0.09	0.00	0.00	Trace	0.00	1.1	0.6	0.1	0.0	35.8	6.7	1.2	0.0	1.0	7.3	.....	.....	6.4	35.8	48.3	6.1	−1.5	11	17
2.5	.....	.....	.....	.....	.....	.....	1.4	0.6	0.15	0.0	31.9	5.2	1.1	.....	0.8	7.3	.....	.....	5.8	32.0	43.4	8.4	−1.4	10	18
2.2	.....	.....	.....	.....	.....	.....	1.1	0.7	0.1	0.0	32.4	4.2	0.8	.....	0.8	7.1	.....	.....	4.9	31.5	41.9	6.9	−1.2	10	19
2.8	.....	0.14	0.00	0.00	0.00	0.00	1.1	0.8	.....	0.0	29.3	4.9	1.2	0.0	0.8	8.5	.....	.....	8.7	32.7	43.1	6.6	−1.6	11	20
2.8	.....	.....	.....	.....	.....	.....	1.2	0.8	0.2	0.0	43.2	3.9	1.1	.....	0.3	5.3	.....	.....	3.1	38.5	47.4	6.2	−1.3	10	21
2.5	.....	.....	.....	.....	.....	.....	1.4	0.6	0.1	0.0	37.5	6.0	1.0	.....	0.3	5.8	.....	0.00	4.4	35.2	46.1	7.8	−1.4	10	22
2.3	0.89	0.07	0.00	0.00	0.00	0.00	1.1	0.6	0.15	0.0	34.4	3.7	0.9	0.0	0.7	7.2	.....	.....	4.2	32.4	42.7	6.7	−1.6	11	23
2.7	.....	.....	.....	.....	.....	.....	1.0	0.7	0.2	0.0	33.5	3.6	1.2	.....	0.6	6.6	.....	.....	6.1	33.6	41.9	5.9	−1.8	11	24
2.8	.....	.....	.....	.....	.....	.....	1.2	0.7	0.1	0.0	34.6	3.4	1.2	.....	0.5	7.1	.....	0.00	5.3	33.7	42.8	7.0	−1.2	10	25
4.2	0.37	0.11	0.00	0.00	0.00	0.00	1.5	0.8	.....	0.0	41.3	8.5	2.2	0.25	1.0	4.7	0.12	.....	12.1	46.0	55.2	6.5	−1.8	11	26
near MABELLA																									
1.8	.....	0.20	0.00	0.00	0.00	0.00	1.1	0.6	0.05	0.0	25.5	4.4	0.9	0.0	0.4	5.2	.....	.....	4.0 (4.6)	24.9 (27.9)	34.2	8.4	−2.2	11	27
near KAMINISTIKWIA																									
2.2	.....	0.13	0.00	0.00	Trace	0.05	1.2	0.7	0.05	0.0 (0)	33.4 (33.7)	3.9	0.9	0.0	0.4	5.5	.....	.....	2.1 (2.3)	29.5 (29.9)	39.7	7.8	−1.5	11	28 29

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 162 – SHEBANDOWAN RIVER*																		
1	Oct. 19/57	12:44	180†	213†	41	18.4	3	7.6	100	4	.....	.....	56.0	0.076	32.1	21.2	115	15.6
2	Nov. 21	12:18	370	361	37	.....	4	7.3	150	4	.....	.....	.....	.....	.....	.....	90.8	12.3
3	Dec. 20	28:38	557	548	39	10.0	2	7.5	60	3	.....	.....	81.2	0.110	121	39.6	80.4	11.0
4	Jan. 23/58	20:32	539	562	37	.....	9	7.0	40	7	.....	.....	.....	.....	.....	.....	133	10.7
5	Feb. 22	16:18	485	484	35	.....	4	7.2	35	3	.....	.....	.....	.....	.....	.....	120	9.6
6	Mar. 20	20:27	409	451	38	7.3	5	7.1	30	2	.....	.....	77.2	0.105	85.0	27.6	82.7	10.7
7	Apr. 25	33:42	1,030	1,090	45	.....	1.5	7.5	120	3	.....	.....	.....	.....	.....	.....	61.2	8.3
8	May 23	13:20	562	591	51	.....	2.5	7.4	100	5	.....	.....	.....	.....	.....	.....	82.8	11.3
9	June 21	25:33	516	770	62	.....	5.	7.0	100	2	.....	.....	73.6	0.100	102	37.2	68.5	9.1
10	July 26	25:54	570	996	74	.....	3	7.3	75	2	.....	.....	.....	.....	.....	.....	72.0	10.5
11	Aug. 26	30:147	195	287e	64	.....	4	7.3	60	0	.....	.....	.....	.....	.....	.....	87.6	11.9
12	Oct. 1	14:122	384	469	50	17.8	2	7.6	90	4	.....	.....	104	0.141	107	50.8	98.7	14.3

* Locally known as Matawin River; sampled from highway No. 17 bridge.
† Discharge data for Aug. 2/57 recorded at Glenwater; remaining data recorded at highway No. 17 bridge near Sunshine.
e estimated

STATION NO. 163 – PIGEON RIVER*																		
13	July 31/57	72:83	155	293	75	5.7	3.5	7.3 (7.8)	25	4	.....	.....	62.8	0.085	26.1	16.4	90.1	11.3
14	Nov. 13	12:47	178	165	36	14.9	2	7.6	80	9	12.	3.2	89.2	0.121	42.6	39.6	92.1	11.2
15	Dec. 16	24:32	101	105	35	.....	2	7.5	50	5	.....	.....	.....	.....	.....	.....	94.6	11.4
16	Jan. 19/58	24:36	95	91	34	.....	3	7.4	30	5	.....	.....	.....	.....	.....	.....	98.0	11.4
17	Feb. 17	24:50	81	89	.....	4.0	2	7.7	25	6	6.1	1.9	83.2	0.113	18.1	26.8	99.1	11.6
18	Mar. 19	15:43	90	93	37	.....	3	7.4	25	5	.....	.....	.....	.....	.....	.....	99.9	11.5
19	Apr. 21	18:29	471	422	48	.....	2	7.2	110	7	.....	.....	.....	.....	.....	.....	58.2	6.6
20	May 17	13:19	178	222	60	.....	2	7.4	85	3	.....	.....	79.6	0.108	38.1	38.0	76.8	8.9
21	June 17	23:31	94	130	57	.....	1	7.7	70	4	.....	.....	.....	.....	.....	.....	86.5	10.5
22	July 15	23:41	76	78	68	.....	3	7.4	50	2	.....	.....	.....	.....	.....	.....	92.8	11.2
23	Aug. 15	24:33	73	65	67	3.7	3	7.4	20	1	.....	.....	68.0	0.092	13.3	26.0	89.9	10.8
24	Oct. 15	7:110	186	206	48	.....	.....	7.5	140	5	.....	.....	.....	.....	.....	.....	89.3	11.2

* Lat. 48°00' 42", Long. 89°36' 40" – Drainage area 600 square miles; sampled at Middle Falls.

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
near KAMI NISTIKWIA (concluded) - Draiaage area - 1,080 square miles																									
4.6	.....	0.30	0.00	0.00	0.00	0.00	2.1	1.1	0.1	0.0	65.0	5.8	2.5	0.0	0.2	8.4	.....	.....	4.5	57.8	72.7	7.1	-0.9	9.4	1
3.9	.....	.....	.....	.....	.....	.....	1.7	0.8	0.1	0.0	45.2	5.6	2.7	.....	0.2	9.9	.....	.....	9.6	46.7	59.5	7.1	-1.5	10	2
2.5	.....	0.14	0.00	0.00	Trace	0.00	1.2	0.7	0.1	0.0	41.1	4.9	1.3	0.0	0.2	7.4	.....	0.10	4.0	37.7	49.7	6.3	-1.3	10	3
2.8	.....	.....	.....	.....	.....	.....	7.7	4.2	.....	0.0	51.7	4.8	9.6	.....	0.1	6.6	.....	.....	0.0	38.2	71.9	28	-1.8	11	4
2.5	.....	.....	.....	.....	.....	.....	1.9	1.2	0.15	0.0	37.7	5.3	2.1	.....	Trace	8.0	.....	.....	3.3	34.2	49.3	10	-1.7	11	5
2.6	.....	0.08	0.00	0.00	0.00	0.00	1.4	0.8	0.1	0.0	38.4	6.2	1.3	0.0	0.8	7.2	.....	.....	5.9	37.4	50.1	7.3	-1.8	11	6
2.4	.....	.....	.....	.....	0.00	.....	1.0	0.6	0.1	0.0	25.5	5.4	1.4	.....	0.6	7.2	.....	.....	7.4	30.6	39.4	6.5	-1.6	11	7
2.8	.....	.....	.....	.....	.....	.....	1.3	0.7	0.1	0.0	40.2	5.9	1.3	.....	0.2	4.6	.....	0.00	6.7	39.7	47.9	6.5	-1.4	10	8
2.6	.....	0.10	0.00	0.00	Trace	0.00	1.1	0.6	0.1	0.0	35.2	5.0	1.0	0.0	1.5	4.9	.....	.....	4.5	33.4	43.2	6.5	-1.9	11	9
2.3	.....	.....	.....	.....	.....	.....	1.3	0.6	0.2	0.0	38.9	4.5	0.7	.....	0.4	6.2	.....	.....	3.8	35.7	45.6	7.2	-1.6	11	10
3.3	.....	.....	.....	.....	.....	.....	1.4	0.7	0.15	0.0	46.1	5.7	1.0	.....	0.5	5.6	.....	0.00	5.5	43.3	52.8	6.5	-1.4	10	11
3.5	2.7	0.12	0.00	0.00	0.00	0.00	1.2	0.8	0.1	0.0	50.6	4.6	1.0	0.0	0.2	6.9	0.0	.....	8.6	50.1	57.5	4.8	-1.0	9.6	12
near PIGEON RIVER																									
3.1	.....	0.04	0.00	0.03	0.00	0.00	1.5	0.5	0.05	0.0	44.0	6.9	1.8	0.0	0.8	6.8	.....	.....	4.8	40.9	54.5	7.2	-1.5	10	13
3.8	.....	0.13	0.00	0.00	0.00	0.00	2.2	0.8	0.0	0.0	41.4	10.2	2.9	0.0	0.4	7.4	.....	.....	9.6	43.6	59.4	9.6	-1.2	10	14
3.7	.....	.....	.....	.....	.....	.....	1.7	0.6	.....	0.0	43.6	8.3	2.1	.....	0.2	7.8	.....	.....	7.9	43.7	57.3	7.7	-1.3	10	15
3.8	.....	.....	.....	.....	.....	.....	1.8	0.6	0.0	0.0	47.1	7.6	1.8	.....	0.2	7.9	.....	0.00	6.5	45.1	58.7	7.9	-1.4	10	16
3.7	.....	0.10	0.00	0.02	0.00	0.00	1.8	0.6	0.1	0.0	46.9	8.4	1.8	0.0	0.6	9.5	.....	.....	5.7	44.2	61.3	7.9	-1.1	9.9	17
3.8	.....	.....	.....	.....	.....	.....	1.9	0.6	0.1	0.0	46.3	7.9	1.6	.....	0.5	7.9	.....	.....	6.3	44.3	58.6	8.3	-1.4	10	18
2.5	.....	.....	.....	.....	.....	.....	1.4	0.5	0.1	0.0	23.3	6.9	1.1	.....	0.8	7.1	.....	0.00	7.6	26.7	38.4	10	-2.0	11	19
3.3	0.37	0.07	0.00	0.00	0.00	0.00	1.7	0.6	0.1	0.0	33.3	7.1	1.3	0.0	0.2	3.9	.....	.....	8.5	35.8	43.5	9.2	-1.6	11	20
3.4	.....	.....	.....	.....	.....	.....	2.0	0.5	0.2	0.0	42.9	7.2	1.3	.....	0.2	4.5	.....	.....	5.0	40.2	50.7	9.6	-1.1	9.9	21
3.7	.....	.....	.....	.....	.....	.....	1.7	0.5	0.2	0.0	46.8	7.6	1.5	.....	0.0	4.0	.....	.....	4.8	43.2	53.2	7.8	-1.3	10	22
3.6	.....	0.02	0.00	0.00	0.00	0.00	1.6	0.5	0.05	0.0	44.2	6.2	1.6	0.0	0.4	5.0	.....	.....	5.5	41.8	51.5	7.6	-1.5	10	23
4.1	.....	.....	.....	.....	.....	.....	1.8	0.6	0.1	0.0	41.7	6.4	1.9	.....	0.6	7.1	.....	0.00	10.6	44.8	54.2	7.9	+1.3	10	24

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TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly meao	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific coeduct-ance K × 10⁶ at 25°C.	Calcium (Ca)
STATION NO. 164 – LAKE HURON (GEORGIAN BAY, NORTH CHANNEL)																		
1	June 8/63	31:60	Water Level 576.91†	576.92†	71	4.2	2	7.5 (8.1)	5	2	.....	.....	74.4	0.101	.....	.....	123	14.1
STATION NO. 165 – TIMAGAMI RIVER*																		
2	June 5/63	22:54	.....	.....	73	8.7	3	6.6 (7.0)	20	0.5	.....	.....	40.0	0.054	.....	14.0	52.4	4.5
STATION NO. 166 – MARTEN RIVER*																		
3	June 5/63	22:54	.....	.....	72	9.4	2	7.0 (7.2)	25	0.5	.....	.....	.....	.....	.....	.....	62.6	6.3
STATION NO. 167 (STATION NO. 19) – LAKE NIPISSING *																		
4	June 4/63	21:55	642.10†	642.15†	66	9.0	3	7.0 (7.3)	25	3	1.6	0.9	54.0	0.073	.....	20.8	73.1	6.6
STATION NO. 168 – SOUTH RIVER*																		
5	June 4/63	23:37	185†	134†	72	11.3	5	6.3 (6.3)	30	1	.....	.....	.....	.....	.....	.....	40.1	3.4
STATION NO. 169 (STATION NO. 24) – TOMIKO RIVER*																		
6	June 5/63	22:54	.....	.....	71	9.5	4	6.0 (6.4)	20	0.9	.....	.....	.....	.....	.....	.....	41.8	2.9
STATION NO. 170 (STATION NO. 79) – SERPENT (KENNEBEC) RIVER*																		
7	June 24/63	50:80	.....	.....	74	2.4	1	6.6 (6.6)	5	1	.....	.....	194	0.264	.....	36.4	283	34.8
STATION NO. 171 (STATION NO. 84) – DEPOT LAKE*																		
8	June 24/63	50:73	.....	.....	74	2.7	2.5	6.7 (7.1)	5	0.5	.....	.....	.....	.....	.....	.....	292	29.9
STATION NO. 172 (STATION NO. 89) – BLIND RIVER																		
9	June 24/63	50:73	.....	.....	71	5.7	5	6.8 (7.6)	20	3	.....	.....	46.0	0.063	.....	23.2	60.2	6.1
STATION NO. 173 (STATION NO. 96) – MISSISSAGI RIVER*																		
10	June 24/63	50:73	1,686†	1,913†	65	5.6	5	6.9 (7.6)	20	2	.....	.....	58.4	0.079	264	22.0	61.7	6.6

† Elevation in feet above mean level at Father Point; referred to IGLD (1955) at Thessalon (Canadian Hydrographic Service)

* Sampled at Martel's Riverside Lodge

* Sampled at highway No. 64 bridge

* At Callander wharf
† Level in feet at public wharf in North Bay above mean sea level based on Geodetic Survey of Canada Stations.

* Sampled at highway No. 11 bridge
† Discharge records at South River immediately below the South River Electric Company - Lat. 45°50', Long. 79°22' 35"

* Sampled from highway No. 11 bridge

* Sampled at highway No. 17 bridge

* Sample at lake outlet from highway No. 108 bridge.

† Discharge records at Rayner Generating Statinn – *see* Station No. 94, page 46
* Sampled at bridge on road to Dean Lake

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at BLIND RIVER																									
4.5	.....	0.00	0.00	0.01	0.00	0.00	2.2	0.7	0.1	0.0	46.4	15.2	2.1	0.08	1.7	2.7	<0.1	.....	15.8	53.9	66.1	8.1	-1.2	9.9	1
near FIELD																									
2.2	0.08	Trace	0.00	0.02	Trace	<0.05	0.8	0.5	<0.1	0.0	7.7	14.2	0.8	0.07	1.1	1.7	< 0.1	.....	14.3	20.6	29.7	7.6	-3.3	13	2
at MARTEN RIVER																									
2.3	0.08	.....	0.00	.....	.....	0.00	1.1	0.6	0.5	0.0	12.7	15.0	0.1	0.09	0.3	1.6	.....	.....	14.6	25.0	33.6	8.5	-2.5	12	3
at CALLANDER																									
2.7	0.14	0.00	0.00	0.04	Trace	0.00	2.0	0.9	0.0	0.0	18.2	14.2	1.1	0.09	0.4	1.0	.....	.....	12.9	27.8	38.9	13	-2.4	12	4
near SOUTH RIVER																									
1.5	0.32	0.02	0.00	.....	.....	0.00	1.0	0.6	<0.1	0.0	6.0	9.9	0.2	0.08	0.4	2.6	.....	.....	9.6	14.5	22.6	13	-3.8	14	5
north of NORTH BAY																									
1.3	0.12	.....	0.03*	.....	.....	0.00	1.5	0.5	0.1	0.0	2.3	12.3	0.8	0.09	0.3	2.0	.....	.....	10.8	12.7	22.8	20	-4.6	15	6
* Total																									
near CUTLER																									
4.6	.....	.....	0.00	0.1	Trace	0.10	6.0	4.5	0.0	0.0	3.3	98.5	5.9	0.14	13	2.1	Trace	.....	103	106	172	10	-2.9	12	7
near ELLIOT LAKE																									
7.0	.....	.....	.....	.....	.....	0.02	7.5	5.8	0.0	0.0	7.7	98.5	8.3	0.17	12	0.3	.....	.....	97.2	103	173	13	-2.4	11	8
at BLIND RIVER																									
2.4	.....	Trace	0.00	0.0	Trace	0.10	1.1	0.3	0.0	0.0	20.5	8.7	0.2	0.07	0.3	0.2	<0.1	.....	8.1	24.9	29.3	8.7	-2.5	12	9
near DEAN LAKE																									
2.6	.....	0.02	0.00	0.0	Trace	0.10	0.9	0.4	0.1	0.0	23.5	8.7	0.2	0.09	0.3	4.3	< 0.1	.....	7.8	27.1	35.7	6.6	-2.3	11	10

96900—5½

TABLE II – (Continued)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million

No.	Date of collection	Storage period (Days)	Stream discharge (Second-feet) On sampling date	Stream discharge (Second-feet) Monthly mean	Water temperature (°F.)	Oxygen consumed by $KMnO_4$	Carbon dioxide (calculated) (CO_2)	pH	Colour (Hazen) (Units)	Turbidity (Units)	Suspended matter Dried at 105°C.	Suspended matter Ignited at 550°C.	Residue on evaporation dried at 105°C. (Dissolved solids) P.P.M.	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per acre-foot	Residue on evaporation dried at 105°C. (Dissolved solids) Tons per day	Loss on ignition at 550°C.	Specific conductance $K \times 10^6$ at 25°C.	Calcium (Ca)
STATION NO. 174 (STATION NO. 109) – MONTREAL RIVER																		
1	June 23/63	57:58	652†	1,033†	57	8.2	14	6.4 (7.5)	40	2	.....	.....	.....	.....	.....	.....	53.3	6.4
† Discharge records at Algoma Central and Hudson Bay Railway bridge, *see* Station No. 109, page 48																		
STATION NO. 175 (STATION NO. 115) – OLD WOMAN RIVER *																		
2	June 23/63	51:58	.....	.....	63	7.5	5	6.6 (7.1)	35	2	.....	.....	.....	.....	.....	.....	41.8	5.0
* Sampled at highway No. 17 bridge																		
STATION NO. 176 – MICHIPICOTEN RIVER *																		
3	June 23/63	40:58	2,395†	2,631†	60	9.9	6	6.9 (7.7)	50	2	.....	.....	66.4	0.090	427	31.6	81.9	11.2
† Discharge records at High Falls, *see* Station No. 116, page 50 * Sampled at bridge on Michipicoten Harbour road																		
STATION NO. 177 (STATION NO. 117) – MAGPIE RIVER *																		
4	June 22/63	41:59	1,520†	1,670†	62	9.4	1	7.6 (7.7)	50	4	6.2	3.3	68.0	0.092	277	34.0	81.7	11.1
† Discharge records near Michipicoten, *see* Station No. 117, page 50 * Sampled at highway No. 17 bridge																		
STATION NO. 178 (STATION NO. 122) – WEST WHITE RIVER *																		
5	June 22/63	41:62	7,780†	5,860†	60	11.3	6	7.1 (7.7)	55	1	.....	.....	.....	.....	.....	.....	88.7	13.0
* Sampled at highway No. 17 bridge † Discharge records at outlet of White Lake, about 3 miles below CPR bridge, 5 miles southwest of Mobert Station, Lat. 48°39' 26", Long. 85°44' 32"																		
STATION NO. 179 (STATION NO. 124) – WHITE LAKE *																		
6	June 22/63	38:47	7,780†	5,860†	62	10.5	2	7.9 (8.3)	45	0.7	.....	.....	96.8	0.132	.....	34.0	138	20.1
* Sampled at highway No. 17 bridge † Discharge records at outlet of White Lake, about 3 miles below CPR bridge, 5 miles southwest of Mobert Station, Lat. 48°39' 26", Long. 85°44' 32"																		
STATION NO. 180 (STATION NO. 128) –BLACK RIVER *																		
7	June 22/63	38:51	.....	.....	56	16.1	2.5	7.7 (8.2)	80	14	35	31	126	0.171	.....	61.8	146	22.5
* Sampled at highway No. 17 bridge																		
STATION NO. 181 (STATION NO. 130) – PIC RIVER *																		
8	June 22/63	38:51	.....	.....	56	13.1	2	7.9 (8.1)	80	110	167	140	137	0.186	.....	58.8	177	27.9
* Sampled at highway No. 17 bridge																		
STATION NO. 182 (STATION NO. 160) – KAMINISTIKWIA FALLS																		
9	June 21/63	39:52	12,900†	8,400†	56	17.4	9	6.7	75	2	.....	.....	.....	.....	.....	.....	58.2	8.6
† Discharge records at bridge on highway No. 17Aat Kaministikwia, *see* Station No. 160, page 62																		
STATION NO. 183 (STATION NO. 162) – SHEBANDOWAN RIVER *																		
10	June 21/63	39:46	4,120	2,990	57	19.7	5	6.9	90	7	.....	.....	.....	.....	.....	.....	52.3	8.4
* Sampled at highway No. 17 bridge																		

TABLE II – (Concluded)

Chemical Analyses of Surface Waters in the Upper Great Lakes Drainage Basin

(In parts per million)

Magnesium (Mg)	Iron (Fe) Total	Iron (Fe) Dissolved	Manganese (Mn)	Aluminum (Al)	Copper (Cu)	Zinc (Zn)	Alkalis Sodium (Na)	Alkalis Potassium (K)	Ammonia (NH_3)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Silica (colorimetric) (SiO_2)	Phosphate (PO_4)	Boron (B)	Hardness as $CaCO_3$ Non-carbonate	Hardness as $CaCO_3$ Total	Sum of constituents	Per cent sodium	Saturation index	Stability index	No.
at MONTREAL FALLS																									
2.2	.....	0.02	.....	.....	.....	0.2	0.6	0.5	0.1	0.0	21.1	6.9	0.5	0.09	1.1	4.7	.....	....	7.9	25.2	32.9	4.8	−2.9	12	1
south of MICHIPICOTEN HARBOUR																									
1.4	.....	0.01	.....	.....	.....	.....	0.7	0.4	0.1	0.0	11.7	9.2	0.2	0.12	0.4	4.3	.....	....	8.7	18.3	27.5	7.5	−3.0	13	2
near MICHIPICOTEN HARBOUR																									
2.6	.....	0.01	0.00	0.02	0.00	0.00	0.6	0.4	0.1	0.0	29.5	13.4	0.5	0.14	0.4	3.2	<0.1	....	14.5	38.7	46.6	3.2	−3.0	12	3
near MICHIPICOTEN HARBOUR																									
2.8	.....	0.00	0.00	0.04	.....	.....	0.8	0.5	0.0	0.0	28.6	13.6	0.5	0.16	0.6	3.3	<0.1	.....	15.8	39.3	47.2	4.2	−1.4	10	4
northwest of WHITE RIVER																									
3.2	.....	.....	.....	.....	.....	0.05	0.7	0.3	0.1	0.0	46.4	5.2	0.7	.....	0.2	3.4	.....	.....	7.6	45.7	49.6	3.2	−1.5	10	5
at NARROWS near REGAN																									
5.4	.....	0.02	0.00	0.0	Trace	0.00	0.6	0.4	0.0	0.0	80.0	5.4	0.2	0.14	0.8	3.7	<0.1	.....	6.9	72.5	76.1	1.8	−0.4	8.7	6
above HERON BAY SOUTH																									
4.7	0.89	0.03	0.00	.....	0.00	0.00	1.3	0.4	0.0	0.0	77.5	9.6	0.8	0.19	0.3	3.1	<0.1	.....	11.8	75.4	81.1	3.6	−0.5	8.7	7
above HERON BAY SOUTH																									
6.3	2.4	0.06	0.00	0.08	0.00	0.00	0.7	0.6	0.0	0.0	104	7.6	0.6	0.13	0.5	5.7	<0.1	.....	9.8	95.5	101	1.5	−0.1	8.1	8
at KAKABEKA FALLS																									
2.0	.....	0.04	0.00	.....	.....	.....	0.8	0.5	0.0	0.0	27.3	5.8	0.7	0.12	0.5	6.5	.....	.....	7.5	29.9	39.0	5.4	−2.4	11	9
near KAMINISTIKWIA																									
1.3	.....	.....	.....	.....	.....	.....	1.0	0.5	0.0	0.0	22.7	6.5	0.2	....	1.4	5.9	.....	.....	7.7	26.3	36.4	7.5	−2.3	11	10

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

Municipality	**BLIND RIVER** - (Town)
Year(s)	1958 / 1961 / 1963
Population served:	
In municipality	2,700 (3,733[a]) / 4,027 (4,093[b]) / 3,700 (3,894)††
Outside municipality	0 / 0 / 0
Total	2,700 / 4,027† / 3,700
Date(s) of survey	August 6, 1958; October 13, 1961; June 8, 1963
Ownership	Municipally owned and operated
Source of supply	In 1958 two wells, 68 ft deep in town; in 1961 and 1963 three wells 68 and 75 ft deep*
Treatment	In 1958 and 1961 no treatment with well water pumped direct to standpipe and system. In 1963 temporary chlorination was carried out during the spring.
Storage capacity (thousand gallons)	Elev. tank 500
Consumption (average in mgd)	1958: 0.156 (Max. 0.39); 1961: 0.35; 1963: 0.27. Capacity of system - 0.468
Industrial use	A dairy and the C.P. Ry.; a lumber company has its own supply
Remarks	† Includes West Pronto subdivision †† Total population * Consideration being given in 1961 to an emergency supply of treated river water. The third well is owned by the Ontario Water Resources Commission.

Municipality	**COPPER CLIFF** - (Town)
Year(s)	1958 / 1961 / 1962-63
Population served:	
In municipality	4,050 (3,801[a]) / 3,750 (3,600[b]) / 3,789
Outside municipality	0 / 0 / 0
Total	4,050 / 3,750 / 3,789
Date(s) of survey	August 1, 1958; April 15, 1960; November 30, 1961; June 25, 1963
Ownership	Owned and operated by International Nickel Co. of Canada Ltd. (INCO)
Source of supply	In 1958 and 1961 Meatbird Lake with Lady Macdonald Lake as a supplementary supply.* Since 1962 Vermilion River only.
Treatment	In 1958 and 1961 water was pumped with chlorination from nearby Meatbird Lake. Lady Macdonald Lake was used with chlorination as an auxiliary supply entering system by gravity. In 1962 and 1963 Vermilion River pumped with chlorination to elev. tank and system.
Storage capacity (thousand gallons)	Elev. tank 250
Consumption (average in mgd)	1958: Public -, Industrial -, Total 1.5; 1961: 0.84 (Max.), -, -; 1963: No record, 1.5. Capacity of town system - 0.84
Industrial use	None in 1962-63. Prior to use of Vermilion River water this system supplied the Copper Cliff smelter and refinery. The smelter used about 1.8 mgd of chlorinated Clarabelle Lake and Lady Macdonald Lake by gravity with Meatbird Lake as an auxiliary supply. The refinery used Meatbird Lake for domestic purposes (0.060 mgd), Kelly Lake for processing (1.94 mgd).
Remarks	* The INCO iron ore plant near Copper Cliff in 1961 used chlorinated Vermilion River water with auxiliary supply from two gravel wells (15 ft deep) and Meatbird Lake chlorinated - total use, 1.8 mgd (max. 2.4). Boiler feed water is further clarified, filtered and softened prior to internal treatment

[a] Population according to the Tenth Census of Canada, 1956
[b] Population according to the Eleventh Census of Canada, 1961

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

CAPREOL - (Town)

1958-59	1961	1963
2,550 (2,394[a])	3,000 (3,003[b])	2,978
0	0	0
2,550	3,000 estd	2,978

July 22, 1958; September 2, 1959; 1961

Municipally owned and operated .....

Four wells, 45 ft deep, 1 mile distant

No treatment; well water is pumped direct to reservoir and system.

Reservoir 214

1958-59	1961
0.20 (Max. 0.30)	0.375

Capacity of wells - 0.72
Capacity of system - 0.35

Canadian National Railways

CHELMSFORD - (Town)

1958	1963
2,400 (2,142[a]) (2,559[b])	2,530
30*	30*
2,430	2,560 estd

August 18, 1958; September 23, 1963

Municipally owned and operated**

Whitson River in town .....

In 1958 water pumped to a circular settling tank, sodium hypochlorite or chlorine (30 lb/mg) and alum (225 lb/mg) added, filtered (1) to clear well and repumped to tanks and system. In 1963 chlorine used, two filters and post-chlorinated.

In 1958, elev. tank (town) 80
Elev. tank (C.P. Ry.) 19
In 1963, Elev. tank (town) only .. 80

1958-59	1963
0.145	0.135 estd

Capacity of system - 0.288

In 1958 C.P. Ry. (3,700 gpd); a foundry has its own supply. In 1963, none

* In Balfour Township
** System installed in 1949

CONISTON - (Town)

1958	1961	1963
2,300 (2,478[a])	2,450 (2,692[b])	2,800
25 estd *	50 estd*	50*
2,325 estd	2,500 estd	2,850

July 31, 1958; November 30, 1961; June 6, 1963.

Plant owned and operated by the International Nickel Co. of Canada Ltd., (INCO); distribution system owned by the town.

Wanapitei River below town .....

Chlorinated river water is pumped by town to system; INCO also pumps to Coniston smelter.

Elev. tank (INCO) 130
No storage in town

	1958	1961	1963
Public	0.3	-	0.1
Industrial	1.8	-	2.4
Total	2.1	2.4	2.5

Capacity - 0.25 mgd.

No industrial use in town but the smelter of the International Nickel Co. of Canada Ltd. nearby uses most of the pumpage (86% in 1958).

* In Neelon and Garson Townships.

CREIGHTON (MINES) - (Town)*

1958	1961	1963
- (1,792[a])	1,650 (1,727[b])	1,692†
-	0	0
1,675 estd	1,650	1,692

August 1, 1958; November 30, 1961; June 25, 1963.

Owned and operated by the International Nickel Co. of Canada Ltd.

In 1958 and 1961 Meatbird Lake with Vermilion River, 6 miles distant, as supplementary supply; in 1963 Vermilion River only.

In 1958 and 1961 both waters are pumped with chlorination to tank and system. Since 1962 river water only is pumped with chlorination to tank and system with overflow going to Meatbird Lake.

Elev. tank 250

1958	1961	1963
No data	1.2**	No record

The Creighton Mine plant uses the town water for domestic purposes; the concentrator used, in 1961, 4 mgd of chlorinated Vermilion River water.

* Incorporated a town, March 1, 1958
** Capacity of system

ELLIOT LAKE

(Unincorporated community in the Improvement District of Elliot Lake)

1958-59	1961	1963
- (1,018[a])*	8,990 (9,950)*	9,000
-	0	0
12,000	8,990	9,000

August 14, 1958; September 24, 1959; October 16, 1961; June 24, and September 24, 1963.

Municipally owned and operated .....

Elliot Lake, nearby .....

Water is pumped with chlorination (7 lb/mg) from 1,000 ft out in lake to tank and system. Chlorine demand increases markedly at times.

Elev. tank 335

1959	1960-61	1963
0.75	1.5 (Max. 2.0)	1.2 (Max. 1.7)

None, except a soft drink bottling plant

* Community population. This mining area increased rapidly in population until about 1960-61; in recent years only 4 of 10 mines are still working and the population in the Improvement District decreased from 35,000 in 1959 to 10,000 in 1963; Much of this population lived in trailers and townsites at mines. (see Table IV, page 111). Total Improvement District population in 1956-3,791; in 1961-13,179; 1963-10,000

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

Municipality: **ESPANOLA** - (Town)*

Year(s):

Population served:	1958	1961	1963
In municipality	3,500 (4,381[a])	4,950 (5,353[b])	5,200 (5,360)†
Outside municipality	0	0	0
Total	3,500	4,950	5,200

Date(s) of survey: August 6, 1958; October, 1961; June 7, 1963

Ownership: In 1958 and 1961 jointly owned by town and The K.V.P. Co. Ltd., the plant being operated by the latter, the system by the town. In 1963 owned by O.W.R.C. and operated by town.

Source of supply: Up to Nov. 1962 Spanish River nearby, thereafter, Lake Apsey, 2 miles distant

Treatment: Prior to Nov. 1962 river water was rapid sand (anthrafilt)-filtered, chlorinated (20 lb/mg) and pumped to tanks and system. Since then Lake Apsey water is pumped with chlorination (12 lb/mg) to elev. tank and system.

Storage capacity (thousand gallons):
Up to Nov. 1962 elev. tanks (fire protection only) ..... 100 total
In 1963 elev. tank 200

Consumption (average in mgd):

	1958	1961	1963
Public	0.28	0.45	0.50 (Max. 0.90)
Industrial	17**	25	
Total	17.28	25.45	0.50

Industrial use: In 1963, no industrial users. The K.V.P. Co. has its own system, i.e. the company plant supplying treated Spanish River water.

Remarks:
* Incorporated a town in March 1958. Previously the K.V.P. Co. Ltd owned one-half the town which they supplied with water from their plant. After incorporation the two sections of town became one and the company supplied water from their plant until the new water system from Lake Apsey was placed into operation in Nov. 1962.
† Total town population
** Also use 17.3 mgd of untreated river water.

Municipality: **FORT WILLIAM** - (City)

Year(s):

Population served:	1953	1958-59	1962-63
In municipality	35,000 (39,464[a])	42,200 (45,124[b])	46,200
Outside municipality	0	0	100
Total	35,000	42,200	46,300

Date(s) of survey: August 6, 1953; August, 1959; June 21, 1963

Ownership: Municipally owned and operated

Source of supply: Loch Lomond, 5 miles distant, fed by run-off and springs

Treatment: No treatment; lake water flows by gravity with screening through pipe and rock tunnel to reservoir and system. Continual chlorination is to be started in summer 1963.

Storage capacity (thousand gallons): One concrete reservoir 800

Consumption (average in mgd):

1953	1958-59	1962-63
7 (Max. 11)	8	8.2

Industrial use: In 1953, industrial use by C.N. Rys., C.P. Ry., meat packing plants, bottling plant, dairies, a pulp and paper plant and small industries was estimated at 33 per cent of total consumption. In 1962-63 the above as well as flour mills, a foundry and producer of edible oils.

Remarks:

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

FALCONBRIDGE - (Townsite)*

1958	1961	1963
1,100 (1,273[a])	- (1,138[b])	1,450
0	-	0
1,100	1,200 estd	1,450

August 18, 1958; 1961; September 23, 1963

Privately owned and operated by Falconbridge Nickel Mines Ltd.

Up to August 1962 three wells 70, 70 and 83 feet deep on shore of Boucher Lake in plant area; in 1963 one well, 187 ft deep, in Townsite.

Up to August 1962 the mixed well waters were pumped (37 psi) with chlorination (2 lb/mg) to tanks and to plant and townsite systems. In 1963 new well water taken off line prior to the new elevated tank (0.25 mg capacity) and chlorinated for townsite system (65 psi). The older well system is connected to the new system with a back check valve.

In 1958 two elev. tanks 42, 42
In 1961 and 1963 three elev. tanks 42, 42 and 250

	1958	1961	1963
Public	-	-	-
Industrial	-	-	-
	3.0	3.0	5.1

Both systems are used in Eastern Mine and Falconbridge Mine and plant. The waters are used for cooling, boiler feed, smelter-cooling and all domestic purposes. Between ½ and ⅔ of the new well water pumped is used in the mine and plant.

*New well water is softer than older well water but it is said to be gradually becoming harder.

FERRIS WEST - (Township)*

1958	1961	1963
- (3,966[a])†	- (5,048[b])†	5,500 (5,729)†
-	-	0
3,900	4,700	5,500

July 1958; 1961††; June 5, 1963 .....

Municipally owned and operated .....

Trout Lake, purchased from City of North Bay .....

See North Bay

None .....

1958	1961	1962-63
0.158	0.265	0.3136

Manufacture of diamond cutting tools, and boats; much of the water supplies a large tourist area.

* Mostly in Upper Great Lakes drainage basin but served by water from Ottawa River drainage basin.
† Total township population; may rise in summer to 12,000 (1963).
†† Data from annual directory, Municipal Utilities Magazine, Feb. 1962. West Ferris community population - 2,070[a], 3,014[b].

GARSON

(Unincorporated community in United Townships of Neelon and Garson)*

1958-59	1961	1963
- (1,933[a])† (12,131)††	- (3,786[b])†(5,286)††	3,759 (5,345)††
-	-	0
No data	No data	3,759

August 2, 1958; November 30, 1961; June 7 and September 23, 1963 .....

Owned and operated by United Townships .....

Up to June, 1963, one deep well, 90 ft deep in community; a second well (No. 2), nearer Sudbury and said to be of the same quality went into use.

No treatment; water is pumped to elev. tank and system. .....

Elev. tank 50

1962-63
0.225 (Max. 0.34)

None .....

* Total Townships population was 12,849 prior to amalgamation, of about one-half of the area, and all but 4,791 of the population to Sudbury, on Jan. 1, 1960.
† Total community population
†† Total united Townships population: Garson Township in 1956 - 5,663; in 1961 - 5,041

GATEWAY*

(Unincorporated community in Widdifield Township)

Included in Widdifield Township

* Mostly in Upper Great Lakes drainage basin but served by water from Ottawa River drainage basin

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

Municipality	**GORE BAY** - (Town)	**KORAH TOWNSHIP***
Year(s)	1958	1958 / 1961 / 1963
Population served:		
In municipality	250 (731[a]) (716[b])	6,000 (7,258[a]) / 7,100 (10,338[b]†) / 9,300 (10,260)†
Outside municipality	0	0 / 0 / 0
Total	250	6,000 estd / 7,100 estd / 9,300 estd
Date(s) of survey	August 4, 1958	October 13, 1961; July 4 and September 25, 1963
Ownership	Municipally owned and operated	Distribution system owned and operated by Korah Township
Source of supply	Springs in town and Lake Huron (Georgian Bay)	St. Mary's River and artesian wells, purchased from Sault Ste Marie.
Treatment	Spring water feeds by gravity into 5 cisterns and to parts of system; lake water is pumped with chlorination (sodium hypochlorite) to the remainder of the system.	No treatment by township but water is also pumped by township.
Storage capacity (thousand gallons)	5 cisterns ..... about 30 total	None
Consumption (average in mgd)	No data	No data; included in Sault Ste Marie consumption. The wells supply people living nearby in the Township (1.5 mgd)
Industrial use	No major user; boats are supplied at wharf with drinking water.	No major user
Remarks		* Includes part of the Township of Park Awenge. † Total Township population

Municipality	**MANITOUWADGE** (Unincorporated community in the Improvement District of Manitouwadge)		
Year(s)	1959	1961	1963
Population served:			
In municipality	- (879[a])†	- (2,006[b])†	-
Outside municipality	-	-	-
Total	2,200	2,400	2,600 estd
Date(s) of survey	August 15 and 24, 1959; 1963 ††		
Ownership	Municipally owned and operated*		
Source of supply	Two wells, 80 ft deep		
Treatment	No treatment; well water is pumped direct to system.		
Storage capacity (thousand gallons)	None		
Consumption (average in mgd)	1959: 0.065 (Max. 0.098)	1962: 0.122	1963: 0.155††
Industrial use	None		
Remarks	* System installed in 1959 † Total population of the Improvement District - 877 in 1956; 2,635 in 1961. †† Municipal Utilities Directory, 1963		

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

LEVACK - (Town)

1958	1961
3,130 (2,929[a])	3,110 (3,178[b])
0	0
3,130	3,110

August 20, 1958; April 13, 1960; November 30, 1961

Owned and operated by the International Nickel Co. of Canada Ltd.

Two wells,* 70 ft deep, with Clear Lake as an auxiliary supply.

In 1958, no treatment; in 1961, chlorination, polyphosphate, and soda ash treatment at pumps. Water is pumped with treatment from lake and gravel wells alongside the Onaping River to tank and systems.

Elev. tank (at Levack Mine) 158

1961
0.25 (Max. 0.50)

Capacity of system - 1.0

The Levack mill is supplied with chlorinated water. In 1961 the Levack concentrator used one well (1.8 mgd max.) with chlorination, with the town water as an auxiliary supply.

* An additional well had been drilled but was not being used in August, 1958.

LITTLE CURRENT - (Town)

1958	1961
- (1,514[a])	- (1,527[b])
-	-
1,600	1,600 estd

July 24, 1957; August 5, 1958; 1961†

Municipally owned and operated .....

Lake Huron (Georgian Bay) nearby ...

Lake water is pumped with chlorination* direct to system.

None .....

1958	1961-63
0.20	0.25-0.30

A dairy and a freezing plant .....

* The chlorine demand is much higher in the summer.

† Date from annual directory, Municipal Utilities Magazine.

LIVELY - (Town)

1959	1961	1963
2,900 (2,840[a])	3,211[b]	3,200 (3,256)†
0	0	0
2,900 estd	3,211	3,200

November 30, 1961; June 25, 1963 .....

Owned and operated by the International Nickel Co. of Canada Ltd.

Meatbird Lake* .....

Water is pumped with chlorination to tank, then treated with polyphosphate and soda ash prior to entering the system.

Elev. tank 208

1961	1963
0.25 estd	No record

Capacity of system - 1.2

None .....

* In 1963 Meatbird Lake receives the overflow from the line supplying Vermilion River water to Copper Cliff and Creighton Mines.

† Total population

MARATHON

(Unincorporated community in the Improvement District of Marathon)

1957-58	1959	1962-63
2,400 (2,404[a])†	2,500 (2,568[b])†	2,550
0	0	0
2,400	2,500	2,550 estd

August 5, 1957; September 3, 1959; June 22, 1963 .....

In 1957, privately owned and operated; in 1959 municipally owned and operated

Two wells, 75 ft deep; also, in 1959 two undeveloped wells. Lake Superior via a company system is an emergency supply.

No treatment; water is pumped to reservoir and system. .....

Reservoir 208

1957	1959	1962-63
0.4	0.45 (Max. 0.5)	0.425

Capacity of system (1959) - 0.864

In 1957 about 33 per cent of the pumpage was used by the pulp and paper company for domestic and laboratory purposes.

† Total district population in 1956-2,415; in 1961-2,568

MASSEY - (Town)

1958	1962-63
1,176 (1,068[a])	1,250 (1,324[b])
0	0
1,176	1,250 estd

August 5, 1958; June 8, 1963 .....

Municipally owned and operated .....

Aux Sables River, about 1 mile distant

In 1958 no treatment, water flowing by gravity direct to system. Since Sept. 1962 water flows by gravity to pumphouse where it is pumped with chlorination to system.

None .....

1958	1962-63
Unknown	55,000 gpd (estd)

None .....

System in operation since about 1922.

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

Municipality	McKIM TOWNSHIP*			MICHIPICOTEN TOWNSHIP		
Year(s)	1958	1959	1963	1958	1961	1963
Population served:						
In municipality	- (17,461[a])	-	-	- (3,086[a])†	- (4,440[b])†	- (4,500)†
Outside municipality	Some in Neelon Township		-	-	-	-
Total	15,000	20,753†	0*	3,100 estd	3,500*	4,200 estd
Date(s) of survey	August 1, 1958; June 6, 1963			October 23, 1961; June 23, 1963		
Ownership	Prior to amalgamation distribution system owned by township; water purchased from City of Sudbury.			Privately owned and operated by the Algoma Ore Properties Division, Algoma Steel Corp. Ltd.		
Source of supply	Ramsay Lake, treated-purchased from Sudbury			Wawa Lake		
Treatment	*See* Sudbury			Lake water is pumped with chlorination to the system.		
Storage capacity (thousand gallons)	None			None		
Consumption (average in mgd)	Included in Sudbury consumption			1958: No data; 1961-63: 1.0		
Industrial use				None; the nearby mine is supplied from another source.		
Remarks	* McKim Township amalgamated with City of Sudbury, Jan. 1, 1960. † Total population prior to amalgamation			* In the unincorporated community of Wawa (Jamestown) - total population of which was in 1956 - 2,749; in 1961 - 4,040 † Total township population.		

Municipality	NORTH BAY* - (City)		
Year(s)	1957	1961	1963
Population served:			
In municipality	- (21,020[a])	22,700 (23,781[b])	23,266
Outside municipality	-	-	14,000**
Total	30,000**	-	37,266
Date(s) of survey	July 19, 1957, 1961†; June 5, 1963		
Ownership	Municipally owned and operated		
Source of supply	Trout Lake, 2½ miles distant		
Treatment	Lake water from 400 ft in lake is pumped with chlorination (17 lb/mg 1963) and fluoridation (17 lb sodium silicofluoride/mg, 1963) to reservoir and system; (chlorine 1.4 ppm, fluoride 0.9 ppm as F).		
Storage capacity (thousand gallons)	In 1957, one open reservoir ..... 4,400 In 1961, one open reservoir and elev. tank 4,400, 300		
Consumption (average in mgd)	1957: 2.7 (Max. 3.7)††	1961: 2.6††	1962-63: 3.5 (Max. 4.75)†† 1962 av. = 2.486
Industrial use	Main industrial users are the railroads - C.N. Rys; C.P. Ry.; O.N. Ry., and an asbestos fabricating plant (0.1 mgd).		
Remarks	* Community in the Upper Great Lakes drainage basin but served with water from the Ottawa River drainage basin ** Includes populations served in Ferris West and Widdifield Townships † Data from annual directory, Municipal Utilities Magazine †† Includes consumption in townships		

[a] Population according to the Tenth Census of Canada 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

NEELON TOWNSHIP*

1958	1963
- (8,087[a])†	- (245[b])†
McKim Township	0
15,000**	0

August 1, 1958; October 13, 1961; June 7, 1963

In 1958 distribution system owned by the Townships of Neelon and Garson. After amalgamation with the City of Sudbury (1960) system owned and operated by the United Township of Neelon-Garson.

In 1958 Lake Ramsay, treated, purchased from Sudbury and three wells, 90 feet deep. In 1962-63 deep wells in the community of Garson.

See Sudbury and Garson .....

None - *See* Sudbury and Garson

Included in Sudbury and Garson consumption

In 1963, none .....

* Neelon Township remaining after amalgamation with City of Sudbury, Jan. 1, 1960, became part of the United Townships of Neelon and Garson.

† Total Neelon Township population in 1956 and after amalgamation in 1960

** Includes mostly people served in McKim Township prior to amalgamation.

NIPIGON

(Unincorporated community in Nipigon Township)

1957	1959	1963
1,700 (1,717[a])†	2,000 (2,105[b])†	2,100†
0	0	0
1,700	2,000	2,100 estd

August 6, 1957; August 15, 1959; June 21, 1963 .....

Municipally owned and operated .....

Lake Helen (Nipigon River) nearby .....

Water is pumped with chlorination to plant, rapid sand-filtered, post-chlorinated and repumped to reservoirs and system.

Two concrete ground reservoirs on hill ..... 300 total

1959	1963
0.185 (Max. 0.216)	0.20 (Max. 0.23)

A plywood manufacturing plant; in 1963 this plant used about 25,000 gpd for processing.

† Total township population in 1956-2,304; in 1961-2,618; in 1963-about 2,800.

ONAPING*

(Unincorporated community (Townsite) in the Improvement District)

1958	1961	1962-63
966 (804[a])	1,000 (1,106[b])	1,180
0	0	0
966	1,000	1,180

August 20, 1958; September 23, 1963 ...

Privately owned and operated by Falconbridge Nickel Mines Ltd.

Two wells, about 75 ft deep .....

No treatment; water pumped to tank and system

Elev. tank (at mine) 50

	1958	1959-60	1962-63
Public	-	0.124 estd	-
Industrial	-	0.276	-
Total	0.35	0.400	0.500

Onaping and Hardy Mine use Gill Lake and Onaping River respectively for most process water. They use untreated and treated Onaping well water for cooling, boiler make-up, and drinking water supply (about 400 served in mines, offices, mill etc.)

* Formerly known as Hardy Townsite.

PORT ARTHUR - (City)

1953	1957	1959	1963
31,360	36,000 (38,136[a])	42,580 (45,276[b])	46,000
0	0	0	250 estd
31,360	36,000	42,580	46,250

August 6, 1953; August 2, 1957; August, 1959; June 21, 1963 .....

Municipally owned and operated by a Public Utilities Commission .....

Lake Superior (Thunder Bay) .....

Water from 2,400 ft out in lake feeds to a sump well with screening from which it is pumped with chlorination (6 lb/mg) to reservoirs and system.*

Two covered concrete reservoirs 2,000

Standpipe 200

1953	1957	1959	1962-63
3.7 (Max. 5.5)	4.4 (Max. 6.6)	4.1	4.235 (Max. 6.22)

C.P. Ry., C.N. Rys., two pulp and paper plants, a shipyard, brewery, soft drink plant and a malting company. In 1953 industry used about 16 per cent of pumpage.

*Chlorine demand may rise at times to 50 lb/mg. A filtration plant is being planned to start operation in 1965.

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

Municipality	**POWASSAN** - (Town)	**RED ROCK**† (Unincorporated community in the Improvement District of Red Rock)
Year(s)	1958 / 1963	1959 / 1961 / 1963
Population served:		
In municipality	1,000 (935[a]) / 1,025 (1,064[b])	- (1,275[a])* / 1,500 (1,316[b])* / 1,600*
Outside municipality	0 / 0	- / - / 100
Total	1,000 / 1,025 estd	1,600 / 1,650 estd / 1,700
Date(s) of survey	August 21, 1958; June 4, 1963	August 14, 1959; 1961; June 21, 1963
Ownership	Municipally owned and operated	Owned and operated by the Improvement District of Red Rock.
Source of supply	Genesee Creek, 1 mile east of town	Nipigon Bay (Lake Superior)
Treatment	In 1963 water flows from behind dam by gravity to plant where it is treated with alum (210 lb/mg) and chlorinated (20-60 lb/mg). After 2 hr retention, it is pressure-filtered (anthrafilt) with soda ash addition (210 lb/mg) for pH correction to tank and system. At times a coagulant aid is used to improve coagulation.	Lake water is pumped with chlorination (1.2 lb/mg) to elev. tank and system.
Storage capacity (thousand gallons)	Elev. tank ... 208	Elev. tank ... 100
Consumption (average in mgd)	1958: 0.040 / 1963: 0.080 (Max. 0.10) Plant capacity - 0.30	1959: 0.385 (Max. 0.50) / 1962-63: 0.395 (Max. 0.475) Capacity of system - 0.85
Industrial use	None; a farming community	About 50 per cent of pumpage is used by the pulp and paper mill.
Remarks	Plant started operation in November, 1955	* Total district populations; in 1956-1,652; in 1961-1,861; in 1962-63-2,400. † Red Rock is the townsite for Dominion Tar and Chemical Co. newsprint plant (1963).

Municipality	**SOUTH RIVER** - (Village)	**STURGEON FALLS** - (Town)
Year(s)	1958 / 1963	1957 / 1958 / 1963
Population served:		
In municipality	- (995[a]) / 1,033 (1,044[b])	6,000 (5,874[a]) / 6,200 (6,288[b]) / 6,300
Outside municipality	- / 42	0 / 0 / 700*
Total	975 estd / 1,075	6,000 / 6,200 / 7,000
Date(s) of survey	June 4, 1963;	July 18, 1957; August 21, 1958; June 6, 1963
Ownership	Municipally owned and operated	Municipally owned and operated†
Source of supply	Springs, north of town	Sturgeon River, above town
Treatment	Spring water flows by gravity to sump basin and is pumped with chlorination to tank and system.	Water is pumped with pressure-filtration (3) and chlorination (8 lb/mg) to elevated tank and system.
Storage capacity (thousand gallons)	Elev. tank ... 100	Elev. tank ... 125
Consumption (average in mgd)	1962 - 63: 0.055 (Max. 0.075)	1957: 0.60 / 1958: 0.68 / 1962-63: 0.65 (Max. 0.80) Capacity of system - 0.80
Industrial use	One lumber company uses a small amount for boiler feed.	No major user; the paper box and hardwood plant use the water for drinking purposes only.
Remarks		† System installed in 1921 * In Springer Township

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

DESCRIPTION OF MUNICIPAL WATER SYSTEMS

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

SAULT STE MARIE - (City)

1951	1958	1961	1963
-	39,950 (37,329[a])	42,500 (43,088[b])	44,170
-	11,050†	16,000†	19,400† estd
33,000	51,000	58,500 estd	63,570

October 25, 1951; August 12, 1958; July 4, 1963 .....
Municipally owned and operated by a Public Utilities Commission .....

St. Mary's River (Lake Superior) and 5 artesian wells in Steelton, now a part of the city.

River water enters sump well at plant by gravity and is pumped to reservoirs and system with chlorine (3.6 lb/mg) and ammonium sulphate (1.2 lb/mg) treatment. Well water flows by gravity to reservoir and is then pumped with chlorination to the system in Steelton and nearby areas of Korah Township.

Reservoir 650
Underground reservoir (Steelton wells) 750
In 1963, additional underground reservoir 6,000

1951	1958	1963
3.0 (Wells - 0.65)	5.0 (Max. 5.5)*	7.1 (Wells - 1.5)

Major users are a pulp and paper mill, a steel plant, chrome smelting plant, foundry, railways, oxygen producer, tar and chemical plant, a brewery and smaller manufacturing and steel fabricating plants. In 1958 industrial use estimated at 14 per cent of pumpage. The steel plant uses well water for drinking and river water for boiler and sanitary purposes. In 1958 well water was supplied to about 14,080 persons.

† Parts of Tarentorus and Korah Townships
* About 1.2 mgd from wells

SCHREIBER
(Unincorporated community in Schreiber Township)

1959	1961	1963
1,900 (2,050[a])	2,100 (2,230[b])	2,200
0	0	0
1,900 estd	2,100	2,200

August 15, 1959; June 22, 1963 .....
System from lake to tank owned by C.P. Ry.; community owns distribution system.
Cook's Lake .....

Water is supplied to the system with chlorination by gravity to tank or is pumped.

Elev. tank (C.P. Ry.) 60
None owned by community

1959	1963
0.2 estd	0.25 estd

No major user in community other than C.P. Ry. who use mainly untreated lake water.

SUDBURY - (City)

1958	1961	1962-63
47,700 (46,482[a])	-	81,000
15,000*	-	0
62,700	79,281 (80,120[b])†	81,000

August 1, 1958; October 13, 1961; June 6, 1963 .....
Municipally owned and operated .....

Ramsay Lake near town; two artesian wells are available as an emergency supply.

Water is pumped from 700 ft out in lake with chlorination (6.6 lb/mg) and fluoridation (sodium silica fluoride, 11.5 lb/mg) to elev. tanks and system. Two wells are pumped with no treatment to a very small part of former Neelon and Garson Townships.

Two elev. tanks (1958) ..... 500 & 1,000
Two elev. tanks and stamdpipe (1963) ..... 500, 1,000 & 1,500

1958	1961	1963
5.0 (Max. 6.0)	4.5 (Max. 7.1)	5.0 (Max. 7.5)

Capacity of system 12

A brewery and the C.P. Ry. (73 mg/mth) 1958, are the main users.

* McKim and Neelon Townships using 150 mg per year
† In 1960 McKim and Heelon Township areas amalgamated with City of Sudbury. Wells taken over from Neelon and Garson Townships in 1960.

TARENTORUS TOWNSHIP

1958	1961	1963
- (6,117[a])	- (11,537[b])†	10,100 (15,200)†
0	-	0
5,050 estd	8,900 estd	10,100

August 12, 1958; July 4 and September 25, 1963
Owned and operated by Tarentorus Township Public Utilities Commission.
St. Mary's River, purchased from Sault Ste Marie††
See Sault Ste Marie

None in township .....

See Sault Ste Marie

† Total township population .....
†† No well water reaches township from Sault Ste Marie

DESCRIPTION OF MUNICIPAL WATER SUPPLIES

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

Municipality	**TERRACE BAY** (Unincorporated community in the Township of Terrace Bay)		
Year(s)	1957	1961	1962-63
Population served:			
In municipality	- (1,567[a])†	1,901[b]†	1,928
Outside municipality	-	-	0
Total	1,789	1,901	1,928
Date(s) of survey	August 5, 1957; 1961; June 22, 1963		
Ownership	Municipally owned and operated; water purchased from Kimberly-Clark Pulp and Paper Co. Ltd.		
Source of supply	Lake Superior, nearby		
Treatment	Lake water enters sump well from 1,700 feet out in lake and is pumped to the pulp and paper mill at rate of 18,000 gpm. A portion of this (500 gpm max.) is diverted to town system with chlorination.		
Storage capacity (thousand gallons)	None		
Consumption (average in mgd)	1961	1963	
Public	- No record	No record	
Industrial	- -		
Total	- 22.5		
	Capacity of town system - 0.72 mgd.		
Industrial use	The paper mill uses the large percentage of the pumpage, not all being chlorinated.		
Remarks	† Total Improvement District population in 1956-1,624; total Township population in 1961-2,013. The Improvement District became a Township, July, 1959.		

Municipality	**WAWA (Jamestown)** (Unincorporated community in Michipicoten Township)			**WHITE RIVER** (Unincorporated community in the Improvement District of White River)
Year(s)	1958	1961	1963	1963
Population served:				
In municipality	- (2,749[a])	- (4,040[b])	- (4,500)†	- (672[a]) (836[b])
Outside municipality	-	-	-	-
Total	3,100	3,500	4.000 estd	1,000
Date(s) of survey				June 22, and September 25, 1963
Ownership				Owned and operated by the Canadian Pacific Railway
Source of supply				Lake Tukanee(Tutney)
Treatment	*See* Michipicoten Township			Water flows by gravity from lake to system with chlorination enroute.
Storage capacity (thousand gallons)				None
Consumption (average in mgd)				No record
Industrial use				None, except C.P.R.
Remarks	† Total population in Township			

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

DESCRIPTION OF MUNICIPAL WATER SUPPLIES

In The Upper Great Lakes Drainage Basin in Canada

ONTARIO

THESSALON - (Town)

1958	1963
1,700 (1,716[a])	1,720 (1,720[b])
200*	100*
1,900	1,820

August 8, 1958; 1961†; June 24, 1963 ...
Municipally owned and operated .....
Lake Huron (Georgian Bay) .....
Lake water is pumped from 85 feet out in lake with chlorination (10 lb/mg) to the system.
None .....

1958	1961	1962-63
0.72	0.45 (estd)	0.45

A dairy and the C.P. Ry. (22 mg in 1957) use this water. A veneer mill also was using the water in 1963.

* In Thessalon Township
† Data from annual directory, Municipal Utilities magazine

VERNER - (Police Village)

1958	1962-63
800 (877[a])	925 (965[b])†
0	10
800	935

August 20, 1958; June 6, 1963 .....
Owned and operated by the Township of Caldwell*
Veuve River in village .....
Water is pumped with pressure-filtration and chlorination (sodium hypochlorite) to tank and system.
Elev. tank .....32,750 gals

1958	1963
0.06	0.05 (Max. 0.06)

Capacity - 0.216

A creamery and dairy .....

† Total Township population in 1956-1,947; in 1961-1,854.
* System installed in 1928

WARREN
(Unincorporated community in the Township of Dunnet)

1962 - 63
450 (500)†(569[a]) (557[b])
0
450

June 6, 1963 .....
Owned and operated by Township of Dunnet*
One well, 40 feet deep .....
No treatment; water is pumped to reservoir and system, which serves only the north side of the community.
Elev. tank 48

1962-63
28,000 gpd (Max. 30,000 gpd)

No major industrial user .....

* This system was installed in 1961.
† Population of village

WIDDIFIELD TOWNSHIP

1958	1961	1963
7,500 (7,603[a])	8,575 (12,063)	8,500 (13,000)*
0	0	0
7,500 estd	8,575 estd	8,500

June 5, 1963 .....
Owned and operated by Township .....
Trout Lake treated; purchased from City of North Bay, direct from city reservoir.
See North Bay
None .....

1961	1962
0.315	0.410

None .....
* Includes population of RCAF Station - 2,500 to 3,000

TABLE III

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	BLIND RIVER			
	Source(s)	Wells			
		Raw and finished water			
	Sampling point	At town tap			
1	Date of sampling	Aug. 6/58	Sept. 25/59	May 7/62	June 8/63
2	Storage period (days)	85:56	193:221	37:57	25:61
3	Sampling temperature, °C.	24.4	20.4	11.4	12.8
4	Test temperature, °C.	25.1 (26.2)	24.4	23.7	25.2
5	Oxygen consumed by $KMnO_4$	.....	.....	.....	5.6
6	Carbon dioxide (CO_2) (calculated)	1.5	2	8	6
7	pH	8.2 (7.5)	8.2 (7.7)	7.5	7.6 (7.9)
8	Colour	15 (20)	15	15	15
9	Turbidity	0	0	.....	0.7
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	246	.....	.....	.....
13	Ignition loss at 550°C.	34.0	.....	.....	.....
14	Specific conductance, micromhos at 25°C.	323	320	334	308
15	Calcium (Ca)	45.2	42.8	44.1	42.2
16	Magnesium (Mg)	11.9	11.1	11.1	10.4
17	Iron (Fe) Total	.....	0.07	0.01	0.07
18	Dissolved	Trace	0.01	.....	Trace
19	Manganese (Mn) Total	.....	<0.05	0.0	Trace
20	Dissolved	0.05	0.00	.....	0.00
21	Aluminum (Al)	0.02	0.00	.....	0.03
22	Copper (Cu)	0.00	Trace	.....	0.007
23	Zinc (Zn)	0.2	0.0	.....	0.0
24	Sodium (Na)	4.4	6.7	9.0	5.3
25	Potassium (K)	2.2	2.4	2.0	1.8
26	Ammonium (NH_4)	0.05	0.0	.....	0.0
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	177	170	167	169
29	Sulphate (SO_4)	10.8	11.0	11.1	10.6
30	Chloride (Cl)	4.8	12.1	14.8	7.0
31	Fluoride (F)	0.0	0.1	0.14	0.11
32	Phosphate (PO_4) Total	.....	0.07	.....	<0.1
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	6.0	0.3	5.5	2.2
35	Silica (SiO_2), colorimetric	14	16	11	15
36	Carbonate hardness as $CaCO_3$	145 (150)	139 (136)	137	139
37	Non-carbonate hardness as $CaCO_3$	16.6 (17)	12.6	18.7	9.5
38	Total hardness as $CaCO_3$	162 (167)	152	156	148
39	Sum of constituents	186	205	193	178
40	Per cent sodium	5.5	8.6	11	7.1
41	Saturation index at test temperature	+0.6	+0.5	−0.1	−0.1
42	Stability index at test temperature	7.0	7.2	7.7	7.8
	Remarks				

TABLE III

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

CAPREOL		CHELMSFORD			CONISTON		No.
Wells		Whitson River			Wanapitei River		
Raw and finished water		Raw water*	Finished water		Raw water*		
At town tap		From river at intake	At plant after filter	At town tap	At dam above plant		
June 22/58	Aug. 2/58	Aug. 18/58	Aug. 18/58	Sept. 23/63	July 11/58	July 31/58	1
38:67	85:184	10:197	10:197	22:28	27:53	86:177	2
16.5	15.9	.....	.....	13.9	17.8	21.1	3
22.5	26.9 (16.6)	24.6	24.6	25.0	26.1	24.8 (22.2)	4
3.3	2.7	5.8	5.3	.....	5.7	5.4	5
0.9	4	3	3	3.5	2	2	6
8.1	7.3 (6.8)	7.9	7.8	7.6	7.1	7.1 (7.6)	7
20	40*	35	30	15	30	25	8
11	9	0	0.8	1	0.7	.....	9
4.2	.....	.....	.....	.....	.....	.....	10
2.3	.....	.....	.....	.....	.....	.....	11
106	116	185	178	.....	82.0	68.0	12
18.8	20.0	36.4	40.0	.....	21.6	20.4	13
152	146	282	283	291	121	84.7	14
21.1	18.7	38.5	38.9	36.8	13.9	9.7	15
4.4	4.9	11.1	10.9	10.7	3.2	2.7	16
.....	0.93	.....	.....	0.01	.....	.....	17
0.60	0.58	0.02	0.02	.....	0.07	0.02	18
.....	.....	.....	.....	0.00	.....	.....	19
0.05	0.00	0.00	0.00	.....	0.00	0.00	20
0.00	0.00	0.03	0.03	.....	Trace	0.0	21
0.85	0.00	0.00	0.00	.....	0.00	Trace	22
.....	0.0	0.05	0.05	.....	0.0	0.1	23
1.9	1.9	3.0	3.0	3.3	2.5	1.4	24
0.6	0.6	0.8	0.7	0.7	0.8	0.6	25
0.0	0.1	0.15	0.05	.....	0.3	0.05	26
0.0	0.0	0.0	0.0	0.0	0.0	0.0	27
65.8	55.6	133	130	93.1	19.1	19.0	28
19.3	18.0	30.2	30.8	51.1	34.2	18.0	29
2.6	3.3	2.8	5.6	8.8	0.7	1.3	30
0.0	0.0	0.1	0.1	0.17	0.0	**0.0**	31
.....	.....	.....	.....	.....	.....	.....	32
.....	.....	.....	.....	.....	.....	.....	33
0.15	0.3	0.3	0.3	0.2	0.6	0.5	34
15	16	12	10	7.8	5.5	4.0	35
54.0 (52)	45.6	109	107	76.4	15.7	15.6	36
16.7 (7.8)	21.2	32.8	35.2	59.6	32.1	19.7	37
70.7 (60)	66.8	142	142	136	47.8	35.3	38
84.0	91.8	165	165	165	70.9	47.7	39
5.3	5.6	4.4	4.3	5.0	10	7.7	40
−0.3	−1.1	+0.1	0.0	−0.4	−1.9	−2.1	41
8.7	9.5	7.7	7.8	8.4	11	11	42

* Due to colloidal iron

* *See* also Table II, page 36

**See* also Station No. 35, page 30

TABLE III (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	CONISTON (concl'd)			COPPER CLIFF
	Source(s)	Wanapitei River			Wells
		Raw water	Finished water		Raw and finished water
	Sampling point	At dam above plant	At town tap	At C.N.Rys. Station tap	At iron recovery plant, INCO
1	Date of sampling	Sept. 9/58	July 31/58	June 6/63	Aug. 1/58
2	Storage period (days)	18:129	86:177	22:53	110:179
3	Sampling temperature, °C.	16.7	.....	14.4	16.6
4	Test temperature, °C.	22.6	24.8 (21.8)	25.0	22.3 (28.3)
5	Oxygen consumed by $KMnO_4$	.....	4.5	6.6	.....
6	Carbon dioxide (CO_2) (calculated)	2	3	1.5	3.5
7	pH	7.3	7.0 (7.0)	6.7 (6.4)	7.8 (6.9)
8	Colour	15	20 (35)	30	0 (0)
9	Turbidity	0.8	0	2	0
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	.....	68.8	.....	354
13	Ignition loss at 550°C.	.....	23.2	.....	82.0
14	Specific conductance, micromhos at 25°C.	77.2	84.5	175	512
15	Calcium (Ca)	9.1	7.5	17.0	55.1
16	Magnesium (Mg)	2.5	3.9	5.3	26.6
17	Iron (Fe) Total	.....	.....	0.93	.....
18	Dissolved	.....	0.7	0.53	0.00
19	Manganese (Mn) Total	.....	.....	0.12	.....
20	Dissolved	.....	0.0	0.12	0.02
21	Aluminum (Al)	.....	Trace	0.06	0.02
22	Copper (Cu)	.....	Trace	.....	0.00
23	Zinc (Zn)	.....	0.5	0.00	0.0
24	Sodium (Na)	1.0	1.1	4.5	10.1
25	Potassium (K)	0.4	0.6	1.0	3.0
26	Ammonium (NH_4)	.....	0.1	0.01	.....
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	19.1	16.1	4.5	155
29	Sulphate (SO_4)	17.3	18.4	64.6	117
30	Chloride (Cl)	1.2	3.8	2.3	13.2
31	Fluoride (F)	.....	0.0	0.14	0.0
32	Phosphate (PO_4) Total	.....	.....	<0.1	.....
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	0.3	0.5	0.5	3.0
35	Silica (SiO_2), colorimetric	4.5	3.5	3.7	16
36	Carbonate hardness as $CaCO_3$	15.7	13.2 (13.1)	3.7	127 (127)
37	Non-carbonate hardness as $CaCO_3$	17.3	21.6	60.4	120 (119)
38	Total hardness as $CaCO_3$	33.0	34.8	64.1	247 (246)
39	Sum of constituents	45.7	47.8	102	319
40	Per cent sodium	6.1	6.2	13	8.0
41	Saturation index at test temperature	−1.9	−2.3	−2.9	+0.1
42	Stability index at test temperature	11	12	12.5	7.6
	Remarks				

TABLE III (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

COPPER CLIFF (concl'd)					CREIGHTON MINE	No.
Meatbird Lake	Lady Macdonald Lake	Lakes	Vermilion River		Vermilion River	
Raw and finished water			Raw water	Finished water	Raw water	
At lake	At dam on lake	At town tap	At highway No. 17 bridge	At town hall tap	At intake at river	
Aug. 1/58	Aug. 1/58	Sept. 23/59	June 7/63	June 25/63	Aug. 1/58	1
110:113	86:179	194:222	25:52	48:65	86:179	2
21.9	26.7	19.3	20.0	15.6	23.9	3
22.2	27.1	24.6 (19.0)	27.1	25.1	27.2 (27.3)	4
.....	0.9	.....	7.8	5.8	4.5	5
.....	.....	.....	2.5	1	2	6
4.0 (4.1)	4.1 (4.0)	4.3 (4.6)	7.1 (8.5)	7.6 (7.5)	7.2 (7.4)	7
0	0.5	5	15	20	20 (35)	8
0	1	4	5	1	0.8	9
.....	.....	.....	0.9	.....	.....	10
.....	.....	.....	0.6	.....	.....	11
384	111	.....	62.8	.....	77.2	12
44.8	31.6	.....	17.6	.....	35.2	13
560	184	407	94.1	104	88.3	14
31.5	9.5	27.0	9.4	11.0	9.9	15
25.2	3.6	17.4	3.7	3.7	3.0	16
.....	.....	0.06	0.63	0.28	.....	17
0.09	0.00	0.00	Trace	0.01	Trace	18
.....	.....	1.0	0.00	0.00	.....	19
0.97	0.26	0.92	0.00	0.00	0.00	20
0.04	1.4	0.70	0.01	0.14	0.00	21
1.0	1.3	2.7	0.02	.....	0.00	22
0.3	0.3	0.2	0.02	0.05	0.00	23
12.0	1.7	7.1	1.60	1.20	1.5	24
4.5	1.7	3.6	0.6	0.8	0.7	25
.....	0.05	.....	0.05	0.0	0.1	26
0.0	0.0	0.0	0.0	0.0	0.0	27
0.0	0.0	0.0	19.1	21.9	21.6	28
238	64.4	165	22.9	22.4	18.6	29
8.6	1.5	6.4	0.4	2.5	0.8	30
0.2	0.0	0.2	0.1	0.17	0.0	31
.....	.....	.....	<0.1	<0.1	.....	32
0.4	.....	0.0	.....	.....	.....	33
1.0	1.5	0.0	0.8	Trace	0.6	34
3.7	1.6	1.7	3.9	3.4	4.4	35
0.0	0.0	0.0	15.7	18.0	17.7 (20)	36
182	38.5	138	23.2	24.7	19.3 (20)	37
182	38.5	138	38.9	42.7	37.0 (40)	38
349	88.8	233	52.8	56.0	50.1	39
9.8	5.1	9.0	8.1	5.6	7.9	40
.....	.....	.....	-2.1	-1.5	-1.9	41
.....	.....	.....	11	11	11	42
Acidity as ppm $CaCO_3$ - 11.5 Ni - 21.1 ppm Cr - Trace	Acidity as ppm $CaCO_3$ - 17.9	Acidity as ppm $CaCO_3$ - 2.6				

TABLE III - (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	CREIGHTON MINE (concl'd)		ELLIOT LAKE	
	Source(s)	Vermilion River		Elliot Lake	
		Raw water		Raw and finished water	
	Sampling point	At bridge hwy. 544	At bridge hwy. 17	At town tap	
1	Date of sampling	Aug. 15/58	June 7/63	Aug. 14/58	Sept. 25/59
2	Storage period (days)	85:200	25:52	86:193	85:196
3	Sampling temperature, °C.	21.8	20.0	.....	19.0
4	Test temperature, °C.	25.0	27.1	25.0 (21.7)	26.6
5	Oxygen consumed by $KMnO_4$	2.4	7.8	3.4	.....
6	Carbon dioxide (CO_2) (calculated)	2	2.5	1.5	2
7	pH	7.3	7.1	7.0	7.0
8	Colour	10 (35)	15	10 (25)	5
9	Turbidity	1	5	1	1
10	Suspended matter, dried at 105°C.	.....	0.9	.....	.....
11	Suspended matter, ignited at 550°C.	.....	0.6	.....	.....
12	Residue on evaporation, dried at 105°C.	66.8	62.8	81.2	.....
13	Ignition loss at 550°C.	23.2	17.6	22.8	.....
14	Specific conductance, micromhos at 25°C.	94.3	94.1	98.7	142
15	Calcium (Ca)	10.1	9.4	10.2	14.4
16	Magnesium (Mg)	3.1	3.7	1.6	2.4
17	Iron (Fe) Total	.....	0.63	.....	0.07
18	Dissolved	0.02	Trace	0.03	0.00
19	Manganese (Mn) Total	.....	0.00	.....	.....
20	Dissolved	Trace	0.00	0.01	Trace
21	Aluminum (Al)	0.00	0.01	0.01	Trace
22	Copper (Cu)	0.00	0.02	0.07	0.09
23	Zinc (Zn)	0.00	0.02	0.00	0.10
24	Sodium (Na)	1.9	1.6	3.6	6.1
25	Potassium (K)	0.8	0.6	1.1	1.9
26	Ammonium (NH_4)	0.1	0.05	0.1	0.0
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	25.4	19.1	9.8	11.3
29	Sulphate (SO_4)	18.1	22.9	24.0	34.6
30	Chloride (Cl)	1.3	0.4	5.0	9.4
31	Fluoride (F)	0.0	0.10	0.0	0.0
32	Phosphate (PO_4) Total	.....	0.1	.....	.....
33	Dissolved	.....	.....	.....	0.0
34	Nitrate (NO_3)	0.3	0.8	1.5	0.8
35	Silica (SiO_2), colorimetric	3.9	3.9	2.1	2.5
36	Carbonate hardness as $CaCO_3$	20.8 (20.5)	15.7	8.0 (7.3)	9.3
37	Non-carbonate hardness as $CaCO_3$	17.1 (13.7)	23.2	24.0 (20.5)	36.0
38	Total hardness as $CaCO_3$	37.9 (34.2)	38.9	32.0 (27.8)	45.3
39	Sum of constituents	52.0	52.8	54.1	77.9
40	Per cent sodium	9.6	8.1	20	22
41	Saturation index at test temperature	−1.8	−2.1	−2.4	−2.2
42	Stability index at test temperature	11	11	11	11
	Remarks				

TABLE III - (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

ELLIOT LAKE (concl'd)		ESPANOLA				No.
Elliot Lake		Spanish River				
Raw water	Finished water	Raw water*		Finished water		
At lake	At town tap	At K.V.P. Co. Ltd's plant intake		At town tap		
June 24/63	June 24/63	Sept. 17/57	Aug. 18/58	July 24/57	Aug. 6/58	1
49:52	49:66	17:22	21:35	44:83	85:184	2
23.3	13.9	22.2	20.6	21.7	22.7 (23.5)	3
24.5	25.3	22.2	21.4	22.0	25.5	4
3.0	4.8	8.8	.....	7	5.2	5
8	5	3	3	4	2	6
5.4 (6.6)	5.2	7.0	6.8	7.0	7.0 (7.0)	7
10	5	40	25	40	25 (35)	8
1	1	0.8	0	1	0	9
.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	11
.....	.....	62.8	.....	74.8	57.6	12
.....	.....	34.0	.....	31.2	24.4	13
196	194	68.2	64.0	92.8	77.4	14
18.5	18.3	7.3	6.8	12.7	6.0	15
3.7	4.2	1.9	1.9	1.7	3.2	16
.....	0.30	.....	.....	.....	.....	17
.....	0.10	0.07	.....	0.14	0.02	18
.....	0.30	.....	.....	.....	.....	19
.....	0.30	Trace	.....	0.00	0.00	20
.....	0.07	0.00	.....	0.00	0.00	21
.....	0.20	.....	.....	0.12	Trace	22
.....	0.10	.....	.....	0.01	0.10	23
6.6	6.7	1.6	1.6	1.4	2.0	24
3.0	2.9	0.6	0.6	0.6	0.6	25
.....	0.3	.....	0.1	0.1	0.15	26
0.0	0.0	0.0	0.0	0.0	0.0	27
1.1	0.5	14.5	14.0	24.9	11.5	28
55.1	53.0	15.9	12.3	15.1	16.5	29
9.0	10.4	1.6	1.4	4.1	3.2	30
.....	0.1	0.0	.....	0.3	0.0	31
.....	<0.1	.....	.....	.....	.....	32
.....	.....	.....	.....	.....	.....	33
12	12.5	0.0	0.4	0.3	0.3	34
1.6	1.2	3.9	3.5	4.3	3.8	35
0.9	0.4	11.9	11.5	20.4	9.4 (13)	36
60.4	62.7	14.1	13.3	18.3	18.7 (17)	37
61.3	63.1	26.0	24.8	38.7	28.1 (30)	38
110	110	40.1	35.4	53.1	41.3	39
18	18	41.5	12	7.1	13	40
-4.8	-5.3	-2.5	-2.7	-2.0	-2.6	41
15	16	12	12	11	12	42

* *See* also Station No. 43, page 32

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	ESPANOLA (concl'd)		FALCONBRIDGE (Townsite)	
	Source(s)	Lake Apsey		Well No. 1*	
		Raw water	Finished water	Raw water	
	Sampling point	At pumphouse	At town tap	At pump	
1	Date of sampling	June 7/63	June 7/63	Aug. 18/58	Sept. 23/59
2	Storage period (days)	25:52	25:55	85:197	35:39
3	Sampling temperature, °C.	22.2	12.8	8.9	10.4
4	Test temperature, °C.	27.4	27.5	23.9 (10.2)	25.1 (16.0)
5	Oxygen consumed by $KMnO_4$	5.5	5.3	.....	.....
6	Carbon dioxide (CO_2) (calculated)	2	3	2	2
7	pH	7.2 (7.5)	7.0 (7.2)	8.0 (6.8)	8.0 (6.6)
8	Colour	10	10	0 (5)	0
9	Turbidity	2	9	0	0
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	.....	.....	358	730
13	Ignition loss at 550°C.	.....	.....	61.6	62.0
14	Specific conductance, micromhos at 25°C.	76.4	76.7	505	985
15	Calcium (Ca)	7.6	7.6	63.1	140
16	Magnesium (Mg)	2.6	2.5	16.8	35.1
17	Iron (Fe) Total	.....	2.2	.....	0.02
18	Dissolved	.....	0.01	0.02	Trace
19	Manganese (Mn) Total	.....	0.06	.....	.....
20	Dissolved	.....	0.01	0.00	0.00
21	Aluminum (Al)	.....	0.05	0.02	0.06
22	Copper (Cu)	.....	0.00	0.00	0.04
23	Zinc (Zn)	0.00	0.01	0.00	0.05
24	Sodium (Na)	1.8	1.9	13.0	30.6
25	Potassium (K)	0.7	1.7	1.6	2.5
26	Ammonium (NH_4)	0.04	0.01	.....	.....
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	18.9	17.6	101	138
29	Sulphate (SO_4)	15.2	13.6	159	409
30	Chloride (Cl)	2.4	2.4	5.0	9.5
31	Fluoride (F)	.....	0.06	0.10	0.00
32	Phosphate (PO_4) Total	.....	< 0.1	.....	.....
33	Dissolved	.....	.....	.....	0.03
34	Nitrate (NO_3)	0.2	0.6	2.0	0.0
35	Silica (SiO_2), colorimetric	5.3	5.9	13	15
36	Carbonate hardness as $CaCO_3$	15.5	14.4	83.1 (80)	113
37	Non-carbonate hardness as $CaCO_3$	14.3	15.0	144 (155)	379
38	Total hardness as $CaCO_3$	29.8	29.4	227 (235)	492
39	Sum of constituents	45.1	44.0	323	716
40	Per cent sodium	11	12	11	12
41	Saturation index at test temperature	−2.0	−2.3	+0.3	+0.7
42	Stability index at test temperature	11	12	7.4	6.6
	Remarks			* Wells No. 1 and 2 are side by side	Ni - 0.0 ppm

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

FALCONBRIDGE (Townsite) (concl'd)					FERRIS WEST (TOWNSHIP)	FORT WILLIAM	No.
Well No. 2*	Well No. 3**		Mixed wells		Trout Lake	Loch Lomond	
Raw water	Raw water		Raw and finished water			Raw and finished water	
At pump	At pump		At plant tap	At service station tap		At city tap	
Sept. 23/59	Aug. 18/58	Sept. 23/59	Aug. 18/58	Sept. 23/63		Aug. 6/53	1
35:39	85:197	35:39	82:200	22:28		12:365	2
11.1	13.9	16.6	12.0	12.5		14.4	3
25.0 (16.5)	23.9 (12.3)	25.3 (19.4)	23.9 (12.6)	25.3		22.0 (15)	4
.....	.....	.....	.....	.....		.....	5
2	2	3	1.5	4		5	6
8.1 (7.3)	8.2 (6.9)	7.9 (6.7)	8.2 (6.9)	7.6		7.0 (6.3)	7
0	5 (8)	0	0 (20)	0		30 (30)	8
0.4	0	15	0	0		2.5 (2.5)	9
.....	.....	35	.....	.....		.....	10
.....	.....	31	.....	.....		.....	11
909	940	1,240	948	.....		47.6	12
78.0	72.0	172	104	.....		20.8	13
1,188	1,184	1,456	1,178	618		50.7 (50)	14
175	170	195	167	81.4		5.6	15
42.2	42.1	50.0	39.9	22.3		3.0	16
Trace	.....	Trace	.....	Trace		.....	17
Trace	0.01	0.00	Trace	.....		0.15	18
.....	.....	.....	.....	0.00		.....	19
0.02	Trace	0.00	0.02	.....		.....	20
0.06	0.06	0.08	0.08	.....	*See*	.....	21
0.11	0.00	Trace	0.00	0.002	North Bay	.....	22
0.10	0.00	0.10	0.10	0.035	Ont.	.....	23
34.5	40.0	75.0	39.0	13.5		1.2	24
4.5	3.8	3.6	3.8	1.6		0.7	25
.....	.....	.....	.....	.....		.....	26
0.0	0.0	0.0	0.0	0.0		0.0	27
161	159	167	165	92.0		26.3	28
503	523	662	509	222		6.2	29
12.8	10.2	12.4	9.8	7.7		0.6	30
0.15	0.2	0.15	0.2	0.32		0.0	31
.....	.....	.....	.....	.....		.....	32
0.02	.....	0.07	.....	.....		.....	33
6.0	2.0	6.0	1.5	5.3		0.6	34
16	18	22	17	12		5.9	35
132	130 (133)	137	135 (128)	75.5		21.6 (18)	36
478	468 (456)	556	445 (445)	219.5		4.7 (8.6)	37
610	598 (589)	693	580 (573)	295		26.3 (26.6)	38
876	887	1,110	868	403		36.4	39
11	13	19	13	9.0		8.8	40
+1.0	+1.0	+0.8	+1.0	−0.1		−2.3	41
6.1	6.2	6.3	6.2	7.8		12	42

Ni - 0.35 ppm
* Wells No. 1 & 2 are side by side

** Well developed in 1955-56

Ni - 0.4 ppm

Community in the Upper Great Lakes drainage basin but Trout Lake is in the Ottawa River drainage basin.

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No					
	Municipality	FORT WILLIAM (cont'd)			
	Source(s)	Loch Lomond			
		Raw and finished water			
	Sampling point	At city tap			
1	Date of sampling	Apr. 27/55†	Feb. 29/56†	March/57†	Aug. 1/57
2	Storage period (days)	.....	.....	.....	91:105
3	Sampling temperature, °C.	.....	.....	.....	14.9
4	Test temperature, °C.	.....	.....	.....	25.0
5	Oxygen consumed by $KMnO_4$	.....	.....	.....	5.6
6	Carbon dioxide (CO_2) (calculated)	3	3.5	3	3
7	pH	6.7	7.1	7.6	7.0
8	Colour	.....	15	25	20
9	Turbidity	3	2	2	0
10	Suspended matter, dried at 105°C.	Trace	Trace	Trace	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	36	42	58	43.6
13	Ignition loss at 550°C.	.....	.....	.....	19.2
14	Specific conductance, micromhos at 25°C.	.....	.....	.....	50.6
15	Calcium (Ca)	5.6	6.4	5.6	5.0
16	Magnesium (Mg)	1.9	2.9	2.4	2.3
17	Iron (Fe) Total	0.0	0.0	0.3	.....
18	Dissolved	.....	.....	.....	0.05
19	Manganese (Mn) Total	.....	.....	.....	.....
20	Dissolved	.....	.....	.....	0.00
21	Aluminum (Al)	0.0	0.0	0.0	0.0
22	Copper (Cu)	.....	.....	.....	0.06
23	Zinc (Zn)	.....	.....	.....	.....
24	Sodium (Na)	.....	.....	.....	1.0
25	Potassium (K)	.....	.....	.....	0.4
26	Ammonium (NH_4)	0.1	0.1	0.1	0.05
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	24.4	21.9	24.4	20.4
29	Sulphate (SO_4)	4.1	4.1	1.4	6.3
30	Chloride (Cl)	6.1	2.4	2.4	0.8
31	Fluoride (F)	.....	.....	.....	0.0
32	Phosphate (PO_4) Total	.....	.....	.....	.....
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	.....	.....	.....	0.4
35	Silica (SiO_2), colorimetric	3.5	3.7	4.4	4.2
36	Carbonate hardness as $CaCO_3$	20	18	20	16.7
37	Non-carbonate hardness as $CaCO_3$	2	10	4	5.2
38	Total hardness as $CaCO_3$	22	18	24	21.9
39	Sum of constituents	.....	.....	.....	30.6
40	Per cent sodium	.....	.....	.....	8.7
41	Saturation index at test temperature	−2.6	−2.2	−1.7	−2.4
42	Stability index at test temperature	12	12	11	12
	Remarks	† Analyses supplied by Alchem Ltd., Burlington, Ont.			

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

FORT WILLIAM (concl'd)			GARSON			No.
Loch Lomond			Well			
Raw and finished water			Raw and finished water			
At city tap			At town tap			
June 8/61	May 24/62	June 21/63	Aug. 2/58	Oct. 1/59	June 7/63	1
6	32:34	33:52	86:178	187:214	25:52	2
.....	10.0	8.3	18.6	12.0	8.9	3
23.4	24.3	24.8	27.1 (19.3)	24.4	27.2	4
.....	.....	8.8	.....	.....	1.8	5
3.5	7	3	0.8	2.5	2	6
7.0	6.7	7.0	8.2 (7.2)	7.8	7.8 (7.9)	7
15	25	20	5	0	5	8
.....	0	0.9	0	0	0.3	9
.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	11
.....	.....	.....	194	.....	.....	12
.....	.....	.....	88.8	.....	.....	13
51.8	53.7	52.2	238	251	316	14
4.9	6.2	4.6	30.7	23.5	34.1	15
2.7	2.5	3.0	8.7	6.2	10.8	16
.....	0.01	0.04	.....	0.03	Trace	17
.....	0.01	0.00	0.00	Trace	.....	18
.....	0.00	0.00	.....	0.00	0.00	19
.....	0.00	0.00	0.01	0.00	.....	20
.....	0.00	0.00	Trace	0.0	.....	21
.....	0.30	.....	0.04	0.08	.....	22
.....	Trace	.....	0.2	0.0	0.05	23
1.0	0.9	0.9	3.1	3.9	.....	24
0.6	0.5	0.4	0.6	0.7	.....	25
0.1	.....	0.0	0.05	0.0	0.05	26
0.0	0.0	0.0	0.0	0.0	0.0	27
20.8	21.2	20.2	88.0	92.0	95.8	28
.....	7.1	7.0	32.7	35.0	35.5	29
0.9	0.9	0.5	5.4	8.1	.....	30
0.06	0.11	0.03	0.0	0.0	0.09	31
.....	0.1	<0.1	.....	0.0	.....	32
.....	.....	.....	.....	.....	.....	33
.....	0.1	0.2	4.0	3.0	7.7	34
.....	3.7	3.2	12	16	13	35
17.1	17.4	16.6	72.2 (81)	75.5	78.6	36
6.4	8.4	7.3	40.2 (35)	8.8	51.2	37
23.5	25.8	23.9	112 (116)	84.3	130	38
.....	29.2	29.8	141	142	.....	39
.....	6.8	7.4	5.6	9.0	7.2	40
.....	−2.6	−2.4	+0.2	−0.3	−0.2	41
.....	12	12	7.8	8.4	8.2	42

Note: A second well put into operation in 1963 is said to be of the same quality as the above older well.

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	GATEWAY	GORE BAY		
	Source(s)	Trout Lake	Georgian Bay (Lake Huron) and spring		
			Spring and Georgian Bay		Georgian Bay
			Raw and finished water		
	Sampling point		At town tap	At town tap	From bay at wharf
1	Date of sampling		Aug. 4/58	July 24/57	Aug. 4/58
2	Storage period (days)		84:185	42:83	84:185
3	Sampling temperature, °C.		17.8	15.5	22.1
4	Test temperature, °C.		25.8 (22.8)	24.4	25.7 (23.7)
5	Oxygen consumed by $KMnO_4$		2.1	2.2	1.5
6	Carbon dioxide (CO_2) (calculated)		1	9	1.5
7	pH		8.1 (8.2)	7.6 (7.4)	7.9
8	Colour		5 (8)	5	5 (10)
9	Turbidity		0	0.4	0.8
10	Suspended matter, dried at 105°C.		.....	.....	.....
11	Suspended matter, ignited at 550°C.		.....	.....	.....
12	Residue on evaporation, dried at 105° C.		129	291	98.0
13	Ignition loss at 550° C.		32.8	59.6	21.6
14	Specific conductance, micromhos at 25° C.		227	491	160
15	Calcium (Ca)		27.7	60.5	20.7
16	Magnesium (Mg)		8.4	20.1	5.6
17	Iron (Fe) Total		Trace	.....	.....
18	Dissolved		.....	0.03	0.00
19	Manganese (Mn) Total		.....	.....	.....
20	Dissolved		0.00	Trace	0.00
21	Aluminum (Al)		0.02	0.06	0.02
22	Copper (Cu)	*See*	0.33	0.02	Trace
23	Zinc (Zn)	North Bay	0.3	0.5	0.0
24	Sodium (Na)		3.9	9.0	2.4
25	Potassium (K)		0.7	1.0	0.6
26	Ammonium (NH_4)		0.05	0.0	0.1
27	Carbonate (CO_3)		0.0	0.0	0.0
28	Bicarbonate (HCO_3)		105	226	75.5
29	Sulphate (SO_4)		13.9	26.2	11.4
30	Chloride (Cl)		8.3	25.5	3.3
31	Fluoride (F)		0.0	0.0	0.0
32	Phosphate (PO_4) Total		.....	.....	.....
33	Dissolved		.....	.....	.....
34	Nitrate (NO_3)		2.5	10	1.0
35	Silica (SiO_2), colorimetric		4.7	9.6	6.1
36	Carbonate hardness as $CaCO_3$		86.5 (88.9)	185	61.9 (62.6)
37	Non-carbonate hardness as $CaCO_3$		21.3	48.2	12.8 (14.4)
38	Total hardness as $CaCO_3$		108	234	74.7 (77.0)
39	Sum of constituents		124	274	88.2
40	Per cent sodium		7.1	7.7	6.5
41	Saturation index at test temperature		0.0	+0.2	−0.4
42	Stability index at test temperature		8.1	7.2	8.7
	Remarks	Community in the Upper Great Lakes drainage basin but Trout Lake is in the Ottawa River drainage basin.			

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

KORAH TOWNSHIP	LEVACK		LITTLE CURRENT		LIVELY	No.
Wells and St. Mary's River	Wells		Georgian Bay (Lake Huron)		Meatbird Lake	
	Raw water	Finished water	Raw and finished water		Raw and finished water	
	At pump	At house tap	At town tap	At plant tap	At town tap	
	Aug. 20/58	Aug. 20/58	July 24/57	Aug. 5/58	Sept. 30/59	1
	84:196	84:196	44:83	84:185	1214	2
	8.5	.....	13.9	20.6	.....	3
	23.9 (11.6)	23.9 (16.6)	21.8	25.7 (22.5)	24.7	4
	.....	1.0	2.2	1.7	.....	5
	0.8	4	3	0.8	1	6
	7.8 (6.6)	7.1 (6.7)	7.7	8.2	6.6	7
	0 (5)	0 (5)	0	10	5	8
	0	0	0.8	0	2	9
	.....	.....	.....	.....	.....	10
	.....	.....	.....	.....	.....	11
	160	150	108	111	.....	12
	32.8	48.0	27.2	42.4	.....	13
	238	234	178	179	494	14
	22.6	22.8	22.0	22.1	40.6	15
	9.1	8.9	6.5	6.6	15.2	16
	.....	.....	.....	0.03	0.00	17
	0.2	0.02	0.03	.....	0.00	18
	.....	.....	.....	.....	1.0	19
	0.00	0.00	0.00	0.00	0.98	20
	0.05	0.03	0.05	0.03	0.24	21
See	0.00	0.02	Trace	.....	0.82	22
Sault Ste. Marie	0.0	0.2	0.0	.....	0.07	23
	5.5	5.4	2.6	3.3	19.8	24
	1.2	1.2	0.8	0.8	4.4	25
	0.05	0.05	0.0	.....	.....	26
	0.0	0.0	0.0	0.0	0.0	27
	34.4	33.2	82.3	83.1	3.5	28
	67.1	66.4	14.4	13.0	203	29
	6.0	6.1	4.5	5.6	8.6	30
	0.0	0.0	0.2	0.0	0.2	31
	.....	.....	.....	.....	.....	32
	.....	.....	.....	.....	0.0	33
	0.3	0.3	0.8	0.8	0.4	34
	15	14	3.1	5.2	3.4	35
	28.2	27.2 (27.4)	67.5	68.2 (69.7)	2.9	36
	65.6	66.3 (62.5)	14.1	14.1 (14.8)	161	37
	93.8 (98.4)	93.5 (89.9)	81.6	82.3 (84.5)	164	38
	144	142	95.6	98.4	299	39
	11	11	6.4	7.9	20	40
	−0.9	−1.6	−0.6	0.0	−2.9	41
	9.6	10	8.9	8.2	12	42

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.					
	Municipality	LIVELY (concl'd)	MANITOUWADGE	MARATHON	
	Source(s)	Meatbird Lake	Two wells	Two wells	
		Raw and finished water	Raw and finished water	Raw and finished water	
	Sampling point	At town tap	At townsite tap	At townsite taps	
1	Date of sampling	June 25/63	Aug. 15/59	Aug. 5/57	Aug. 15/59
2	Storage period (days)	48:65	31:54	92:105	31:54
3	Sampling temperature, °C.	15.6	16.0	8.2	14.0
4	Test temperature, °C.	24.9	20.5	23.4	21.0
5	Oxygen consumed by $KMnO_4$	1.2	3.1	2.1	2.2
6	Carbon dioxide (CO_2) (calculated)	7	3	2	2
7	pH	6.2	8.2	8.1 (7.6)	8.2 (8.2)
8	Colour	5	0	0	0 (5)
9	Turbidity	2	0	0	0 (< 1)
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	.....	267	172	172
13	Ignition loss at 550°C.	.....	38.8	26.8	15.2
14	Specific conductance, micromhos at 25°C.	385	447	291	295
15	Calcium (Ca)	21.2	72.0	46.3	47.2
16	Magnesium (Mg)	19.5	15.8	8.4	9.2
17	Iron (Fe) Total	0.11	0.07	.....	0.08
18	Dissolved	0.07	0.04	0.00	0.01
19	Manganese (Mn) Total	0.64	.....	.....	.....
20	Dissolved	0.62	0.00	0.00	0.00
21	Aluminum (Al)	2.1	0.02	0.06	0.0
22	Copper (Cu)	.....	1.4	0.00	0.26
23	Zinc (Zn)	0.10	0.3	0.3	0.1
24	Sodium (Na)	14.5	1.5	1.6	1.5
25	Potassium (K)	3.1	1.1	1.1	1.1
26	Ammonium (NH_4)	0.0	.....	0.0	0.0
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	7.1	273	172	174
29	Sulphate (SO_4)	165	14.5	10.7	11.7
30	Chloride (Cl)	6.3	6.0	3.1	3.4
31	Fluoride (F)	0.2	0.0	0.0	0.0
32	Phosphate (PO_4) Total	8.9	.....	.....	.....
33	Dissolved	.....	0.0	.....	0.0
34	Nitrate (NO_3)	0.4	6.0	0.7	3.0
35	Silica (SiO_2), colorimetric	2.8	9.1	7.7	9.6
36	Carbonate hardness as $CaCO_3$	5.8	224	141	142 (140)
37	Non-carbonate hardness as $CaCO_3$	127	21.0	9.2	13.2 (20)
38	Total hardness as $CaCO_3$	133	245	150	155 (160)
39	Sum of constituents	249	262	165	173
40	Per cent sodium	17	1.3	2.2	2.0
41	Saturation index at test temperature	−3.1	+0.9	+0.5	+0.5
42	Stability index at test temperature	12	6.4	7.1	7.2
	Remarks				

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

MARATHON (concl'd)	MASSEY			MCKIM TOWNSHIP	MICHIPICOTEN TOWNSHIP	No.
Two wells	Aux Sables River			Ramsay Lake	Wawa Lake	
Raw and finished water	Raw and finished water	Raw water	Finished water		Raw water	
At service station tap	At intake	At hwy. No. 17 bridge	At town tap		At lake	
June 22/63	Aug. 5/58	June 8/63	June 8/63		Oct. 24/61	1
32:45	84:185	24:51	24:54		23:33	2
11.7	24.3	21.1	18.9		.....	3
24.4	25.8 (23.8)	27.5	27.7		24.0	4
1.3	2.8	4.9	5.2		2.4	5
3	0.9	2	4		3	6
7.9	7.2 (7.0)	6.9	6.4 (6.7)		7.4	7
5	15 (35)	20	20		5	8
0.8	10	1	0.7		0.4	9
.....	.....	.....	.....		.....	10
.....	.....	.....	.....		.....	11
.....	36.0	.....	.....		83.2	12
.....	18.0	.....	.....		30.0	13
313	40.4	39.7	41.3		124	14
47.7	3.8	3.5	3.5		17.1	15
10.2	1.3	1.4	1.6		3.3	16
0.02	.....	.....	0.24		0.02	17
0.00	0.02	.....	0.02		0.00	18
0.01	.....	.....	0.00		0.00	19
0.01	0.00	.....	0.00		0.00	20
0.04	0.0	.....	Trace	*See*	0.00	21
0.00	0.00	.....	0.01	Sudbury	0.00	22
0.05	0.05	0.0	0.05		0.15	23
1.5	1.3	1.0	1.0		0.8	24
1.2	0.4	0.4	0.4		0.7	25
0.0	0.1	0.03	0.02		0.0	26
0.0	0.0	0.0	0.0		0.0	27
177	9.5	8.8	5.7		39.6	28
12.3	6.9	10.1	10.3		22.4	29
3.3	0.5	0.7	0.9		1.4	30
0.14	0.0	.....	0.07		0.05	31
<0.1	.....	.....	<0.1		<0.1	32
.....	.....	.....	.....		<0.1	33
2.3	0.6	0.7	0.3		0.4	34
7.4	5.3	4.0	3.7		1.6	35
145	7.8 (10.1)	7.2	4.7		32.5	36
16.0	7.0 (7.0)	7.3	10.6		23.9	37
161	14.8 (17.1)	14.5	15.3		56.4	38
173	24.9	26.1	24.6		67.3	39
2.0	16	13	12		2.9	40
+0.3	−2.6	−3.0	−3.7		−1.3	41
7.3	12	13	14		10	42

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	MICHIPICOTEN TOWNSHIP (concl'd)			NEELON TOWNSHIP	NIPIGON
	Source(s)	Wawa Lake			Ramsay Lake and wells	Lake Helen (Nipigon River)
		Finished water				Raw water
	Sampling point	At town tap				
1	Date of sampling	Oct. 24/61	May 26/62	June 23/63		Aug. 19/59
2	Storage period (days)	23:33	30:32	31:34		32:53
3	Sampling temperature, °C.	.....	.....	11.7		14
4	Test temperature, °C.	23.9	24.3	24.6		24.6
5	Oxygen consumed by $KMnO_4$	2.2	.....	2.8		4.7
6	Carbon dioxide (CO_2) (calculated)	3	3	3		2
7	pH	7.4	7.6	7.3 (7.6)		7.0
8	Colour	5	0	5		10
9	Turbidity	0	0	0.7		0.8
10	Suspended matter, dried at 105°C.	.....	.....	.....		.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....		.....
12	Residue on evaporation, dried at 105°C.	88.4	.....	.....		92.8
13	Ignition loss at 550°C.	23.6	.....	.....		25.2
14	Specific conductance, micromhos at 25°C.	126	128	133		152
15	Calcium (Ca)	16.2	17.0	17.2		24.0
16	Magnesium (Mg)	3.9	3.7	4.6		3.9
17	Iron (Fe) Total	0.05	0.03	0.05		0.10
18	Dissolved	0.00	0.01	Trace		0.01
19	Manganese (Mn) Total	0.01	0.00	0.01		.....
20	Dissolved	0.01	0.00	0.01		0.00
21	Aluminum (Al)	0.02	0.03	0.01		0.01
22	Copper (Cu)	0.40	0.03	0.00	*See*	0.00
23	Zinc (Zn)	<0.05	0.00	0.05	Garson	0.0
24	Sodium (Na)	0.8	0.7	1.0	and	1.5
25	Potassium (K)	0.7	0.5	0.6	Sudbury	0.6
26	Ammonium (NH_4)	0.0	.....	0.0		0.0
27	Carbonate (CO_3)	0.0	0.0	0.0		0.0
28	Bicarbonate (HCO_3)	37.1	36.9	39.1		90.6
29	Sulphate (SO_4)	21.5	24.2	25.7		6.2
30	Chloride (Cl)	2.9	2.5	1.6		1.3
31	Fluoride (F)	0.08	0.11	0.07		0.0
32	Phosphate (PO_4) Total	<0.1	0.18	<0.1		.....
33	Dissolved	<0.1	.....	.....		0.0
34	Nitrate (NO_3)	0.3	0.9	1.1		0.4
35	Silica (SiO_2), colorimetric	1.6	1.8	1.7		5.5
36	Carbonate hardness as $CaCO_3$	30.3	30.3	32.1		74.3
37	Non-carbonate hardness as $CaCO_3$	26.0	27.5	29.8		1.6
38	Total hardness as $CaCO_3$	56.3	57.8	61.9		75.9
39	Sum of constituents	66.2	69.8	72.8		88.0
40	Per cent sodium	2.9	2.5	3.4		4.1
41	Saturation index at test temperature	−1.3	−0.8	−1.3		−0.4
42	Stability index at test temperature	10	9.2	9.9		8.6
	Remarks					*See* also Station No. 149, page 60

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

NIPIGON (concl'd)				NORTH BAY			No.
Lake Helen (Nipigon River)				Trout Lake			
Raw water	Finished water			Raw water	Finished water		
At hwy. 17 bridge	At town tap	At town tap	At town tap	At plant intake			
June 21/63	Aug. 6/57	Aug. 14/59	May 25/62	June 5/63	July 18/57	Aug. 18/59	1
39:46	91:104	26:55	31:33	22:44	5:5	7:13	2
12.2	20.5	16.0	8.9	16.7	17.2	18.0	3
24.9	23.2	27.0	24.2	24.6	25.1	27.2	4
5.1	5.2	5.0	.....	5.2	6.4	4.8	5
3.5	0.8	1	2.5	2	2	3	6
7.6 (8.3)	8.3	8.1 (8.1)	7.8	6.9 (7.4)	6.8	6.6	7
20	10	10 (10)	35	10	10	10	8
2	0	0.8 (<1)	3	0.7	0.9	0.6	9
.....	.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	.....	11
106	111	99.2	.....	49.6	48.4	48.0	12
23.6	28.0	17.6	.....	18.8	20.4	27.6	13
177	169	157	159	58.5	53.7	55.1	14
22.0	24.0	24.5	23.9	4.4	4.8	5.0	15
4.7	3.8	3.9	5.0	2.1	1.5	1.6	16
0.13	.....	0.06	0.14	0.07	.....	0.05	17
0.00	Trace	0.01	0.03	0.00	0.03	0.04	18
0.00	.....	.....	0.00	0.02	.....	.....	19
0.00	0.00	0.00	0.00	0.00	0.00	0.01	20
0.01	0.09	0.03	0.00	0.03	0.11	0.09	21
Trace	Trace	Trace	0.00	.....	0.07	0.16	22
0.00	0.2	0.3	0.00	<0.05	0.05	0.05	23
1.4	5.2	2.0	2.0	1.9	1.5	1.7	24
.....	0.6	0.7	0.6	1.0	1.0	1.2	25
0.0	0.05	0.0	.....	0.01	0.05	0.0	26
0.0	0.0	0.0	0.0	0.0	0.0	0.0	27
85.9	98.5	92.4	92.5	9.8	9.1	8.2	28
5.0	3.8	3.7	5.2	11.4	11.1	8.8	29
.....	3.4	1.5	1.9	1.9	3.1	3.9	30
0.07	0.0	0.0	0.17	0.07	0.0	0.0	31
.....	.....	.....	0.19	<0.1	.....	.....	32
<0.1	.....	0.0	.....	.....	.....	.....	33
0.8	0.1	0.4	0.1	0.8	0.6	3.0	34
3.5	5.2	5.4	3.9	2.4	3.0	2.0	35
70.5	75.5	75.8	75.9	8.0	7.5	6.7	36
3.7	0.0	1.4	4.5	11.6	10.6	12.4	37
74.2	75.5	77.2	80.4	19.6	18.1	19.1	38
.....	94.9	87.9	88.5	30.8	31.4	21.6	39
.....	13	5.2	5.1	17	14	15	40
-0.6	+0.2	0.0	-0.4	-2.9	-3.0	-3.2	41
8.8	7.9	8.1	8.6	13	13	13	42
							43

Community in the Upper Great Lakes drainage basin but Trout Lake is in the Ottawa River drainage basin.

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	NORTH BAY (concl'd)	ONAPING	PORT ARTHUR	
	Source(s)	Trout Lake	Well	Thunder Bay (Lake Superior)	
		Finished water	Raw and finished water	Raw water*	
	Sampling point	At pumphouse tap	At house tap	At pump	
1	Date of sampling	June 5/63	Aug. 20/58	Aug. 5/53	Mar. 13/58
2	Storage period (days)	22:44	84:199	12:365	21:49
3	Sampling temperature, °C.	16.7	11.7	14.4	0.6
4	Test temperature, °C.	24.9	22.3 (11.9)	22.0 (16.0)	24.4
5	Oxygen consumed by $KMnO_4$	5.1	.....	.....	.....
6	Carbon dioxide (CO_2)(calculated)	2	6	3	2
7	pH	6.8 (7.1)	6.9 (6.9)	7.5 (6.5)	7.5
8	Colour	10	0 (5)	5 (15)	5
9	Turbidity	0.5	0	3 (5)	0
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	47.2	100	.....	.....
13	Ignition loss at 550°C.	22.0	32.0	.....	.....
14	Specific conductance, micromhos at 25°C.	64.3	142	102 (90)	99.1
15	Calcium (Ca)	4.6	14.2	13.0	13.5
16	Magnesium (Mg)	2.7	5.0	4.4	2.9
17	Iron (Fe) Total	0.11	.....	.....	.....
18	Dissolved	0.00	0.02	.....	.....
19	Manganese (Mn) Total	0.03	.....	.....	.....
20	Dissolved	0.01	0.02	.....	.....
21	Aluminum (Al)	0.02	0.0	.....	.....
22	Copper (Cu)	.....	0.03	.....	.....
23	Zinc (Zn)	.....	0.1	.....	.....
24	Sodium (Na)	2.2	2.7	2.6	1.3
25	Potassium (K)	1.0	0.8	0.8	0.6
26	Ammonium (NH_4)	0.05	0.05	.....	0.1
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	8.9	30.8	59.4	53.0
29	Sulphate (SO_4)	11.4	17.5	4.5	3.5
30	Chloride (Cl)	3.0	11.2	1.5	1.4
31	Fluoride (F)	0.95	0.0	0.0	.....
32	Phosphate (PO_4) Total	< 0.1	.....	.....	.....
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	1.0	3.0	1.2	1.3
35	Silica (SiO_2), colorimetric	2.9	13	5.8	2.9
36	Carbonate hardness as $CaCO_3$	7.3	25.3 (25)	48.6	43.5
37	Non-carbonate hardness as $CaCO_3$	12.7	15.7 (18)	1.9	2.1
38	Total hardness as $CaCO_3$	20.0	41.0 (43)	50.5	45.6
39	Sum of constituents	34.2	83.2	63.0	53.6
40	Per cent sodium	18	9.4	9.9	5.7
41	Saturation index at test temperature	−3.0	−2.0	−1.1	−1.2
42	Stability index at test temperature	12	11	9.7	9.9
	Remarks			*See also Station No. 14, page 22	

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

PORT ARTHUR (concl'd)						No.
Thunder Bay (Lake Superior)						
Raw water		Finished water				
At pump						
Aug. 7/59	June 21/63	Feb. 2/56†	May 3/56†	Aug. 17/56†	Nov. 1/56†	1
11:19	33:41	.....	.....	.....	.....	2
13.3	7.8	.....	.....	.....	.....	3
26.1	24.6	.....	.....	.....	.....	4
2.5	3.0	.....	.....	.....	.....	5
2.5	3	2	2	2	3	6
7.5	7.4	7.5	7.7	7.8	7.4	7
10	5	0	5	3	8	8
0.8	0.9	2	2	2	2	9
.....	.....	Trace	Trace	Trace	Trace	10
.....	.....	.....	.....	.....	.....	11
67.6	.....	68	64	68	82	12
15.6	.....	.....	.....	.....	.....	13
94.0	94.5	.....	.....	.....	.....	14
13.4	12.2	14.4	14.4	12.8	14.4	15
3.1	3.5	4.4	2.4	3.4	3.4	16
0.09	.....	0.1	Trace	0.1	0.2	17
0.02	.....	.....	.....	.....	.....	18
0.00	.....	.....	.....	.....	.....	19
0.00	.....	.....	.....	.....	.....	20
0.07	.....	0.0	0.0	0.0	0.0	21
Trace	.....	0.6	Trace	0.4	0.1	22
0.0	.....	.....	.....	.....	.....	23
1.5	1.3	.....	.....	.....	.....	24
0.7	0.4	.....	.....	.....	.....	25
.....	.....	0.0	0.1	0.2	Trace	26
0.0	0.0	0.0	0.0	0.0	0.0	27
52.1	59.2	56.1	61.0	61.0	56.1	28
4.6	4.8	0	0	2.7	0	29
1.8	0.7	4.9	3.6	6.1	4.9	30
0.0	.....	.....	.....	.....	.....	31
.....	.....	.....	.....	.....	.....	32
0.0	.....	.....	.....	.....	.....	33
0.4	0.8	.....	.....	.....	.....	34
3.1	2.3	2.5	2.8	2.3	2.4	35
42.7	40.6	46	46	46	46	36
3.5	4.2	8	0	0	4	37
46.2	44.8	54	46	46	50	38
54.4	50.4	.....	.....	.....	.....	39
6.4	5.9	.....	.....	.....	.....	40
−1.1	−1.3	−1.1	−0.9	−0.8	−1.8	41
9.7	10	9.7	9.5	9.4	9.8	42

† Analysis supplied by Alchem Ltd., Burlington, Ont.

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	PORT ARTHUR (concl'd)			POWASSAN
	Source(s)	Thunder Bay (Lake Superior)			Genesee Creek
			Finished water		Raw water
	Sampling point	At town tap	At town tap	At plant tap	
1	Date of sampling	Aug. 2/57	May 25/62	June 21/63	Aug. 21/58
2	Storage period (days)	90:104	31:33	33:52	.....
3	Sampling tempreature, °C.	14.2	8.8	7.8	.....
4	Test temperature, °C.	25.0	24.2	24.8	22.2
5	Oxygen consumed by $KMnO_4$	2.8	.....	3.6	6.3
6	Carbon dioxide (CO_2) (calculated)	1	14	6.5	1
7	pH	7.8 (6.8)	6.8	7.1	7.3
8	Colour	5	5	5	40
9	Turbidity	0.4	0	0.5	7
10	Suspended matter, dried at 105° C.	.....	.....	.....	13
11	Suspended matter, ignited at 550°C.	.....	.....	.....	11
12	Residue on evaporation, dried at 105°C.	65.6	.....	.....	57.2
13	Ignition loss at 550°C.	15.2	.....	.....	22.0
14	Specific conductance, micromhos at 25°C.	97.7	95.0	94.8	57.9
15	Calcium (Ca)	12.8	12.9	12.2	4.8
16	Magnesium (Mg)	3.1	3.6	3.4	2.3
17	Iron (Fe) Total	.....	0.06	0.05	0.52
18	Dissolved	0.07	0.01	0.00	0.21
19	Manganese (Mn) Total	.....	0.00	.....	0.00
20	Dissolved	Trace	0.00	0.00	0.00
21	Aluminum (Al)	0.02	0.02	0.01	0.0
22	Copper (Cu)	0.02	0.05	0.00	0.0
23	Zinc (Zn)	0.0	0.00	0.00	0.0
24	Sodium (Na)	2.6	1.2	1.1	2.0
25	Potassium (K)	0.4	0.4	0.4	0.9
26	Ammonium (NH_4)	0.0	.....	0.0	0.15
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	52.5	49.6	49.4	18.0
29	Sulphate (SO_4)	3.7	3.7	4.2	7.7
30	Chloride (Cl)	2.5	2.2	1.8	1.1
31	Fluoride (F)	0.0	0.11	0.02	0.0
32	Phosphate (PO_4) Total	.....	0.17	< 0.1	.....
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	0.4	0.9	0.2	1.5
35	Silica (SiO_2), colorimetric	5.1	2.4	2.0	9.0
36	Carbonate hardness as $CaCO_3$	43.1 (42)	40.7	40.5	14.8
37	Non-carbonate hardness as $CaCO_3$	1.6 (4)	6.3	4.1	6.6
38	Total hardness as $CaCO_3$	44.7 (46)	47.0	44.6	21.4
39	Sum of constituents	52.3	52.0	50.4	38.4
40	Per cent sodium	11	5.2	5.1	16
41	Saturation index at test temperature	−0.8	−1.9	−1.6	−2.2
42	Stability index at test temperature	9.4	11	10	12
	Remarks				

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

POWASSAN (concl'd)			RED ROCK			No.
Genesee Creek			Nipigon Bay (Lake Superior)			
Raw water	Finished water		Raw water	Raw and finished water	Finished water	
At plant pump	At town tap	At plant tap	At hwy. No. 17 bridge		At pumphouse tap	
June 4/63	Aug. 21/58	June 4/63	June 21/63	Aug. 14/59	June 21/63	1
21:37	84:97	21:37	39:43	26:46	33:46	2
20.6	19.4	20.6	.....	15	.....	3
23.6	22.2 (21.7)	23.7	24.7	27.0	24.7	4
14.4	2.6	7.5	6.5	4.9	8.2	5
3	2	2	4	2	4	6
6.8 (7.1)	7.4 (7.5)	7.5 (7.3)	7.5	7.9	7.5	7
70	15 (30)	20	25	10	30	8
5	0	0.5	3	2	2	9
.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	11
.....	74.8	84.0	.....	101	.....	12
.....	15.2	19.2	.....	30.4	.....	13
51.0	104.5	124.5	145	151	147	14
4.5	8.5	3.7	22.9	23.7	22.1	15
2.0	1.7	2.2	4.2	3.7	4.7	16
1.0	.....	0.14	.....	0.34	0.26	17
.....	0.08	0.04	.....	0.02	Trace	18
.....	.....	0.00	.....	.....	0.00	19
.....	0.02	0.00	.....	Trace	0.00	20
.....	0.02	0.27	.....	0.0	0.02	21
.....	0.05	0.02	.....	Trace	0.00	22
.....	0.5	0.00	.....	0.1	0.05	23
1.3	8.0	16.6	1.2	1.5	1.4	24
0.6	0.8	0.7	0.5	0.7	0.6	25
0.0	0.05	0.0	0.0	0.0	0.0	26
0.0	0.0	0.0	0.0	0.0	0.0	27
12.1	26.3	30.5	84.2	83.1	82.4	28
9.7	22.0	24.7	4.7	5.0	6.0	29
0.7	1.6	2.7	1.1	2.6	1.5	30
.....	0.0	0.10	.....	0.0	0.08	31
.....	.....	0.1	.....	.....	0.1	32
.....	.....	.....	.....	.....	.....	33
0.3	0.6	0.2	0.8	1.5	0.8	34
3.1	8.1	2.5	3.7	5.0	3.8	35
9.9	21.6 (23)	18.4	69.1	68.2	67.6	36
9.6	6.6 (2)	0.0	5.5	6.1	7.0	37
19.5	28.2 (25)	18.4	74.6	74.3	74.6	38
28.1	64.9	68.7	80.6	84.8	81.6	39
12	36	65	3.3	4.1	3.9	40
−2.9	−1.8	−1.9	−0.7	−0.2	−0.7	41
13	11	11	8.9	8.3	8.9	42

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.						
	Municipality	SAULT STE. MARIE				
	Source(s)	St. Mary's River (Lake Superior) and wells				
		Wells*			St. Mary's River (Lake Superior)†	
		Raw and finished water				
	Sampling point	At pump house			At plant tap	At town tap
1	Date of sampling	Oct. 25/51	Aug. 12/58	Sept. 25/63	Oct. 25/51	Aug. 12/58
2	Storage period (days)	9:33	87:195	20:26	9:25	87:195
3	Sampling temperature, °C.	7.2	9.4	7.2	9.4	18.8
4	Test temperature, °C.	22	25.6 (14.3)	25.0	22.0	25.7 (18.8)
5	Oxygen consumed by $KMnO_4$	.....	.....	.....	.....	0.8
6	Carbon dioxide (CO_2) (calculated)	2	1	1	1	0.8
7	pH	7.6	7.8 (7.4)	7.8	7.8	8.0 (6.6-7.8)
8	Colour	0	5 (5)	0	0	3 (5)
9	Turbidity	0.5	0	0	1	0
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	80.6	88.8	.....	55.2	59.2
13	Ignition loss at 550°C.	12.4	10.0	.....	8.6	4.8
14	Specific conductance, micromhos at 25°C.	119	122.5	119	93.1	94.0
15	Calcium (Ca)	15.3	15.4	14.2	13.8	12.7
16	Magnesium (Mg)	3.4	3.5	3.8	2.8	3.2
17	Iron (Fe) Total	.....	.....	0.00	.....	.....
18	Dissolved	0.02	0.0	.....	0.02	Trace
19	Manganese (Mn) Total	.....	.....	0.00	.....	.....
20	Dissolved	.....	Trace	.....	.....	0.00
21	Aluminum (Al)	.....	Trace	.....	.....	0.04
22	Copper (Cu)	.....	0.0	.....	.....	0.02
23	Zinc (Zn)	.....	0.0	.....	.....	0.05
24	Sodium (Na)	2.6	2.8	2.5	1.3	1.1
25	Potassium (K)	0.5	0.8	0.7	0.3	0.5
26	Ammonium (NH_4)	.....	0.05	.....	.....	0.1
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	52.9	55.2	52.9	50.3	50.7
29	Sulphate (SO_4)	8.0	8.1	8.0	2.6	2.6
30	Chloride (Cl)	3.0	2.0	1.1	2.5	1.3
31	Fluoride (F)	0.05	0.0	0.10	0.0	0.0
32	Phosphate (PO_4) Total	.....	.....	.....	.....	.....
33	Dissolved	.....	.....	.....	.....	.....
34	Nitrate (NO_3)	4.0	2.0	2.9	1.2	1.0
35	Silica (SiO_2), colorimetric	15	15	13	2.6	3.8
36	Carbonate hardness as $CaCO_3$	43.4	45.3 (42.5)	43.4	41.2	41.6 (41)
37	Non-carbonate hardness as $CaCO_3$	8.8	7.5 (13.0)	7.8	4.7	3.2 (6)
38	Total hardness as $CaCO_3$	52.2	52.8 (55.5)	51.2	45.9	44.8 (47)
39	Sum of constituents	77.5	76.8	72.7	52.0	51.4
40	Per cent sodium	9.7	10	9.5	5.7	5.0
41	Saturation index at test temperature	−1.0	−0.7	−0.8	−0.9	−0.7
42	Stability index at test temperature	9.6	9.2	9.4	9.6	9.4
	Remarks	* Supply suburban district of Steelton and parts of Korah Township.				† *See* also Station No. 9, page 20

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

SAULT STE. MARIE (concl'd)			SCHREIBER		SOUTH RIVER*	No.
St. Mary's River (Lake Superior) and wells			Cook's Lake		Springs	
St. Mary's River (Lake Superior)						
Raw and finished water			Raw and finished water		Raw and finished water	
At town tap			At town tap		At town tap	
Sept. 26/59	May 26/62	June 8/63	Aug. 15/59	May 25/62	June 4/63	1
192:220	30:32	25:54	33:54	24:47	21:37	2
16.1	8.3	11.7	18.0	13.0	12.8	3
24.9 (16.1)	24.4	24.7	24.8	23.2	23.6	4
.....	.....	2.0	4.4	2.9	5.0	5
2	2	4	2	2.5	9	6
7.7 (6.9)	7.6	7.3	7.3 (7.1)	7.2	6.3 (6.15)	7
5	0	5	10 (10)	15	0	8
2	2	0.3	0.8 (<1)	0	1	9
.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	11
.....	.....	.....	46.4	.....	310	12
.....	.....	.....	14.4	.....	80.4	13
93.3	93.3	96.1	63.6	54.6	488	14
12.9	12.2	12.1	10.3	9.0	20.4	15
3.0	3.1	3.4	0.6	1.8	4.3	16
0.06	0.04	0.10	0.12	0.06	0.47	17
0.01	0.01	0.10	0.02	0.02	0.00	18
0.00	0.00	0.00	.....	0.01	0.51	19
0.00	0.00	0.00	0.00	0.01	0.39	20
0.04	0.01	Trace	0.0	0.01	0.04	21
Trace	0.01	0.00	0.05	0.28	0.11	22
0.0	0.0	0.0	Trace	Trace	0.09	23
1.7	1.1	1.1	0.8	0.5	55.5	24
0.5	0.5	0.5	0.2	0.2	10.1	25
0.5	.....	0.04	0.1	0.1	0.3	26
0.0	0.0	0.0	0.0	0.0	0.0	27
53.1	48.5	48.3	28.3	23.8	10.4	28
1.6	3.6	3.5	7.3	6.9	14.7	29
2.0	2.0	0.9	0.5	2.0	114	30
0.0	0.08	0.06	0.0	0.15	0.06	31
.....	0.16	< 0.1	.....	0.15	<0.1	32
Trace	.....	.....	0.0	.....	.....	33
0.4	1.4	0.9	0.1	0.3	18	34
6.7	2.1	2.1	4.3	2.5	11	35
43.6 (40)	39.8	39.6	23.2	19.5	8.5	36
0.9 (5)	3.6	4.5	5.0	10.5	60.2	37
44.8 (45)	43.4	44.1	28.2	30.0	68.7	38
65.0	50.1	48.4	38.1	35.3	253	39
7.5	5.1	5.1	5.7	3.4	60	40
−1.1	−1.1	−1.4	−1.7	−1.9	−2.9	41
9.7	9.8	10	11	11	12	42

* *See* also index, page

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.					
	Municipality	STURGEON FALLS			
	Sources(s)	Sturgeon River			
		Raw water*			Finished water
	Sampling point	At intake well			At plant tap
1	Date of sampling	July 18/57	Aug. 21/58	June 6/63	Aug. 21/58
2	Storage period (days)	40:63	84:197	22:43	84:197
3	Sampling temperature, °C.	22.2	20.3	18.9	20.3
4	Test temperature, °C.	24.5	22.3	25.5	22.3 (20.5)
5	Oxygen consumed by $KMnO_4$	7.1	4.2	8.3	3.9
6	Carbon dioxide (CO_2), (calculated)	2	1	2	2
7	pH	6.8 (6.6)	7.5	7.0 (6.9)	7.2 (7.1)
8	Colour	30	15	25	15 (20)
9	Turbidity	4	0	5	0
10	Suspended matter, dried at 105°C.	14.8	.....	.....	.....
11	Suspended matter, ignited at 550°C.	8.9	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	63.2	65.6	.....	48.0
13	Ignition loss at 550°C.	24.0	20.0	.....	17.2
14	Specific conductance, micromhos at 25°C.	66.2	72.5	65.4	72.5
15	Calcium (Ca)	6.9	8.1	6.2	8.1
16	Magnesium (Mg)	2.0	2.7	1.4	2.5
17	Iron (Fe) Total	.....	.....	0.23	.....
18	Dissolved	0.26	0.02	0.01	0.02
19	Manganese (Mn) Total	.....	.....	0.40	.....
20	Dissolved	0.05	0.00	0.00	0.00
21	Aluminum (Al)	0.0	0.0	0.02	0.0
22	Copper (Cu)	Trace	0.00	.....	0.00
23	Zinc (Zn)	0.0	0.0	0.0	0.0
24	Sodium (Na)	0.7	0.8	0.8	0.8
25	Potassium (K)	0.4	0.4	0.4	0.4
26	Ammonium (NH_4)	0.1	0.1	0.01	0.1
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	9.9	20.8	12.4	19.1
29	Sulphate (SO_4)	15.1	14.1	18.0	13.8
30	Chloride (Cl)	3.7	0.3	0.3	1.5
31	Fluoride (F)	0.0	0.0	0.1	0.0
32	Phosphate (PO_4) Total	.....	.....	<0.1	.....
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	0.15	0.5	0.2	0.6
35	Silica (SiO_2), colorimetric	2.8	4.2	2.6	3.2
36	Carbonate hardness as $CaCO_3$	17.3	17.1	10.2	15.7 (15.6)
37	Non-carbonate hardness as $CaCO_3$	8.1	14.2	16.7	14.8
38	Total hardness as $CaCO_3$	25.4	31.3	26.9	30.5
39	Sum of constituents	37.0	41.4	36.2	40.3
40	Per cent sodium	5.4	5.2	6.0	5.3
41	Saturation index at test temperature	−2.8	−1.7	−2.5	−2.1
42	Stability index at test temperature	12	11	12	11
	Remarks	* *See* also Station No. 17, page 24			

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

STURGEON FALLS (concl'd)	SUDBURY					No.
Sturgeon River	Ramsay Lake					
Finished water	Raw water		Finished water			
At plant tap	At intake well	At intake well	At house tap			
June 6/63	Aug. 1/58	June 6/63	July 22/57	Aug. 1/58	Sept. 22/59	1
22:43	82:197	22:53	44:67	84:175	196:224	2
18.9	19.2	12.2	.....	.....	15.5	3
25.2	24.9	24.8	24.4	24.8 (21.6)	24.4 (18.5)	4
8.2	2.1	3.6	3.2	3.2	.....	5
2	0.9	4	6	3	3	6
6.9 (6.8)	7.2	6.7 (7.0)	6.3	6.8 (6.4)	7.0 (6.6)	7
25	10 (25)	15	10	10 (15)	15	8
1	0	1	0.8	0	3	9
.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	.....	11
.....	87.4	.....	96.4	104	.....	12
.....	22.6	.....	21.6	26.8	.....	13
67.4	151	190	143	151	165	14
6.4	13.2	15.4	12.5	13.0	14.8	15
1.4	4.3	5.1	3.9	4.5	4.5	16
0.11	.....	.....	.....	.....	0.48	17
0.02	Trace	.....	0.13	0.08	0.12	18
0.00	.....	.....	.....	.....	0.60	19
0.00	0.00	.....	0.05	0.04	0.60	20
0.03	Trace	.....	0.0	0.02	0.0	21
.....	0.00	.....	0.14	0.77	0.11	22
0.00	0.0	0.00	0.05	0.3	0.03	23
1.1	5.2	8.8	4.8	5.0	6.3	24
0.4	1.6	1.6	1.4	1.5	1.6	25
0.04	0.05	0.02	0.05	0.05	0.0	26
0.0	0.0	0.0	0.0	0.0	0.0	27
10.1	9.5	11.9	7.6	11.0	16.2	28
18.0	43.1	45.8	40.3	41.9	40.2	29
1.5	7.7	15.4	7.4	10.7	10.6	30
0.1	0.1	.....	0.8	0.15*	1.2	31
< 0.1	.....	.....	.....	.....	.....	32
.....	.....	.....	.....	.....	0.05	33
0.2	0.3	0.2	0.5	0.2	0.2	34
3.0	1.9	0.5	2.2	1.9	4.5	35
8.3	7.8	9.8	6.2	9.0 (14)	13.3 (15)	36
19.1	42.8	49.5	41.0	41.9 (48)	41.9	37
27.4	50.6	59.3	47.2	50.9 (62)	55.2	38
37.1	82.1	98.7	78.0	85.5	94.5	39
7.9	18	24	17	17	19	40
-2.7	-2.2	-2.5	-3.2	-2.5	-2.1	41
12	12	12	13	12	11	42

* No fluoride being added

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	SUDBURY (concl'd)		TARENTORUS TOWNSHIP	TERRACE BAY
	Source(s)	Ramsay Lake		St. Mary's River	Lake Superior
		- Finished water			Raw water
	Sampling point	At house tap	At plant tap		At paper mill pumphouse
1	Date of sampling	May 6/62	June 6/63		June 22/63
2	Storage period (days)	38:39	22:23		38:45
3	Sampling temperature, °C.	.....	12.2		3.9
4	Test temperature, °C.	23.8	24.8		24.8
5	Oxygen consumed by $KMnO_4$	.....	4.0		1.3
6	Carbon dioxide (CO_2), (calculated)	4	5		3
7	pH	6.7	6.5 (6.95)		7.4 (7.8)
8	Colour	10	10		5
9	Turbidity	.....	0.3		0.5
10	Suspended matter, dried at 105°C.	.....	.....		.....
11	Suspended matter, ignited at 550°C.	.....	.....		.....
12	Residue on evaporation, dried at 105°C.	.....	.....		.....
13	Ignition loss at 550°C.	.....	.....		.....
14	Specific conductance, micromhos at 25°C.	192	196		93.4
15	Calcium (Ca)	14.4	14.9		13.1
16	Magnesium (Mg)	4.8	5.4		3.2
17	Iron (Fe) Total	0.11	0.07		.....
18	Dissolved	.....	0.02		.....
19	Manganese (Mn) Total	0.02	0.07	*See*	.....
20	Dissolved	.....	0.07	Sault Ste. Marie	.....
21	Aluminum (Al)	.....	Trace		.....
22	Copper (Cu)	.....	0.07		.....
23	Zinc (Zn)	.....	< 0.05		.....
24	Sodium (Na)	7.7	9.1		1.1
25	Potassium (K)	1.6	2.5		0.5
26	Ammonium (NH_4)	0.1	0.0		0.0
27	Carbonate (CO_3)	0.0	0.0		0.0
28	Bicarbonate (HCO_3)	11.6	8.9		50.3
29	Sulphate (SO_4)	41.5	46.3		4.0
30	Chloride (Cl)	15.1	17.2		0.8
31	Fluoride (F)	0.14*	0.77		.....
32	Phosphate (PO_4) Total	.....	<0.1		....
33	Dissolved	.....	.....		.....
34	Nitrate (NO_3)	0.6	0.4		1.0
35	Silica (SiO_2), colorimetric	1.0	0.6		2.3
36	Carbonate hardness as $CaCO_3$	9.5	7.3		41.3
37	Non-carbonate hardness as $CaCO_3$	46.3	52.0		4.7
38	Total hardness as $CaCO_3$	55.8	59.3		46.0
39	Sum of constituents	92.5	102		50.8
40	Per cent sodium	23	24		4.9
41	Saturation index at test temperature	-2.5	-2.9		-1.2
42	Stability index at test temperature	12	12		9.8
	Remarks	* No fluoride being added			

TABLE III – (Continued)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

TERRACE BAY (concl'd)		THESSALON			VERNER	No.
Lake Superior*		Lake Huron (Georgian Bay)			Veuve River	
Finished water		Raw water*	Raw and finished water		Raw water	
At town tap	At town tap	From wharf	At pumphouse	At town tap	From river below intake	
May 25/62	June 22/63	June 24/63	Aug. 8/58	June 24/63	Aug. 20/58	1
24:27	32:45	49:52	90:187	49:66	84:198	2
5.0	6.1	11.7	17.0	10.0	20.3	3
23.0	24.6	24.7	23.4	26.2	22.3	4
0.6	1.9	1.5	1.6	1.1	10.4	5
2	3	10	1	4	4	6
7.6	7.5 (8.2)	7.1 (8.2)	8.0	7.5	7.5 (6.7)	7
5	5	5	0	5	50 (90)	8
0	0.3	0.9	0	1	4	9
.....	.....	.....	.....	.....	12.8	10
.....	.....	.....	.....	.....	10.2	11
.....	.....	.....	93.6	94.8	133	12
.....	.....	.....	18.8	40.8	36.0	13
87.3	108	164	154	165	158	14
12.6	12.2	20.7	20.1	21.0	18.8	15
3.3	3.6	6.8	5.5	6.4	6.8	16
0.02	0.02	.....	.....	0.08	0.26	17
0.00	0.00	.....	Trace	Trace	0.05	18
0.00	0.00	.....	.....	0.00	.....	19
0.00	0.00	.....	0.00	0.00	0.00	20
0.01	Trace	.....	0.03	0.02	0.0	21
0.05	Trace	.....	0.00	0.01	0.00	22
0.00	0.00	.....	0.0	0.40	0.0	23
1.1	1.2	2.1	2.1	2.1	2.8	24
0.5	.....	0.6	0.5	0.8	0.9	25
.....	0.0	.....	0.1	0.1	0.1	26
0.0	0.0	0.0	0.0	0.0	0.0	27
50.1	50.0	77.5	74.0	77.3	74.2	28
3.3	4.2	12.1	8.5	10.8	12.8	29
1.6	.....	4.0	3.4	4.0	2.1	30
0.15	0.04	.....	0.0	0.10	0.0	31
0.27	<0.1	.....	.....	<0.1	.....	32
.....	.....	.....	.....	.....	.....	33
0.9	1.3	0.1	1.0	0.6	2.0	34
2.2	2.3	2.4	3.3	2.0	6.4	35
41.1	41.0	63.6	60.7 (63.6)	63.4	60.9 (60.6)	36
4.9	4.4	16.0	12.1 (9.2)	15.4	14.0 (5.8)	37
45.0	45.4	79.6	72.8 (72.9)	78.8	74.9 (66.4)	38
50.6	.....	87.0	80.9	85.8	89.2	39
5.0	4.9	5.4	5.8	5.4	7.4	40
-1.1	-1.2	-1.2	-0.3	-0.7	-0.9	41
9.8	9.9	9.5	8.6	8.9	9.4	42

* *See* also Station No. 7, page 20

TABLE III – (Concluded)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

No.	Municipality	VERNER			WARREN
	Source(s)	Veuve River			Well
		Raw water	Finished water		Raw and finished water
	Sampling point	At pumphouse	At house tap		At house tap
1	Date of sampling	June 6/63	Aug. 20/58	June 6/63	June 6/63
2	Storage period (days)	22:43	85:198	22:43	22:53
3	Sampling temperature, °C.	21.1	17.8	10.6	8.9
4	Test temperature, °C.	25.3	22.3 (17.8)	25.5	25.3
5	Oxygen consumed by $KMnO_4$	11.6	9.8	11.3	1.7
6	Carbon dioxide (CO_2), (calculated)	8	2	2	5.5
7	pH	6.7 (7.2)	7.7 (7.6)	7.2 (7.0)	7.8 (7.6)
8	Colour	40	50 (90)	40	0
9	Turbidity	13	2	6	0
10	Suspended matter, dried at 105°C.	.....	.....	.....	.....
11	Suspended matter, ignited at 550°C.	.....	.....	.....	.....
12	Residue on evaporation, dried at 105°C.	.....	115	.....	294
13	Ignition loss at 550°C.	.....	40.8	.....	67.2
14	Specific conductance, micromhos at 25°C.	109.5	166	116.5	474
15	Calcium (Ca)	10.3	18.8	9.7	57.9
16	Magnesium (Mg)	5.0	7.4	5.8	20.0
17	Iron (Fe) Total	0.61	.....	0.39	0.02
18	Dissolved	0.01	0.21	0.04	0.00
19	Manganese (Mn) Total	0.04	.....	0.03	0.00
20	Dissolved	0.00	Trace	0.02	0.00
21	Aluminum (Al)	0.02	0.0	0.06	0.07
22	Copper (Cu)	.....	Trace	.....	0.34
23	Zinc (Zn)	<0.05	2.0	0.50	0.00
24	Sodium (Na)	1.8	4.0	1.7	8.0
25	Potassium (K)	0.8	0.9	0.8	2.2
26	Ammonium (NH_4)	0.02	0.1	0.2	0.0
27	Carbonate (CO_3)	0.0	0.0	0.0	0.0
28	Bicarbonate (HCO_3)	23.5	77.8	23.3	21.4
29	Sulphate (SO_4)	27.3	13.9	26.8	28.6
30	Chloride (Cl)	0.2	4.4	2.4	16.3
31	Fluoride (F)	0.15	0.0	0.15	0.10
32	Phosphate (PO_4) Total	.....	.....	< 0.1	<0.1
33	Dissolved	.....	.....	.....	.....
34	Nitrate (NO_3)	0.6	0.9	0.4	18
35	Silica (SiO_2), colorimetric	2.4	6.3	2.4	15
36	Carbonate hardness as $CaCO_3$	19.3	63.8	19.1	176
37	Non-carbonate hardness as $CaCO_3$	26.8	13.5	29.0	51.3
38	Total hardness as $CaCO_3$	46.1	77.3	48.1	227
39	Sum of constituents	60.2	97.1	61.8	272
40	Per cent sodium	7.6	9.6	7.0	7.0
41	Saturation index at test temperature	−2.3	−0.7	−1.9	+0.4
42	Stability index at test temperature	11	9.1	11	7.0
	Remarks				

TABLE III – (Concluded)

Chemical Analyses of Municipal Water Supplies

Upper Great Lakes Drainage Basin in Canada

ONTARIO

(In parts per million)

WAWA	WHITE RIVER	WIDDIFIELD TOWNSHIP*		No.
	Lake Tukanee (Lake Tutney)	Trout Lake		
	Raw and finished water			
	At Service Station tap prior to chlorination			
	June 22/63			1
	41:59			2
	11.7			3
	24.7			4
	6.1			5
	1			6
	7.7			7
	25			8
	0.9			9
	.....			10
	.....			11
	.....			12
	.....			13
	62.6			14
	7.6			15
	2.6			16
	.....			17
	.....			18
	.....			19
	.....			20
See Michipicoten Township	.....	*See* North Bay		21
	.....			22
	0.05			23
	0.8			24
	0.3			25
	0.1			26
	0.0			27
	31.3			28
	6.0			29
	0.4			30
	0.10			31
	.....			32
	.....			33
	0.4			34
	4.1			35
	25.7			36
	4.0			37
	29.7			38
	37.7			39
	5.5			40
	-1.4			41
	11			42

* Community in the Upper Great Lakes drainage basin but Trout Lake is in the Ottawa River drainage basin.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	COMMUNITY	ALGOM NORDIC MINE*			
		Townsite		Trailer Camp	
	Total Population Served	1959: 125	1963**: 100 estd	1959: 750†	1963**: 0
	Ownership	In 1959, Algom Uranium Mines Ltd.; in 1963, Rio Tinto Mining Co. of Canada Ltd.			
	Source	Ryan Lake		Pecors Lake (via canal)	
	Treatment	Chlorination		Chlorination in 1959; in 1963, no system	
	Storage capacity (thousand gal)	None		None	
	Industrial use	None		Lake water also used in mine and mill	
	Sampling point	At dining hall tap		Chlorinated - at bunkhouse tap	Untreated - at open canal
1	Date of sampling	Sept. 25/59		Sept. 25/59	Sept. 24/63
2	Storage period (days)	187:196		185:196	22:27
3	Sampling temperature, °C.	17.5		20.5	12.5
4	Test temperature, °C.	26.8		26.7	25.7
5	Oxygen consumed by $KMnO_4$	.....		.....	.....
6	Carbon dioxide (CO_2), calculated	2		3	0.8
7	pH	7.0 (6.1)		6.8 (6.6)	6.1
8	Colour	0		0	5
9	Turbidity	0.8		1	0
10	Residue on evaporation, dried at 105°C.	.....		.....	.....
11	Ignition loss at 550°C.	.....		.....	.....
12	Specific conductance, micromhos at 25°C.	48.7		225	788
13	Calcium (Ca)	5.6		26.6	112
14	Magnesium (Mg)	1.1		4.4	16.8
15	Iron (Fe) Total	0.10		0.23	0.08
16	Dissolved	0.01		0.00	.....
17	Manganese (Mn)	0.02		0.10	0.49
18	Dissolved	0.01		0.00	.....
19	Aluminum (Al)	0.0		0.0	.....
20	Copper (Cu)	0.02		0.00	0.00
21	Zinc (Zn)	0.00		0.00	0.08
22	Sodium (Na)	0.8		5.2	14.2
23	Potassium (K)	0.6		2.6	13.7
24	Ammonia (NH_3)	.....		0.0	.....
25	Carbonate (CO_3)	0.0		0.0	0.0
26	Bicarbonate (HCO_3)	11.6		10.2	1.1
27	Sulphate (SO_4)	7.1		75.9	330
28	Chloride (Cl)	3.5		6.0	16.6
29	Fluoride (F)	0.0		0.0	0.50
30	Phosphate (PO_4) Total	.....		.....	.....
31	Dissolved	0.0		0.0	.....
32	Nitrate (NO_3)	0.0		1.0	33
33	Silica (SiO_2), colorimetric	2.0		3.0	3.3
34	Carbonate hardness as $CaCO_3$	9.5		8.4 (7.5)	0.9
35	Non-carbonate hardness as $CaCO_3$	9.1		75.5	347
36	Total hardness as $CaCO_3$	18.6		83.9	348
37	Sum of constituents	26.4		130	540
38	Per cent sodium	8.3		11	7.8
39	Saturation index at test temperature	−2.6		−2.2	−3.3
40	Stability index at test temperature	12		11	13
	Remarks	* In Elliot Lake Improvement District, about 3½ miles from the community of Elliot Lake ** Mine still operating but no trailer camp or bunkhouses. † Population includes 250 in bunkhouses			

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

ALGOM QUIRKE MINE* Quirke Townsite, Trailer Camp and Campsite		CAN. MET MINE* Townsite and Trailer Camp		CONSOLIDATED DENISON MINE* Townsite		FECUNIS MINE* Hillcrest Townsite		
1959	1963	1959	1963	1959	1963	1959	1963	
1,120 (138[a]) (290[b])	100 estd†	No data	0†	800 estd (606[a]) (145[b])	125 estd	50 estd†	0††	
In 1959, Algom Uranium Mines Ltd.; in 1963, Rio Tinto Mining Co. of Canada Ltd.		In 1959, Canadian Metallurgical Explorations Ltd.†		In 1959, Consolidated Denison Mines Ltd.; in 1963, Denison Mines Ltd.		Falconbridge Nickel Mines Ltd.		
Dunlop (Long) Lake, nearby		Quirke Lake, nearby		Quirke Lake, nearby		Moose Lake, nearby		
Chlorination		In 1959, chlorination		Chlorination		Chlorination and ammonia addition		
Standpipe		No data		Elev. tank - 80 (estd)		Elev. tank - 80 (estd)		
In 1959, about 2.35 mgd used in mine and mill		Lake water also used in 1959 in mine and mill		Lake water also used in mine and mill		Lake water also used in mine and mill		
At highway No. 108 bridge				At mine office tap		At mine tap		
Sept. 24/59				Sept. 29/59		Aug. 20/58		1
186:197				183:203		85:196		2
16.7				19.8		21.7		3
26.8 (21.2)				26.8		22.3 (22.9)		4
.....				.....		2.1		5
3				3		1.5		6
6.5 (6.7)				6.4		6.1 (5.7)		7
0				5		5 (15)		8
0				2		0		9
.....				.....		69.6		10
.....				.....		20.8		11
32.9				281		85.2		12
3.9				33.9		8.1		13
0.6				3.4		1.5		14
0.04				0.25		.....		15
0.00				0.12		Trace		16
.....		*See*		0.12		.....		17
0.00		Consolidated Denison Mine		0.04		0.25		18
Trace		and		0.0		0.0		19
0.00		Stanrock Mine		Trace		0.6		20
0.00		(This Table)		0.0		0.4		21
0.8				6.6		2.0		22
0.5				4.6		1.5		23
0.0				0.2		0.1		24
0.0				0.0		0.0		25
6.8				4.4		1.1		26
6.8				90.7		29.8		27
0.2				8.9		1.3		28
0.0				0.15		0.0		29
.....				.....		.....		30
0.0				0.0		.....		31
0.1				0.6		0.3		32
1.5				2.4		2.0		33
5.6 (5)				3.6		0.9 (1.0)		34
6.5				94.0		25.5		35
12.1				97.6		26.4		36
17.8				154		47.9		37
12				12		13		38
-2.7				-2.9		-4.4		39
12				12		15		40

* In Elliot Lake Improvement District, about 10 miles north of the community of Elliot Lake
† Townsite and staffhouse population only; includes employees of other operating mines and of the newly-opened Ontario Reformatory.

* In Elliot Lake Improvement District, north of the community of Elliot Lake.
† This mine was sold to Consolidated Denison Mines Ltd. about 1960 - 1961; in 1963 it was not operating and some mine and mill equipment had been sold and was being dismantled.

* In the Elliot Lake Improvement District, north of the community of Elliot Lake

* near Onaping, Ont.
† Hillcrest Campsite (12 homes) was used during development; in 1963 this camp was not operating.
†† About 200 persons, including development staff at mine but none live at the mine site.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	COMMUNITY	FROOD MINES* Townsite at Frood - Stohie Mines		GARSON MINE* Townsite	
	Total population served	1958-59	1961	1961	1963
		96† (124[a])	90† (200[h])	495	328
	Ownership	International Nickel Company of Canada Ltd.		International Nickel Company of Canada Ltd.	
	Source	Whitson Lake		Well, 90 ft deep, north of townsite	
	Treatment	Chlorination		Chlorination	
	Storage capacity (thousand gal)	Elev. Tank - 235.2		Elev. wooden tank - 5.5	
	Industrial use	Lake water also used in the mine		Well water also used in the mine for domestic purposes	
	Sampling point	At staffhouse tap	At lake	At townsite tap	
1	Date of sampling	Aug. 20/58	June 25/63	Sept. 23/63	
2	Storage period (days)	84:198	49:65	22:28	
3	Sampling temperature, °C.	18.0	23.9	15.3	
4	Test temperature, °C.	22.0 (19.5)	24.0	25.4	
5	Oxygen consumed by $KMnO_4$	1.0	0.5	.....	
6	Carbon dioxide (CO_2), (calculated)	.....	7	2	
7	pH	4.4 (4.8)	4.2 (4.3)	7.9	
8	Colour	0 (10)	0	0	
9	Turbidity	0	3	0	
10	Residue on evaporation, dried at 105°C.	62.8	74.4	.....	
11	Ignition loss at 550°C.	12.0	12.4	.....	
12	Specific conductance, micromhos at 25°C.	123	141	293	
13	Calcium (Ca)	8.5	8.8	35.0	
14	Magnesium (Mg)	2.6	3.5	10.8	
15	Iron (Fe) Total	.....	.....	0.00	
16	Dissolved	0.01	.....	0.00	
17	Manganese (Mn) Total	.....	.....	0.00	
18	Dissolved	0.33	.....	0.00	
19	Aluminum (Al)	0.13	0.40	.....	
20	Copper (Cu)	0.09	0.08	0.00	
21	Zinc (Zn)	0.02	0.05	0.01	
22	Sodium (Na)	2.1	3.4	5.7	
23	Potassium (K)	1.0	1.3	0.6	
24	Ammonia (NH_3)	0.05	0.1	.....	
25	Carbonate (CO_3)	0.0**	0.0***	0.0	
26	Bicarbonate (HCO_3)	0.0	0.0	92.2	
27	Sulphate (SO_4)	37.6	41.0	45.9	
28	Chloride (Cl)	3.0	5.4	11.9	
29	Fluoride (F)	0.0	0.18	0.12	
30	Phosphate (PO_4) Total	.....	<0.1	.....	
31	Dissolved	.....	.....	.....	
32	Nitrate (NO_3)	0.1	0.4	2.7	
33	Silica (SiO_2), colorimetric	1.2	0.7	13	
34	Carbonate hardness as $CaCO_3$	0.0	0.0	75.6	
35	Non-carbonate hardness as $CaCO_3$	31.9	36.3	56.4	
36	Total hardness as $CaCO_3$	31.9	36.3	132	
37	Sum of constituents	56.9	65.1	171	
38	Per cent sodium	10	14	8.6	
39	Saturation index at test temperature	.....	-6.3	-0.1	
40	Stability index at test temperature	.....	17	8.1	
	Remarks	* Frood Mines town was amalgamated with the City of Sudbury, January 1, 1960. † Staffhouse or townsite population. ** Acidity 5.4 ppm as $CaCO_3$ *** Acidity 7.0 ppm as $CaCO_3$		* Adjoins community of Garson in Neelon-Garson Township - *see* Table III	

[a] Population according to the Tenth Census of Canada, 1956.
[h] Population according to the Eleventh Census of Canada, 1961.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

HERON BAY SOUTH* Townsite			HIGH FALLS Townsite	
1957		1963	1963	
150† (190[a])		175† (167[b])	30*	
Ontario Paper Co. Ltd.			The Great Lakes Power Co. Ltd.	
Pic River, nearby			A creek, nearby	
Coagulation (Infilco), filtration, chlorination (alum, lime and activated silica).			None; gravity flow to system	
Clear well - 22		Pressure tank - 3	None	
Treated water is also used for heating and cooling in the plant			None	
Raw water		Finished water	At townsite tap	
At highway No. 17 bridge	At townsite pump	At townsite tap		
June 22/63	July 2/58	June 22/63	June 23/63	1
38:51	26:40	32:45	50:58	2
13.3	14.4	12.8	11.1	3
24.6	26.3	24.6	25.5	4
13.1	.....	8.4	11.6	5
2	2	1	0.9	6
7.9 (8.1)	8	8.1 (8.5)	7.6 (7.6)	7
8	180	20	50	8
110	300	0.9	2	9
137	.....	.....	.....	10
58.8	.....	.....	.....	11
177	155	271	63.8	12
27.9	28.0	43.3	9.4	13
6.3	4.0	6.2	1.8	14
2.4	3.8	0.03	0.28	15
0.06	.....	0.00	0.07	16
.....	.....	0.00	0.01	17
0.00	.....	0.00	0.01	18
0.08	.....	1.2	0.06	19
0.00	.....	0.00	0.50	20
0.00	.....	0.00	0.30	21
0.7	0.8	3.0	0.6	22
0.6	0.9	0.6	0.3	23
0.0	.....	0.0	0.0	24
0.0	0.0	0.0	0.0	25
105	95.6	95.2	22.2	26
7.6	6.9	55.1	11.6	27
0.6	1.4	1.0	0.4	28
0.13	.....	0.18	0.17	29
<0.1	.....	<0.1	<0.1	30
.....	.....	.....	.....	31
0.5	0.3	0.8	0.4	32
5.7	4.3	1.2	8.4	33
85.7	78.4	78.1	18.2	34
9.8	7.9	55.6	12.8	35
95.5	86.3	134	31.0	36
102	93.6	160	44.1	37
1.5	2.0	4.4	3.9	38
−0.1	0.0	+0.2	−1.5	39
8.1	8.0	7.7	11	40

* Community near Marathon, Ont.
† Estimated; increases at times to about 300 when bunkhouses are filled.

* 7 homes only supplied

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	COMMUNITY	LACNOR MINE*				LAWSON QUARRY
		Townsite		Trailer Camp		Townsite
	Total population served	1959	1963	1959	1963	
		147†	0**	794††	0**	
	Ownership	Northspan Uranium Mines Ltd.				
	Source	Sheriff Lake and the McCabe-Crotch Lake system		Serpent River via creek, Pecors Lake, creek, canal, Westner and Dumbell Lakes		
	Treatment	Chlorination		Chlorination		
	Storage capacity (thousand gal)	None		In 1959 elev. tank at mine - 60		
	Industrial use	No data		In 1959, 4.5 mgd, lake water used in mine and mill		
	Sampling point					
1	Date of sampling	No data (assumed similar to nearby lakes *see* Milliken Mine)		*See* Pecors Lake (Algom Nordic Mine Trailer Camp, this table)		*See* Willisville, this table
2	Storage period (days)					
3	Sampling temperature, °C.					
4	Test temperature, °C.					
5	Oxygen consumed by $KMnO_4$					
6	Carbon dioxide (CO_2), calculated					
7	pH					
8	Colour					
9	Turbidity					
10	Residue on evaporation dried at 105°C.					
11	Ignition loss at 550°C.					
12	Specific conductance, micromhos at 25°C.					
13	Calcium (Ca)					
14	Magnesium (Mg)					
15	Iron (Fe) Total					
16	Dissolved					
17	Manganese (Mn)					
18	Dissolved					
19	Aluminum (Al)					
20	Copper (Cu)					
21	Zinc (Zn)					
22	Sodium (Na)					
23	Potassium (K)					
24	Ammonia (NH_3)					
25	Carbonate (CO_3)					
26	Bicarbonate (HCO_3)					
27	Sulphate (SO_4)					
28	Chloride (Cl)					
29	Fluoride (F)					
30	Phosphate (PO_4) Total					
31	Dissolved					
32	Nitrate (NO_3)					
33	Silica (SiO_2), colorimetric					
34	Carbonate hardness as $CaCO_3$					
35	Non-carbonate hardness as $CaCO_3$					
36	Total hardness as $CaCO_3$					
37	Sum of constituents					
38	Per cent sodium					
39	Saturation index at test temperature					
40	Stability index at test temperature					
	Remarks	* In Elliot Lake Improvement District near Milliken Mine and Elliot Lake community; at one time known as Lake Nordic Mine † Includes some trailers †† Includes 431 persons in a campsite ** Mine and townsite closed since about 1960 - 1961				

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

LONG VACK MINE Campsite		MICHIPICOTEN HARBOUR Unincorporated Community	MILLIKEN MINE* Townsite and Trailer Camp		MOOSE LAKE LODGE Campsite		
1958-59	1963	1963	1959	1963	1959	1963	
120	0*	120 (136[a]) (159[b])	800 estd (32[a])	375 estd** (700[b])	very few	12 estd	
Falconbridge Nickel Mines Ltd.		Algoma Central Railway (A.C. Ry.)	In 1959, Milliken Uranium Mines Ltd.; in 1963, Rio Algom Mines Ltd.		Falconbridge Nickel Mines Ltd.		
Small beaver ponds (creek)		Small lake, north of community	Dumbell Lake (Pecors and Westner Lakes system)		Moose Lake		
Occasional chlorination		None; gravity flow to system	Chlorination		Chlorination		
No data		None	Elev. tank - 60 estd		None		
Cooling of compressors at the mine		Cooling purposes by A.C. Ry.	Lake water also used in mine and plant		None		
At creek (from ponds)		At tap	At townsite tap				
Aug. 20/58		June 23/63	Sept. 25/63				1
84:196		40:58	21:27				2
25.6		11.1	17.8				3
24.0 (26.3)		24.6	24.6				4
3.6		15.1	.....				5
0		4	6				6
5.3		7.0 (7.6)	4.9				7
20		60	0				8
4		0.9	0				9
38.8		68.0	.....				10
27.2		12.4	.....				11
40.5		71.8	693				12
2.9		10.4	84.4				13
1.1		2.2	18.3				14
0.68		0.24	0.13				15
0.41		0.04	.....				16
.....		0.00	1.3		*See* Fecunis Mine, this table		17
0.02		0.00	.....				18
0.03		0.15	.....				19
Trace		Trace	0.05				20
0.00		0.0	.....				21
1.1		0.5	12.2				22
0.3		0.3	10.4				23
0.1		0.2	.....				24
0.0		0.0	0.0				25
0.0		22.6	Acidity 5.4 ppm as $CaCO_3$				26
12.3		15.9	290				27
0.5		0.5	12.5				28
0.0		0.24	0.50				29
.....		0.06	.....				30
.....		.....	.....				31
0.3		0.7	18				32
2.7		5.0	4.5				33
0.0 (1.5)		18.5	0				34
11.8		16.4	286				35
11.8		34.9	286				36
21.7		47.0	450				37
15		3.0	8.0				38
-5.6		-2.1	-4.7				39
17		11	14				40
* The mine and campsite were not operating in 1963			* In the Improvement District of Elliot Lake, about 2 miles from the community of Elliot Lake. ** In June, 1963 mine was still operating with about 73 trailers and 23 homes occupied.		Area almost closed in 1963		

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	COMMUNITY	MURRAY MINE Townsite		NORANDA TOWNSITE* Townsite	
	Total population served	1960-61	1963	1958	1963
		50 estd	50 estd	210 estd	No data†
	Ownership	International Nickel Co. of Canada Ltd.		In 1958, Noranda Mines Ltd.	
	Source	Pump Lake, 400 ft south-east of mine		Well	
	Treatment	Chlorination		None	
	Storage capacity (thousand gal)	Concrete tank (1961) - 160		Elev. tank - 150 estd	
	Industrial use	Lake also used for drinking water in the mine		None	
	Sampling point	At townsite tap		At townsite tap	
1	Date of sampling	Sept. 23/63		Aug. 15/58	Sept. 30/59
2	Storage period (days)	22:28		85:192	187:215
3	Sampling temperature, °C.	17.5		15.3	14.0
4	Test temperature, °C.	24.4		25.1 (18.8)	24.6
5	Oxygen consumed by $KMnO_4$	.....		.....	.....
6	Carbon dioxide (CO_2), calculated	3		4	2.5
7	pH	6.3		7.3 (6.4)	7.5
8	Colour	20		5 (10)	0
9	Turbidity	0.5		0	0
10	Residue on evaporation dried at 105°C.	.....		110	.....
11	Ignition loss at 550°C.	.....		6.8	.....
12	Specific conductance, micromhos at 25°C.	125		146	205
13	Calcium (Ca)	10.3		15.6	20.3
14	Magnesium (Mg)	4.4		4.5	6.2
15	Iron (Fe) Total	0.12		.....	0.02
16	Dissolved	.....		Trace	Trace
17	Manganese (Mn) Total	0.09		.....	< 0.05
18	Dissolved	.....		0.01	0.02
19	Aluminum (Al)	.....		Trace	0.0
20	Copper (Cu)	0.05		0.06	0.2
21	Zinc (Zn)	0.02		0.00	0.01
22	Sodium (Na)	2.1		4.4	7.6
23	Potassium (K)	2.0		1.3	1.7
24	Ammonia (NH_3)	.....		0.1	0.3
25	Carbonate (CO_3)	0.0		0.0	0.0
26	Bicarbonate (HCO_3)	3.7		55.6	52.8
27	Sulphate (SO_4)	42.8		12.9	20.1
28	Chloride (Cl)	1.4		6.9	18.9
29	Fluoride (F)	0.16		0.0	0.1
30	Phosphate (PO_4) Total	.....		.....	.....
31	Dissolved	.....		.....	0.0
32	Nitrate (NO_3)	0.3		1.0	3.0
33	Silica (SiO_2), colorimetric	0.5		16	19
34	Carbonate hardness as $CaCO_3$	3.0		45.6 (44)	43.3
35	Non-carbonate hardness as $CaCO_3$	41.0		11.8 (10)	32.3
36	Total hardness as $CaCO_3$	44.0		57.4 (54)	75.6
37	Sum of constituents	65.8		90.3	124
38	Per cent sodium	8.9		14	17
39	Saturation index at test temperature	−3.6		−1.3	−1.0
40	Stability index at test temperature	14		9.9	9.5

Remarks

* Near Cutler, Ontario
† Decreasing operation at Elliot Lake area mines has decreased the townsite population.

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	PANEL MINE* Townsite		PANEL MINE* Trailer Camp No. 2		PRONTO MINE* Townsite**		
	1960	1963	1960	1963	1959	1963	
Population	400 (42[a]) (552[b])†	0	440	0	90	90	
Remarks	In 1960, Northspan Uranium Mines Ltd.; in 1963, Rio Tinto Mining Co. of Canada Ltd.				In 1959, Pronto Uranium Mines Ltd.; in 1963, Rio Tinto Mining Co. of Canada Ltd.		
Source	Quirke Lake		Well 96 ft deep		Lake Huron		
Treatment	Chlorination				Chlorination		
Softening	None				None		
Other supplies	Lake water (about 3.5 mgd) also used in 1960 in mill and mine		None		None		
	At lake shore				From lake near Blind River		
	June 24/63				June 8/63		1
	49:66				31:60		2
	18.9				21.7		3
	24.4				24.1		4
	0.9				4.2		5
	.....				2		6
	5.4 (6.1)				7.5 (8.1)		7
	0				5		8
	0.3				2		9
	246				74.4		10
	53.6				32.8		11
	344				123		12
	43.1				14.1		13
	5.7				4.5		14
	.....				.....		15
	0.00				0.00		16
	.....				.....		17
	0.20				0.00		18
	.....				0.01		19
See	0.00				0.00		20
also	0.05		No data		0.00		21
Consolidated	5.8				2.2		22
Denison	6.1				0.7		23
Mine	> 0.5				0.1		24
	0.0				0.0		25
	0.0				46.4		26
	121				15.2		27
	5.6				2.1		28
	0.23				0.08		29
	<0.1				<0.1		30
	.....				.....		31
	22				1.7		32
	2.5				2.7		33
	0.0				38.1		34
	131				15.8		35
	131				53.9		36
	212				66.1		37
	8.3				8.1		38
	.....				-1.2		39
	.....				9.9		40

* In Elliot Lake Improvement District, near Algom Quirke Mine on shore of Quirke Lake.
† Townsite 80; campsite 320

* In 1963 known as the Pater-Copper Mine
** near Spragge, Ont. on shore of Lake Huron.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	COMMUNITY	PRONTO MINE* Townsite and Trailer Camp***		
	Total population served	1959: 170 estd	1963: 125 estd †	
	Ownership	In 1959, Pronto Uranium Mines Ltd.; in 1963, Rio Tinto Mining Co. of Canada Ltd.		
	Source	Lake Lauzon		
	Treatment	Chlorination		
	Storage capacity (thousand gal)	Elev. tank - 180		
	Industrial use	Used as drinking water in mine and mill		
	Sampling point	At highway No. 17	At mill tap	At highway No. 17
1	Date of sampling	Sept. 25/59	Sept. 29/59	Aug. 6/58
2	Storage period ((days)	197:207	183:203	85:104
3	Sampling temperature, °C.	19.4	.....	24.5
4	Test temperature, °C.	26.8	26.8	25.2
5	Oxygen consumed by $KMnO_4$	.....	.....	1.7
6	Carbon dioxide (CO_2), calculated	2	3	1
7	pH	6.8 (6.5-6.8)	6.4 (6.1-6.5)	6.8 (7.5)
8	Colour	0	0	5 (15)
9	Turbidity	2	0.8	0
10	Residue on evaporation, dried at 105°C.	.....	.....	58.8
11	Ignition loss at 550°C.	.....	.....	13.2
12	Specific conductance, micromhos at 25°C.	96.7	459	69.7
13	Calcium (Ca)	9.3	38.6	6.7
14	Magnesium (Mg)	2.3	18.2	1.8
15	Iron (Fe) Total	0.08	0.31	.....
16	Dissolved	0.00	0.11	Trace
17	Manganese (Mn) Total	.....	0.07	.....
18	Dissolved	0.00	0.05	0.00
19	Aluminum (Al)	0.00	Trace	0.03
20	Copper (Cu)	0.00	0.00	0.00
21	Zinc (Zn)	0.00	0.00	0.05
22	Sodium (Na)	3.3	16.6	1.7
23	Potassium (K)	1.1	4.4	0.6
24	Ammonia (NH_3)	0.0	0.0	0.05
25	Carbonate (CO_3)	0.0	0.0	0.0
26	Bicarbonate (HCO_3)	7.3	5.6	5.7
27	Sulphate (SO_4)	24.9	167	18.7
28	Chloride (Cl)	5.1	26.9	1.8
29	Fluoride (F)	0.1	0.1	0.0
30	Phosphate (PO_4) Total	.....	.....	.....
31	Dissolved	0.0	0.0	.....
32	Nitrate (NO_3)	0.3	0.3	0.6
33	Silica (SiO_2), colorimetric	2.6	2.9	1.6
34	Carbonate hardness as $CaCO_3$	6.0 (7)	4.6	4.7 (7.1)
35	Non-carbonate hardness as $CaCO_3$	26.3	166	19.4 (16.4)
36	Total hardness as $CaCO_3$	32.3	171	24.1 (23.5)
37	Sum of constituents	52.6	278	36.4
38	Per cent sodium	17	17	13
39	Saturation index at test temperature	-2.8	-2.7	-3.0
40	Stability index at test temperature	12	12	13

Remarks

* In 1963 known as the Pater-Copper Mine
*** Near mine, north of Spragge - a townsite, trailer camp and a bunkhouse area
† In 1963, townsite and a few people in bunkhouses and 3 to 4 houses nearby.

[a] Population according to the Tenth Census of Canada, 1956.
[b] Population according to the Eleventh Census of Canada, 1961

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

RCAF STATION (NORTH BAY) Townsite*		SPANISH* Unincorporated Community		
1963		1957	1963	
2,500		150 (789[a])	125 estd (1,536[b])	
Department of National Defence		In 1957, C.P. Ry.; in 1963, privately owned by E. Mitchell*		
Four Mile Lake		Spanish River, nearby		
Chlorination and pH adjustment (lime)		Chlorination in 1963		
Elev. tank - 200		Elev. tank - 60		
None		None (1963)		
Raw water	Finished water At tap	At store tap	At house tap	
June 26/63	June 26/63	Sept. 30/59	June 8/63	1
50:55	47:64	187:215	25:51	2
22.8	16.1	16.5	11.7	3
24.7	25.5	24.7	25.6	4
3.9	4.0	.....	7.3	5
4	4	5	5	6
6.2	6.5 (8.5)	7.0	7.0 (6.9)	7
10	10	25	30	8
2	1	3	4	9
.....	.....	.....	.....	10
.....	.....	.....	.....	11
41.6	56.5	102	127	12
3.0	4.1	10.5	11.7	13
1.4	2.6	2.6	3.8	14
.....	0.19	0.50	0.50	15
0.01	0.03	0.11	.....	16
.....	0.00	< 0.05	0.00	17
.....	0.00	0.01	.....	18
.....	0.00	0.00	.....	19
.....	0.02	0.39	.....	20
.....	0.05	0.30	0.50	21
0.9	0.9	4.8	5.8	22
0.8	0.9	0.8	1.0	23
0.0	0.05	0.3	0.2	24
0.0	0.0	0.0	0.0	25
3.9	7.2	31.2	32.2	26
12.4	11.7	16.5	21.7	27
0.5	2.4	5.3	5.9	28
0.09	0.13	0.0	0.10	29
.....	< 0.1	.....	.....	30
.....	.....	0.0	.....	31
Trace	Trace	0.2	0.9	32
1.2	1.0	4.2	5.0	33
3.2	5.9	25.6	26.4	34
10.2	15.0	10.8	18.5	35
13.4	20.9	36.4	44.9	36
22.2	27.3	61.0	71.7	37
12	8.1	21	21	38
-4.1	-3.4	-1.9	-1.9	39
14	13	11	11	40

* Permanent married quarters and 12 trailers at Station

* This system not normally used for drinking water.

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

	COMMUNITY	STANLEIGH MINE* Townsite and Trailer Camp	STANROCK MINE* Townsite and Trailer Camp		STRATHCONA MINE* Campsite
	Total population served	1959: 1,010(24[a])(125[b]) 1963: 10 estd***	1959: 700† (908[b]) 1963: 425 estd††		1959-1963: No data but very small
	Ownership	In 1959, Stanleigh Uranium Mines Ltd.; in 1960, Rio Tinto Mining Co. of Canada Ltd.***	Stanrock Uranium Mines Ltd.		Falconbridge Nickel Mines Ltd.
	Source	Dumbell Lake via Pecors and Westner Lakes and creeks	Quirke Lake, nearby		Small lake near mine site
	Treatment	Chlorination	Chlorination		Chlorination
	Storage capacity (thousand gal)	Elev. tank - 60	Three reservoirs - 200 total (one 65.5 for fire protection only)		None
	Industrial use	In 1959 lake water also used in mine and mill	Lake water also used in mine and mill		Lake also used for cooling mine compressors and drilling
	Sampling point	At laboratory tap	At laboratory tap	At gatehouse tap	At lake
1	Date of sampling	Sept. 25/59	Sept. 25/59	Sept. 24/63	Aug. 20/58
2	Storage period (days)	185:196	185:196	21:27	85:196
3	Sampling temperature, °C.	21.5	19.5	15.3	20.9
4	Test temperature, °C.	26.6	26.6 (21.2)	24.5	22.4 (22.5)
5	Oxygen consumed by $KMnO_4$	.....	.....	.....	2.1
6	Carbon dioxide (CO_2), calculated	2	3	4	.....
7	pH	7.0 (7.3)	6.6 (6.0-6.4)	5.0	4.5 (5.1)
8	Colour	0 (40)	0	0	0 (25)
9	Turbidity	2	0.4	0.5	0
10	Residue on evaporation, dried at 105°C.	.....	.....	.....	242
11	Ignition loss at 550°C.	.....	.....	.....	30.0
12	Specific conductance, micromhos at 25°C.	267	242	363	352
13	Calcium (Ca)	30.3	28.9	44.1	30.6
14	Magnesium (Mg)	5.8	3.5	6.0	8.4
15	Iron (Fe) Total	0.37	0.17	0.16	.....
16	Dissolved	0.00	0.13	.....	0.03
17	Manganese (Mn) Total	0.10	0.10	0.20	1.5
18	Dissolved	0.00	0.02	.....	.....
19	Aluminum (Al)	0.00	0.0	.....	0.35
20	Copper (Cu)	0.00	Trace	0.01	0.05
21	Zinc (Zn)	0.00	0.05	0.16	0.5
22	Sodium (Na)	7.0	6.2	5.8	11.0
23	Potassium (K)	3.8	3.9	6.5	1.8
24	Ammonia (NH_3)	0.0	0.0	.....	0.3
25	Carbonate (CO_3)	0.0	0.0	0.0	0.0 (0.0)
26	Bicarbonate (HCO_3)	14.1	7.1	2.7**	8.3**
27	Sulphate (SO_4)	91.7	77.2	126	138
28	Chloride (Cl)	8.2	7.9	7.2	5.2
29	Fluoride (F)	0.0	0.0	0.20	0.0
30	Phosphate (PO_4) Total	.....	.....	.....	.....
31	Dissolved	0.0	0.0	.....	.....
32	Nitrate (NO_3)	1.5	6.0	23	1.5
33	Silica (SiO_2), colorimetric	4.4	3.2	2.6	7.4
34	Carbonate hardness as $CaCO_3$	11.6	5.8 (5.6)	0.0	0.0
35	Non-carbonate hardness as $CaCO_3$	87.3	79.7	135	111
36	Total hardness as $CaCO_3$	98.9	85.5	135	111 (113)
37	Sum of constituents	160	141	222	207
38	Per cent sodium	13	13	8.0	16
39	Saturation index at test temperature	−1.8	−2.6	−4.8	−5.5
40	Stability index at test temperature	11	12	15	16
	Remarks	* In Elliot Lake Improvement District near Milliken Mine ** 635 in townsite and trailer camp, 375 in staffhouses *** Mine has not operated since 1961; laboratory and offices only being operated (offices are 3 homes in townsite).	* In the Improvement District of Elliot Lake, about 4 miles from the community of Elliot Lake ** Acidity as $CaCO_3$ † Includes staffhouse population †† In June, 1963, about 103 trailers and 42 homes; in Sept. 1963 about 80 trailers and 25 homes still occupied.		* Mine is still being developed ** Acidity as $CaCO_3$

[a] Population according to Tenth Census of Canada, 1956.
[b] Population according to Eleventh Census of Canada, 1961

TABLE IV

Some Small Community Supplies in the Upper Great Lakes Drainage Basin in Canada

TIMAGAMI Unincorporated Community		WILLISVILLE* Townsite			
1963 75 (1,000†) (761[a]) (473[b])		1963 125 estd† (127[a]) (115[b])			
Ontario Northland Railway (O.N. Ry)*		International Nickel Company of Canada Ltd.			
Lake Timagami, nearby		Frood Lake, nearby			
Chlorination		Chlorination			
Elev. tank - 25		Wooden tank - 15 estd.			
O.N. Ry. also use this water supply		About 12,000 gpd used for heating and cooling in 1960			
At lake	At tap	Raw water	At outlet - Whitefish River	Finished water At housetap	
June 5/63	June 5/63	June 7/63	Sept. 13/63	June 7/63	1
22:44	22:44	25:52	22:28	25:52	2
21.1	21.1	22.2	16.4	18.9	3
24.7	24.6	28.0	24.5	27.8	4
6.3	6.5	4.6	.....	3.7	5
3	3	2	3	1.5	6
7.1 (7.6)	7.0 (7.0)	6.7 (7.3)	6.6	6.9 (7.1)	7
5	5	5	5	10	8
3	2	0.9	0	3	9
61.6	60.4	.....	.....	48.0	10
25.2	21.6	.....	.....	12.8	11
83.4	84.5	68.1	70.3	75.2	12
8.8	8.6	6.2	6.4	6.4	13
2.5	2.6	2.5	2.6	2.4	14
0.03	0.07	0.04	0.00	0.12	15
0.00	Trace	.....	.....	0.01	16
0.01	0.02	.....	0.00	0.00	17
0.01	0.01	.....	0.00	0.00	18
0.03	0.03	.....	.....	Trace	19
.....	.....	.....	.....	0.03	20
0.00	0.00	0.00	.....	0.05	21
2.1	2.1	1.2	1.2	1.4	22
0.4	0.4	0.7	0.7	1.8	23
0.05	0.02	0.0	.....	0.04	24
0.0	0.0	0.0	0.0	0.0	25
19.7	17.6	6.7	7.4	7.3	26
15.5	15.7	21.1	21.1	20.6	27
2.6	3.5	0.2	0.7	2.0	28
0.06	0.06	0.07	0.10	0.07	29
<0.1	<0.1	.....	.....	<0.1	30
.....	.....	.....	.....	.....	31
0.6	0.1	0.2	0.1	0.2	32
1.2	1.1	0.8	0.3	1.1	33
16.2	14.4	5.5	6.1	6.0	34
16.0	17.9	20.1	20.5	20.0	35
32.2	32.3	25.6	26.6	26.0	36
43.6	42.9	36.3	36.9	39.6	37
12	12	9.0	8.7	9.7	38
-2.1	-2.3	-3.0	-3.1	-2.8	39
11	12	13	13	13	40

† Total population which increases in summer due to tourist business
* System installed in 1925

* Townsite for Lawson Quarry
† In 1963 quarry was not working full time and some houses in the townsite were vacant.

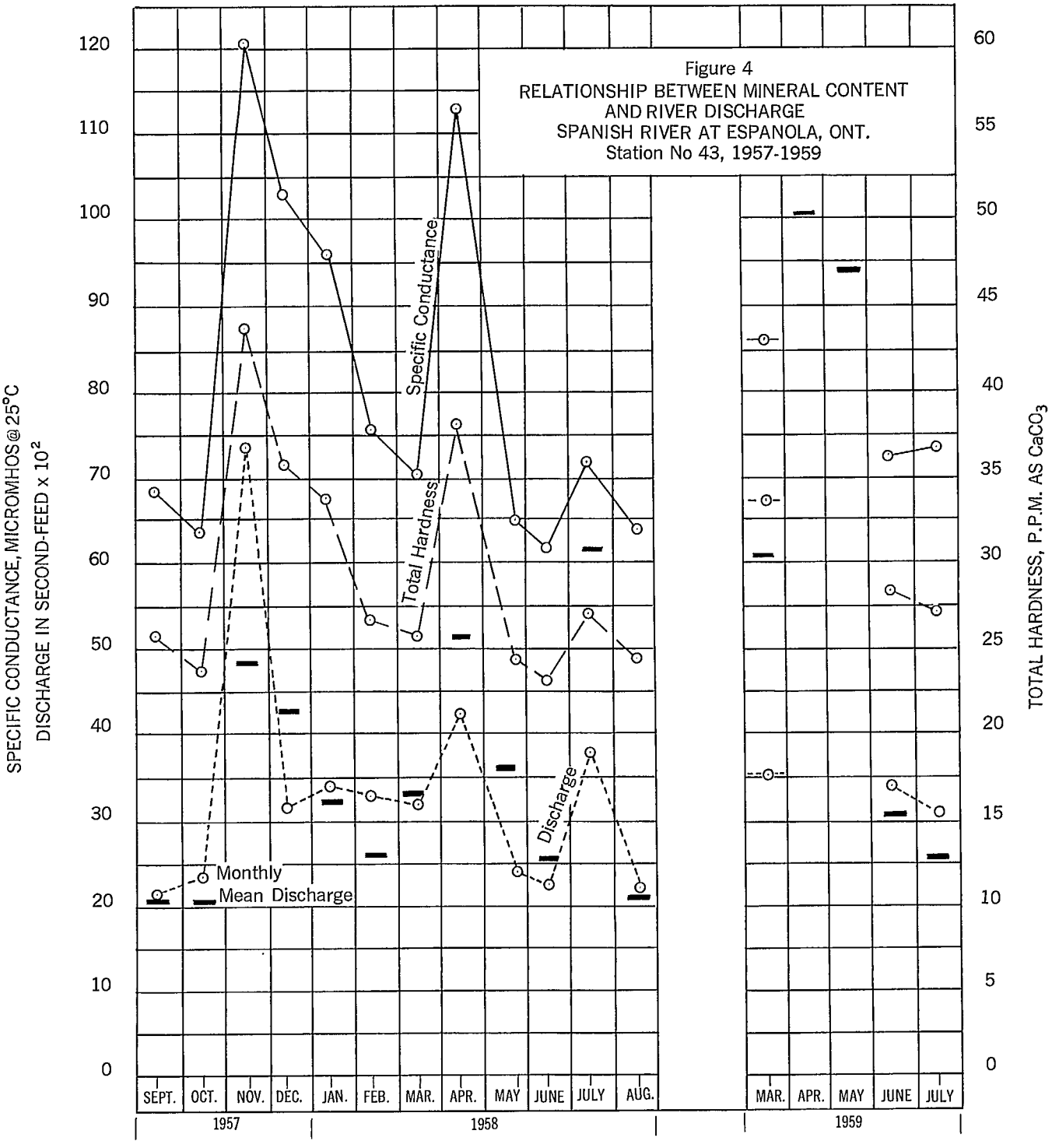


Figure 4
RELATIONSHIP BETWEEN MINERAL CONTENT
AND RIVER DISCHARGE
SPANISH RIVER AT ESPANOLA, ONT.
Station No 43, 1957-1959
SPECIFIC CONDUCTANCE, MICROMHOS @ 25°C
DISCHARGE IN SECOND-FEED x 10²
TOTAL HARDNESS, P.P.M. AS CaCO3
Specific Conductance
Total Hardness
Discharge
Monthly
Mean Discharge
120
110
100
90
80
70
60
50
40
30
20
10
0
60
55
50
45
40
35
30
25
20
15
10
5
0
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
MAR.
APR.
MAY
JUNE
JULY
1957
1958
1959

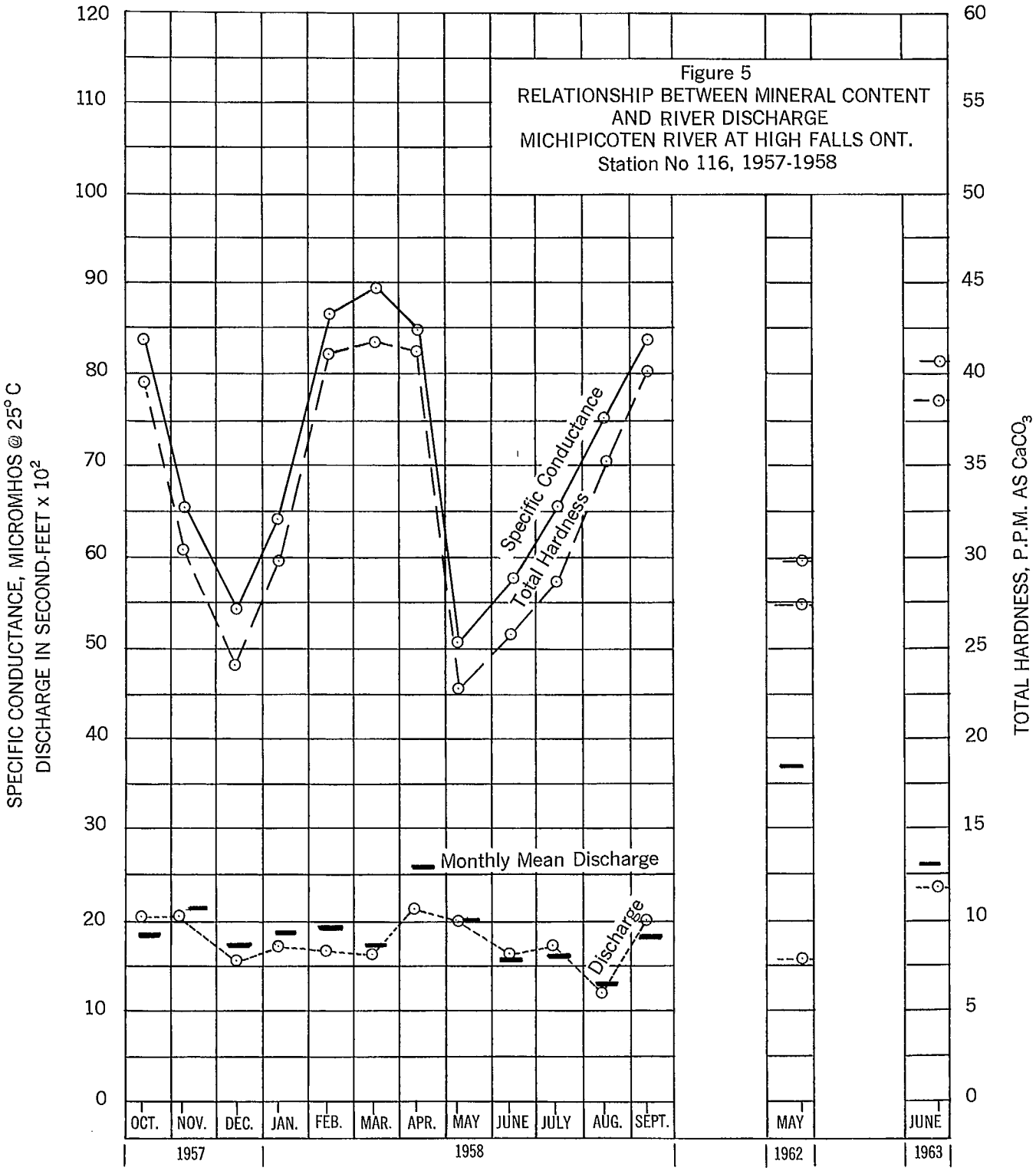


Figure 5
RELATIONSHIP BETWEEN MINERAL CONTENT
AND RIVER DISCHARGE
MICHIPICOTEN RIVER AT HIGH FALLS ONT.
Station No 116, 1957-1958
SPECIFIC CONDUCTANCE, MICROMHOS @ 25° C
DISCHARGE IN SECOND-FEET x 10²
TOTAL HARDNESS, P.P.M. AS CaCO₃
Specific Conductance
Total Hardness
Monthly Mean Discharge
Discharge
120
110
100
90
80
70
60
50
40
30
20
10
0
60
55
50
45
40
35
30
25
20
15
10
5
0
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
MAY
JUNE
1957
1958
1962
1963

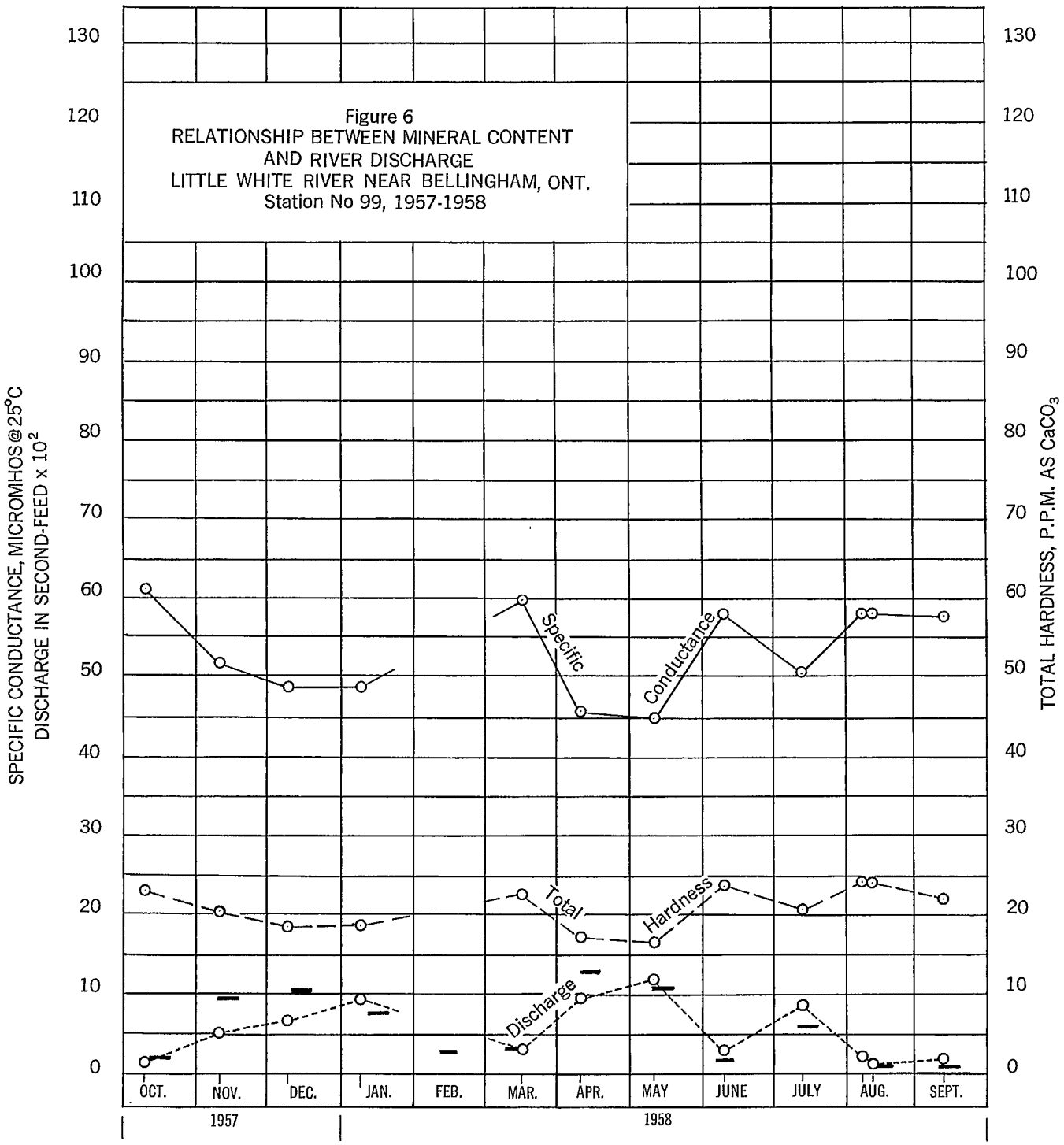


Figure 6
RELATIONSHIP BETWEEN MINERAL CONTENT
AND RIVER DISCHARGE
LITTLE WHITE RIVER NEAR BELLINGHAM, ONT.
Station No 99, 1957-1958
SPECIFIC CONDUCTANCE, MICROMHOS@25°C
DISCHARGE IN SECOND-FEED x 10²
TOTAL HARDNESS, P.P.M. AS CaCO₃
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Specific
Conductance
Total
Hardness
Discharge
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.
SEPT.
1957
1958

DISCUSSION

In terms of area, the drainage basin covered by this report represents about 16 per cent of Ontario and 1.8 per cent of Canada. As defined in this report (*see* page 12) the basin lies within Northern Ontario and, except for several islands in Georgian Bay and a small part of the nearby mainland, it lies within the Canadian Shield physiographic region.

Table I shows the relationship between area and 1956 and 1961 populations of this basin and other drainage basins of Eastern Canada. The Upper Great Lakes Basin is about 17.6 per cent of the total area of the Great Lakes-St. Lawrence River drainage basin in Canada (383,000 square miles). Within this basin in 1956 dwelt 5.9 per cent of the Ontario population: 1961 it increased to 6.2 per cent. This represents about 3.3 and 3.5 per cent of the population of the total Great Lakes-St. Lawrence River system in 1956 and 1961, respectively. Table I shows a 22 per cent increase in the basin population from 1956 to 1961. During the same period Ontario's and Canada's population increased by 15.3 and 13.4 per cent, respectively.

The chemical quality of the larger and more industrially important rivers of the basin is reported in detail in Table II. Since geological and climatic conditions are essentially uniform throughout the basin it is believed that most surface waters not studied in this survey are generally similar in quality to nearby waters dealt with in Table II. Some differences in chemical quality of surface waters in some watersheds are shown in Table II but these differences are, in most cases, readily related to local geological and/or climatic conditions, or to human activities such as industrial contamination, agriculture, regulation of discharge, etc. These differences are, however, insignificant in so far as over-all quality and end use of the water are concerned.

No attempt is made in this report to discuss in detail the data of Table II. It is recognized that statistical studies, at least of some of the data, might be advantageous, not only in determining mean or median quality but, possibly, in extrapolating quality to other periods of time and season. Lack of discharge records at many sampling points, the influence of regulating dams at other points, and the fact that this study was necessarily carried out over several years and was not designed for statistical evaluation, hinders such treatment.

Table II also shows that major surface waters of this basin are generally very soft to soft waters when classified as follows:

Classification		Total Hardness as $CaCO_3$ (in parts per million)
Very soft	–	up to and including 30
Soft	–	up to 60
Medium hard	–	61 to 120
Hard	–	121 to 180
Very hard	–	greater than 180

Within the basin a few surface waters are in the medium hard to hard category; these are mostly on St. Joseph and Manitoulin islands and the adjacent mainland, which are in the St. Lawrence Lowlands physiographic region. A number of other waters from mining and industrial areas also are hard and correspondingly higher in mineral content, evidently because of industrial waste contamination.

The mineral content of surface waters of the basin is mostly carbonate hardness, i.e. the bicarbonates of calcium and magnesium. These waters are correspondingly very low in alkalis, sulphates and chlorides; they have markedly negative saturation indices, stability indices of 11 or greater and, being usually saturated with oxygen, are therefore quite corrosive. Total mineral content of uncontaminated waters is seldom above 100 ppm and is generally in the range of 50 to 75 ppm or lower. This quality is typical of waters of the Canadian Shield where between 80 to 98 per cent of the dissolved mineral content (as equivalents per million) is alkaline earth salts. Surface Waters rising and flowing through the Canadian Shield are seldom turbid, but are often highly coloured.

Water Survey Report No. 3[1] showed the increase in variation in hardness and mineral content as the waters of the Great Lakes-St. Lawrence River system flowed to the sea. This report shows in more detail the increase in these parameters within the Upper Great Lakes portion of this system; for most purposes these increases are not significant.

[1] Dept. Mines and Technical Surveys, Mines Branch. *Upper St. Lawrence River–Central Great Lakes Drainage Basin.* Water Survey Report No. 3, Mines Branch Report No. 837, Ottawa, 1954.

Lake Superior water has a mineral content (ppm) and total hardness (ppm as $CaCO_3$) of about 55 and 45, respectively; the St. Mary's River shows little change in quality from Lake Superior water. However, Lake Huron (Georgian Bay) in the vicinity of Manitoulin and St. Joseph islands is considerably more mineralized and harder, rising at times to 110 ppm total dissolved minerals and 100 ppm as $CaCO_3$ total hardness. Lake Huron at Parry Sound does not show this same increase in mineral content but is still a somewhat harder and more mineralized water than that of Lake Superior. The more mineralized water of Georgian Bay is no doubt due to non-mixing of drainage from more mineralized islands and nearby mainland areas, notably the limestone regions of Manitoulin Island and St. Joseph Island. Rivers from this region markedly influence the quality of water of the north channel of Georgian Bay, south of Thessalon, Ont.

The quality of other tributary drainage into the main lake-river system varies, but seldom significantly. Drainage from the French River-Lake Nipissing basin is somewhat more highly coloured than some other small tributary basins, rising to 40 Hazen units. It is very soft, with low mineral content. A number of small creeks and the Veuve River are noticeably higher in hardness, mineral content and turbidity, no doubt because of industrial and/or agricultural activities in these basins. Some of the creeks are highly coloured–up to 150 Hazen units.

The Wanapitei River basin, except for obviously contaminated portions, has waters similar in quality to the French River system.

The large Spanish River system is also a coloured, soft water (about 30 ppm as $CaCO_3$); some small tributaries are evidently contaminated by mining activities in the Sudbury region of the basin.

As already mentioned, rivers of the Manitoulin and St. Joseph islands are different in quality to the usual mainland Canadian Shield waters. Although they are low in colour and in non-carbonate hardness they are much harder, with mineral contents rising to 175 ppm.

Rivers and lakes in the Elliot Lake area of the basin (Serpent River system) are naturally very soft and coloured, many having only about 20 ppm as $CaCO_3$ hardness, which hardness is the principal mineralization. The effect of mining activities in this watershed is illustrated by the increased mineralization, especially non-carbonate hardness, of some lake waters over the period of this report.

The Mississagi River system, as well as most tributary rivers entering Lake Superior and St. Mary's River as far north as the Magpie River, are typical waters of the forested uplands areas of the Canadian Shield with total mineral content ranging around 35 to 40 ppm.

Rivers entering Lake Superior north and west of and including the Magpie River show some increase in mineral content and hardness; this is particularly evident in Black and Pic rivers. These rivers are also more highly coloured. Tributary rivers of this portion of the basin are, for the most part, still typical of Shield waters in that they are primarily relatively clear, coloured, non-carbonate waters. Except for a few rivers or lakes, such as Mojikit Lake, Little Gravel River, Walker Lake, all studied surface waters entering the system from the north are of this general character, i.e. somewhat more mineralized than those entering south of the Magpie River.

Figures 4, 5 and 6 are included in this report to illustrate the seasonal change in major constituents of some basin rivers. Similar graphs can be prepared from Table II for other rivers which were sampled on a monthly basis. However, most rivers of any size in this basin are controlled, at least at one point, by dams, either for hydro-electric development or other industrial purpose and, as a result, variations in chemical quality with discharge are not readily apparent.

Figure 4 shows the relationship between discharge, total hardness and total mineralization in the Spanish River at Espanola over about a two-year period. Dams control river flow on this river upstream at High Falls and Turbine and at Espanola. The water discharging at the Espanola dam during late 1957 and 1958 shows increased mineral content with increased discharge. Total hardness and total mineral content (specific conductance) follow almost identical curves. Greatest discharge occurred in late 1957, the spring run-off or discharge in April being not quite so great. However, water quality, in so far as mineral content and hardness are concerned, was about the same at both periods. In July, 1958 a major increase in discharge did not show nearly as great an increase in mineralization and hardness. Since discharge in this river is controlled by reservoirs or dams, power demands, etc. it is difficult to relate quality and discharge. In contrast to most rivers of the basin,

increased mineralization follows increased discharge. Control dams and resulting reservoirs level out changes in quality; the water released at Espanola varied during 1957-1958 from 24 to 44 ppm as $CaCO_3$ total hardness and from about 62 to 120 micromhos specific conductance. These variations are, however, insignificant for most end uses of the water.

Figure 5 shows a similarly parallel relationship between specific conductance (mineral content) and total hardness in the Michipicoten River at High Falls where a hydro-electric dam again controls discharge. However, despite such control, when discharge is relatively constant mineralization decreased rapidly instead of increasing during the late part of 1957, rising to a high in February, March and April, 1958. With the spring run-off, when some increase in discharge was evident, a low-mineral water was discharged. Mineralization rose steadily from a low in May until September even though changes in discharge occurred. Mineralization is again mainly due to hardness salts and even when the most mineralized water occurred it still had only about 42 ppm hardness as $CaCO_3$.

Figure 6 is a similar graph of water quality and discharge in a small river—Little White River near Bellingham—a tributary of the Mississagi River system. No control of discharge is known on this stream and it is seen that the expected increase in mineralization with decrease in discharge occurs. Discharge again rose rapidly in December 1957 and then decreased rapidly to a low value until the spring break-up in March, 1958. Peak run-off occurred in early May. In July 1958 there was a major increase in discharge with a return to low discharge in mid-August. This river does not have a high discharge; it ranges only from 200 to 1,200 cfs, so that a heavy rainfall or flash flood in the small watershed will markedly influence the discharge curve. Specific conductance (mineral content) and total hardness of this river water again follow parallel curves. The variation in these parameters over the 1957-58 period is relatively minor in comparison to the change in discharge e.g. a more than three-fold increase in run-off (from 340 to 1,200 cfs) results in only a decrease of conductance of 15 (from 60 to 45 micromhos) and in hardness of about 6 (from 23 to 17 ppm as $CaCO_3$). Such changes in water quality are insignificant for most industrial and domestic uses.

Table II further shows that most rivers tributary to the Great Lakes in this basin are essentially of the same character with regard to mineral content and hardness. They are generally highly coloured, and relatively free from turbidity except possibly for a few days during the spring run-off.

Within this basin there has been in recent years an increase in the population served by organized systems, excluding those systems serving very small mines and campsites. In 1961 about 87 per cent of the basin population was so served. Since the total number of communities served has not increased since about 1959 this population growth has been largely in the established urban areas, a pattern common to most of Canada during this period. In 1963, twenty-nine of the thirty-eight water supply systems in the basin were owned by the municipalities, the remainder being either privately owned or jointly owned by municipal and private interests.

During the period 1959-63 about 94 per cent of the population served with water used surface water alone or mixed with some ground water (Table V). Only 16 per cent of the population served received untreated water in 1963, a decrease from 19 per cent so served in 1959. In 1961 and 1963 about the same population used waters after chlorination only, as used waters with treatment additional to chlorination, but the number of systems employing such additional treatment was only about one-half the number using chlorination alone, i.e. the large centres and systems normally employed treatment additional to chlorination. Such additional treatment is usually to remove colour and, for short periods, turbidity. Some also treat the water to reduce corrosion of the system. Organic colour is not considered detrimental except for esthetic reasons, but its removal is usually demanded in larger systems. Such removal also improves bacteriological control of larger supplies using surface sources.

96900—10½

TABLE V

Municipal Systems, Treatment and Population Served, 1959, 1961 and 1963

Year	Number of communities and population in hundreds served with water by organized system								Number and population served by	
	Cities	Towns	Villages	Townships	Improvement Districts	Unincorporated Communities	Small Town-† sites, mine campsites, etc.	Totals	Municipally** owned systems	Municipally owned; water purchased systems
1959-60	5	13	0	11	5	3	35	37	20	8
	2,044*	347		488	188	37	106	3,105	2,460	436
1961	5	14	0	11	4	2		36	20	7
	2,339	405		434	166	23		3,367	2,775	358
1963	5	14	0	11	5	2	22	37	22	7
	2,550	410		488	169	26	51	3,643	3,045	404

* Lower figure is population to nearest hundred
† Not included in totals and statistics of Tables V and VI. All are private - or government - owned systems.
** Includes those operated by a Public Utilities Commission.

TABLE VI

Municipal Water Hardness, 1959, 1961 and 1963

Year	Number of communities and estimated population in hundreds served in			Number of systems and estimated population served with waters classed as				Percentage of population served residing in	
	Cities Towns and Villages	Townships, Improvement Districts, etc.	Small Townsites† and Campsites	Soft (0 - 60)	Medium hard (61 - 120)	Hard (121 - 180)	Very hard (over 180)	Cities, Towns and Villages	Townships, Improvement Districts, etc.
1959-60	18	19	35	22	8	5	2	77.0	23.0
	2,391*	713	106†	2,779	147	146	33		
1961	19	17		19	9	6	2	81.5	18.5
	2,745	620		2,964	170	197	36		
1963	19	18	22	20	9	5	3	81.3	18.7
	2,960	683	51	3,266	174	158	45		

TABLE V

Municipal Systems, Treatment and Population Served, 1959, 1961 and 1963

Number and population served by		Water sources and estimated population in hundreds served			Number of water sources and estimated population, served with water treated as follows			Percentage of population served using	
Privately owned systems	Jointly owned systems	Ground water	Surface water	Mixed water	No Treatment	Chlorinated	Additional Treatment	Surface and mixed waters	Untreated water
8	1	8	22	2	9	15	8	94.5	19.1
174	35	169	2,423	513	592	1,274	1,239		60.1
8	1	8	21	3	7	16	9	93.8	18.1
185	50	210	1,777	1,380	609	1,369	1,389		58.7
8	1	9	21	3	7	18	8	94.0	16.4
194	101	218	1,977	1,448	598	1,532	1,512		58.5

TABLE VI

Municipal Water Hardness, 1959, 1961 and 1963

Percentage of population served with water classed as				Weighted hardness (ppm $CaCO_3$) of municipal waters						
Soft	Medium hard	Hard	Very hard	Cities, Towns and Villages	Townships, Improvement Districts, etc.	Small Townsites Campsites	Ground waters G	Surface waters S	Mixed waters M	Total basins
89.5	4.7	4.7	1.1	S - 45 G - 105 M - 45	S - 45 G - 205 M - 45	57	156	45	45	51
88.0	5.0	5.9	1.1	S - 38 G - 108 M - 55	S - 44 G - 154 M - 45	–	132	39	54	51
89.7	4.8	4.3	1.2	S - 37 G - 107 M - 55	S - 44 G - 177 M - 45	34	145	38	53	51

Only eight to nine of the larger municipal or organized systems use ground waters alone. Tables III and VI show that ground waters, at least in parts of the basin, are not especially high in minerals nor abnormally high in iron and/or manganese.

Also, within this basin are a number of very small communities, campsites, and mine townsites,having some form of a central or organized water supply. In 1959, thirty-five such systems were noted serving about 10,600 people. By 1963, when uranium mining in the basin had almost ceased, many such systems were not operating or had been dismantled; at that time the twenty-two remaining systems served about 5,100 people. Table IV, which gives some data on these small supplies, shows that in 1963, twenty of the twenty-two systems used surface water, and eighteen of these treated the water, but by chlorination only.

Most of the population of the basin receive soft waters since most organized systems use surface waters which are usually very soft to soft in character. About 90 per cent of those served, receive water having total hardness less than 61 ppm as $CaCO_3$. Only about 6 per cent use hard or very hard water (121 ppm as $CaCO_3$ or greater). Table VI shows that in 1961 and 1963 about 81 per cent of those served with water lived in cities, towns and villages; the remaining 19 per cent lived in townships, improvement districts and unincorporated communities.

The weighted average hardness of all waters supplied by organized system in the basin is 51 ppm as $CaCO_3$. The weighted average hardness of ground waters supplied by systems varies from 132 to 156 and the surface and mixed waters between 38 and 54 depending on the year of study. It will be noted that since the larger urban centres use mostly surface water these have weighted hardness below 45 ppm as $CaCO_3$. Even ground water supplied to cities, towns and villages has a weighted average hardness below 120 ppm. Harder ground waters are supplied in some townships, improvement districts and unincorporated communities.

The small campsites and mine townsites are also supplied mostly with soft water, the average weighted hardness as ppm $CaCO_3$, of these supplies studied being 57 in 1959-60 and 34 in 1963.

SUMMARY

Surface waters of the Upper Great Lakes basin, a part of the Great Lakes-St. Lawrence River system, are for the most part very soft to soft (below 60 ppm as $CaCO_3$ hardness); surface waters in a few areas are in the medium-hard to hard range.

Waters of the main St. Lawrence River system in this portion of the basin are quite constant in chemical quality, even softer than many tributary streams, but there is a definite increase in mineralization in parts of the Georgian Bay region of Lake Huron.

Most tributary rivers show little significant change in chemical quality, including turbidity, with season or river discharge. Many rivers are, however, highly coloured. Tributary rivers generally show decreased mineral content with increased discharge, except for some rivers whose discharge is controlled by dams, power development, etc. when the opposite relationship has been noted.

The good quality of these surface waters is evident from the large proportion used in organized systems without any treatment other than chlorination. Additional treatment is usually for colour removal.

Over 93 per cent of the basin population is served by organized system; this high percentage is due to the rough terrain and lack of agriculture, etc. with resultant concentration of population along the main lake-river system and at centres of mining, lumbering etc.

The main problems arising in the industrial and municipal use of surface waters in this basin are organic matter (colour), corrosivity and, occasionally, turbidity. The problem of economically treating these very soft waters to reduce corrosion when very large volumes are used in major industries is still not completely solved. Since the industries in the area use very large quantities of water, e.g. the pulp and paper, and steel and mining industries, the need to reduce contamination is very important. The increase in mining and associated industries in the basin demands that careful control of large volumes of industrial waste waters be maintained. This is especially true when tourism is a major industry and access now is possible to much of the area including the upper reaches of rivers. The Canadian Shield, especially this forested basin, is noted for fishing, hunting, and other recreational sports. Careless contamination of the numerous small streams and lakes vital to the tourist industry would have a serious effect on the economic growth of the region.

APPENDIX A

Surface Water Sampling Locations

APPENDIX A

Surface Water Sampling Locations

APPENDIX A

Surface Water Sampling Locations

APPENDIX A

Surface Water Sampling Locations

APPENDIX B

Index to Data and Analyses - by Municipality

† Municipality in the Upper Great Lakes drainage basin but using water from the Ottawa River drainage basin.
†† Municipality not classed within the Upper Great Lakes drainage basin but adjacent thereto, and included in this report to bring the data up to date. *See* also Water Survey Report No. 3.

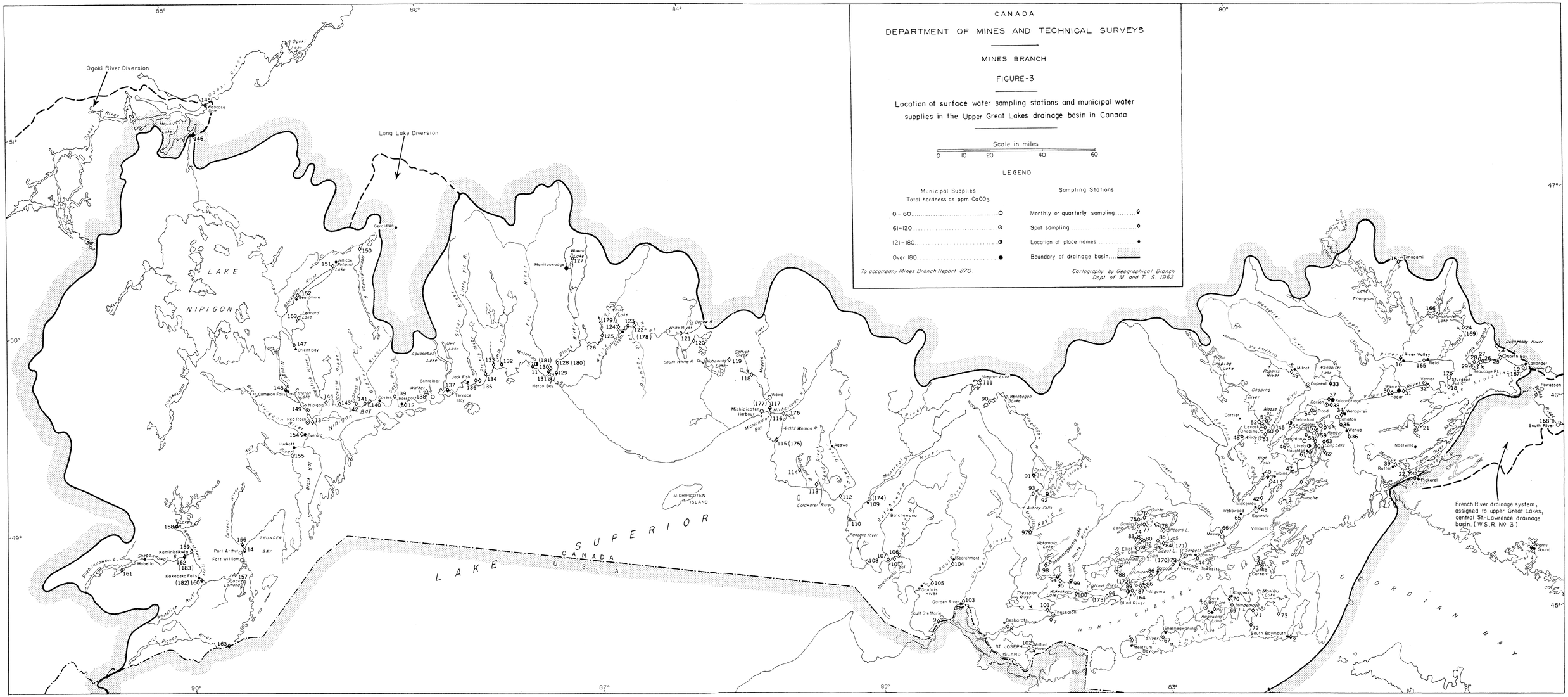
APPENDIX B

Index to Data and Analyses - by Municipality

† Municipality in the Upper Great Lakes drainage basin but using water from the Ottawa River drainage basin.

APPENDIX C

Index to Data and Analyses - by Small Communities and Townsites


CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS
MINES BRANCH
FIGURE-3
Location of surface water sampling stations and municipal water supplies in the Upper Great Lakes drainage basin in Canada
Scale in miles
0 10 20 40 60
LEGEND
Municipal Supplies
Total hardness as ppm $CaCO_3$
0 - 60
61-120
121-180
Over 180
Sampling Stations
Monthly or quarterly sampling
Spot sampling
Location of place names
Boundary of drainage basin
To accompany Mines Branch Report 870
Cartography by Geographical Branch Dept. of M. and T. S. 1962
Ogoki River Diversion
Long Lake Diversion
French River drainage system, assigned to upper Great Lakes, central St. Lawrence drainage basin. (W.S.R. No 3)
LAKE NIPIGON
LAKE SUPERIOR
CANADA
U S A
MICHIPICOTEN ISLAND
ST JOSEPH ISLAND
GEORGIAN BAY
NORTH CHANNEL
88°
86°
84°
80°
51°
50°
49°
47°
46°
45°
90°
87°
85°
83°
81°