

GM 06513

REPORT ON RECENT DEVELOPMENTS IN THE CHIBOUGAMAU REGION

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QUEBEC DEPARTMENT OF MINES

MINERAL DEPOSITS BRANCH

No G M- 6513

Recent Developments

in The

^{Rep.}
Chibougamau District

Quebec

by

J. Robert Assad

Quebec Department of Mines

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RECENT DEVELOPMENTS IN THE CHIBOUGAMAU

DISTRICT QUEBEC

Introduction

The Chibougamau camp can take pride in uniqueness and surprising success. It is unique in that it is the first camp to prove that an area located in the interior can become an important copper producer without railway facilities. That it is a surprising success is demonstrated first, by the rate at which new deposits have been found, and second, by the fact that last year Chibougamau produced 21.5% of Quebec's total copper production.

Assuming that the development plans indicated by four of the important mining concerns will prove feasible, it may be of interest to make a rough estimate of the potential of the district within two or three years, when these properties will be exploited.

The present operators, with set milling rates, can produce some 77.5 million pounds of copper each year.

Milling rates for the other five important properties have not yet been determined, but in most cases the tonnage and grade available is fairly well known as a result of surface drilling. In some cases, tonnage figures are not yet well established and a low estimate, which included only the more definite ore, has been purposely chosen. To these estimates of ore reserves, one can apply the rule of thumb which states that a modest milling rate is represented by the tonnage contained in the mining of half a vertical foot per day. In this way it can be estimated that these potential mines can produce approximately 125 million pounds of copper annually.

In summary then, this means that within two or three years Chibougamau may produce a total of some 200 million pounds of copper each year. This sum, when compared with present production figures, represents over 80% of Quebec's copper output and approximately 30% of the total production from all Canadian mines.

Location and Access

The Chibougamau district is located in northern Quebec, some 130 miles northwest of Lake St. John. An all-weather gravel road links the area with St. Felicien at the head of this lake. Rail facilities will be available shortly by way of a 190-mile branch line originating near Senneterre along the C.N.R. transcontinental route. Within a year a second railway line will link Chibougamau with the Lake St. John region.

Review of Developments

In this discussion of recent developments in Chibougamau, I propose first, to outline the regional geology and then to give details concerning both the producers and potential producers. An outline of the general characteristics of the mineral deposits in the anorthosite belt followed by a survey of exploration developments in the various sectors of the camp will complete the review.

Although many of today's producers and potential producers were known prospects when the Quebec Department of Mines completed the road to Chibougamau in 1950, there were at that time no deposits outlined that could be mined.

Opemiska Copper Mines resumed operation in 1952, after initial development in 1937, and by late 1953 production started at the rate of 400 tons/day. Exploration and development of the Campbell Chibougamau property resulted in production at the rate of 1700 tons/day by mid-1955 when hydro-electric power became available. Chibougamau Explorers began shaft sinking in 1952 on their gold-copper property located some 30 miles south of Chibougamau. Merrill Island Mining Corp. sank a 350-foot shaft on their indicated ore zones in 1953, leased part of their holdings to Campbell Chibougamau Mines and then stopped operations until 1955.

Regional Geological Setting (Fig. 1)

Basically, the region lies within the Temiscamian sub-province and at the east end of a "greenstone belt" which is truncated, some 8 miles east of Lake Chibougamau, by an area of gneisses regarded as belonging to the Grenville sub-province. This greenstone belt, which is composed of basic to intermediate volcanics and subordinate sediments, has been invaded by extensive amounts of a large variety of intrusives, ranging from ultrabasics to granite.

Basic to intermediate rocks, varying from serpentinite to diorite, are the oldest group of intrusives and occur essentially as sill-like bodies which are in part related to, and in part younger than, the volcanics.

The Chibougamau anorthosite and related gabbros from the main geological feature of the area and take the form of a canoe-shaped intrusive with the long axis trending northeast.

Granitic plugs and batholiths intrude these rocks. A significant mass occurs along the axial portion and at the south and east boundaries of the anorthosite body.

A young series of coarse clastic rocks, called the Chibougamau Series, unconformably overlies all other rocks and occur as isolated remnants mainly within down-faulted blocks.

The older volcanics, sediments and basic intrusives are folded, steeply inclined and have a general easterly trend. Compositional banding within the anorthosite-gabbro indicate that the northwestern limb of the in-

trusive dips north, while the southern limb dips southeast. This may indicate that the structure represented is that of an anticline plunging northeast with limbs inclined at 50° to 70°.

Faulting in the region is widespread and may be divided into two sets. The first set consists of major northeast-trending faults, three of which are named, from west to east, (1) the Gwillim Lake-Waconichi Lake fault, (2) the MacKenzie Narrows-Dores Lake fault and (3) the Tachée Lake fault along the east side of Lake Chibougamau. The second set consists of faults and shears trending northwest to west and these occur commonly near the major northeast-trending faults as along Dores Lake and in the Opemiska Mine area where, in both regions, they are the ore-bearing structures.

RECENT DEVELOPMENTS (fig. 2)

(a) Producers

Campbell Chibougamau Mines Ltd. is in its second year of production and ranks fourth among all copper producers in Quebec. After the first year of production, reserves to the 1150-foot horizon amounted to over 2.5 million tons. The shaft has been deepened from 1200 to 2100 feet during the past year and reports state that ore extensions at depth are being confirmed.

Chibougamau Explorers Ltd. went into production in February of last year at a rate of 500 tons/day.

Reserves at Opemiska Copper Mines Ltd. a year ago were given as over 2 1/4 million tons averaging 4.08% copper. This represented an increase in reserves of about 1 million tons for each year since 1954. Recent developments indicate that reserves have increased by another million tons during the last year while the indicated potential of the mine has increased even beyond this. Two main features have determined this growth. In the first place, the No. 3 or main ore zone in the mine widens considerably with depth and good continuity down to the 1500-foot horizon is indicated. Secondly, a new and important ore body has been located in the Perry zone area of the property about one half mile east of the main shaft. Underground exploration is in the process of determining the exact nature and potential of this new body.

Production at the Opemiska mine which was curtailed by fire early in November of last year, will be resumed shortly but at an increased mill rate of 1400 tons/day. The main, or No. 1 shaft is being deepened from 1100 to 2000 feet while a new shaft is being put down to the 2000-foot horizon on the Perry zone.

(b) Potential Producers

The Bouzan Mines ore zone lies along the dip extension of the Copper Rand-Eaton Bay ore zone. The ore enters the Bouzan property at a vertical depth of 750 feet and at the 1000-foot horizon the ore zone has a possible strike length of 500 feet. The available tonnage along this zone is not yet known.

Campbell Chibougamau Mines has explored two properties which are now regarded as being future producers. At the Cedar Bay property an existing shaft has been de-watered and reports indicate a possible tonnage of over 1 3/4 million tons averaging 1.6% copper and .1 oz gold. At the Kokko Creek property, drilling to the southeast of the surface showing at the head of the bay, has outlined an ore zone which is reported to contain about 1850 tons/vertical foot averaging 2.38% copper.

Chibougamau Jaculet Mines extended the Dores Lake favourable zone northward with its initial discovery a year ago. An active drilling programme continued during the past year and at the present time shaft sinking is in progress. Two main ore zones, some 800 feet apart, occur in the southern part of the property, and a third zone is being explored about 4000 feet to the northeast. Definite tonnage values have not as yet been determined, but reports indicate that a large tonnage may be outlined grading about 2% copper.

Copper Rand Chibougamau Mines Ltd, was formed a year ago to merge the assets of Copper Cliff Consolidated Mining Corp. and New Royran Copper Mines Ltd. Diamond drilling was followed by the sinking of two shafts late in 1955, one of which is located at Cedar Bay and the other on Machin Point on Gouin Peninsula. Underground development of the three indicated ore zones has been in progress for over 6 months. The Copper Cliff-Cedar Bay zone and the Royran-Machin Point zone on the east side of Dores Lake are similar in size and tenor, each containing a reported 2500 tons/vertical foot grading between 1.5% and 1.8% copper. The Royran-Eaton Bay zone on the east side of Gouin Peninsula is the most important zone and is said to contain some 4500 tons/vertical foot grading between 2% and 3% copper.

The concentrator will be erected on Machin Point. The capacity of this mill has not been decided upon but one with an initial capacity of 5000 to 6000 tons/day has been suggested.

Copper Rand is presently sinking a third shaft at the northern tip of Merrill island to explore an ore zone drilled some years ago which indicated approximately 1/2 million tons averaging 2.2% copper.

Merrill island Mining Corp. deepened its shaft from 350 to 1000 feet during the past year to explore at depth the possibilities of increasing the previously determined reserves of nearly three quarters of a million tons of 2.8% copper.

Shaft sinking was also in progress at the Quebec Chibougamau Goldfields property during the past year to allow for underground examination of an ore zone reported to contain nearly 1 million tons grading 1.14% copper and .107 ozs. in gold.

General Characteristics of the Deposits in Anorthosite (see Fig. 2)

All the deposits in the Dores Lake sector are found in the anorthosite-gabbro intrusive on both sides of a major fault that runs through the northern half of Dores Lake. The fault dips from 50° to 60° northwest except in the region of the Campbell Chibougamau property where it is nearly vertical.

Shear and faults of a second order trending N 50° W to nearly due west occur in the anorthosite on both sides of the major fault. The shear zones vary in width from a few tons to a few hundred feet. In general, those south of Cedar Bay and Machin Point are narrow, while those to the north are wider and may be termed schist zones.

These northwest to west-trending shears contain all the important ore zones and so may be classed as a control of the first order. A group of grey dioritic and porphyritic dikes intruded into shear zones exert a second, but less rigid, control on mineralization. This is shown by the deposits on Merrill island, the Quebec Chibougamau Goldfields deposit and the Copper Rand-Eaton Bay deposit where ore occurs adjacent to and within dikes.

There are two main types of deposits among the Dores Lake group. The first type, which is represented by the deposits on Merrill island and those on the mainland just north of Merrill island, occurs in fairly pure ~~anorthosite~~ ^{see erratum}. The sulphides occur both disseminated and in massive form and are consistently associated with quartz, some chlorite and local carbonate. The main sulphide assemblage is pyrrhotite, chalcopyrite and pyrite for all the deposits except the Quebec Chibougamau Goldfields deposit where only a small amount of pyrrhotite occurs.

The second type of deposit is represented by the Copper Rand-Cedar Bay and Machin Point zones and, probably, the Jaculet deposit. Here the ore zones lie within wide areas of sericite-chlorite-chloritoid and carbonate schist. The mineralization consists of veinlets and stringers of siderite, chalcopyrite and lesser pyrite impregnating the host along the schist planes.

The Copper Rand-Eaton Bay zone appears to have features belonging to both groups in that it possesses dike control, it contains some pyrrhotite and the gangue minerals include both quartz and carbonate.

Recent Developments in Exploration (Fig. 2, in part)

Dores Lake: Detailed exploration is in progress along Dores Lake both to the north and to the south of the ore-bearing sector. Bateman Bay Mining is continuing an active drilling programme on its property at the north end of the lake and has intersected local mineralized zones. Obalski (1945) Ltd., located west of Merrill island, is steadily drilling its property but deep overburden conditions preclude rapid progress. Chibougamau Mining and Smelting has done some preliminary drilling at the southern end of Dores Lake.

Lake Chibougamau: The area covered by Lake Chibougamau as well as the area to the east of the lake has been surveyed by airborne geophysical methods. This is being followed by detailed ground exploration.

During the past summer Portage Island Chibougamau Mines drilled a new mineralized zone under Hematite Bay along the north-central shore of the island where anorthosite, greenstone and granite are in contact. Extensions of this zone are being explored and may represent the first important copper zone to be found in greenstone in the Dores Lake-Chibougamau Lake region.

----- Erratum -----

after "fairly pure..." read as follows: ...brecciated anorthosite that is sheared and intruded by dikes along a relatively narrow zone. Original textures in the anorthosite gradually fade toward the sheared and mineralized area.

Grandines Mines has completed another drilling programme on its property north of Portage Bay. The ore occurs in a brecciated granite and present estimates of ore stand at nearly 1/2 million tons grading 2 1/2% copper.

During the past year Chibougamau Asbestos Ltd, drilled the surface showings on Mackenzie island in MacKenzie Bay north of Lake Chibougamau where asbestos occurs in a serpentinized dunite. Extensive surface stripping and sampling followed the drilling.

Yorcan Explorations has actively explored its holdings in Lake Chibougamau during the past year. Reports of the past few weeks indicate that a new copper-bearing mineralized zone has been discovered at the north end of the Yorcan property less than 1000 feet from the east shore of Portage island and along the common boundary with The Campbell Chibougamau 'K' group. The encouraging drill results indicate an east-trending zone that dips south and which contains local nickel and minor cobalt values along with the copper content.

In the area east of Lake Chibougamau, Dominion Gulf explored the magnetite formations which occur within the layered gabbro-anorthosite intrusive. Two main magnetite zones, one 80 feet and the other 200 feet wide, have been traced for over 1 1/4 miles and bulk samples show a content of 43.4% soluble iron and 7.4% titanium. It is understood that the Jones and Laughlin Steel Corp. has taken an interest in the property.

Opemiska Mine Area: (Fig. 3). Little success was encountered with the recent drilling along the gabbro and pyroxenite bands in the area north of the Opemiska Copper Mines property. To the east of Opemiska Mines, Chibougamau Copper Corp. was engaged in drilling which located the faulted extension of the sequence of volcanic, basic and ultrabasic rocks which occurs in the Opemiska shaft area. A strike separation of some 13000 feet along the Campbell Lake fault is indicated. In the area near the fault values of 1% copper over 5 and 10-foot lengths are reported in the offset Ventures-like gabbro, but at a distance from the fault both to the east and to the west of the Chibougamau Copper property, similar rocks rarely contain more than 0.2% copper over 1 and 2 feet.

Gwillim Lake-Scott Lake: During the past year much activity was centered in the Gwillim Lake-Scott Lake area where general exploration and diamond drilling were carried out. However, no important developments were recorded.

Lake Waconichi: Exploration, including some diamond drilling has been completed at the north end of Lake Waconichi in the Chibougamau Series where disseminated chalcopyrite occurs in quartzite and argillite. Although the chalcopyrite occurs locally along shear zones, the possibility that chalcopyrite may also occur in zones parallel to the bedding should not be overlooked.

Conclusions

Developments of the past few years have assured Chibougamau's importance as a copper producing area. It was this promise of importance that led to the active prospecting and exploration that Chibougamau has witnessed recently. Improved transportation facilities combined with a better knowledge of the area will now allow efficient and detailed exploration which is most certain to prove successful.

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LEGEND

MISTASSINI SERIES

Dolomitic sediments



CHIBOUGAMAU SERIES

Arkosic sediments



PRE-CHIBOUGAMAU

Granite, syenite



Chibougamau gabbro-anorthosite



Basic to intermediate intrusives



Sedimentary rocks



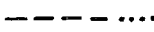
Basic to intermediate volcanics



Granitic gneiss



FAULTS



MINING PROPERTIES



Producers:

Campbell Chibougamau Mines

1

Chibougamau Explorers

2

Opemiska Copper Mines

3

Potential Producers:

Bouzan Mines

4

Campbell Chib. - Cedar Bay

5

Chibougamau Jaculet Mines

6

Copper Rand Chib. Mines

7

Copper Cliff prop.

8

New Royran prop.

9

Copper Cliff - Merrill I. prop.

10

Kokko Creek

11

Merrill Island Mng.

12

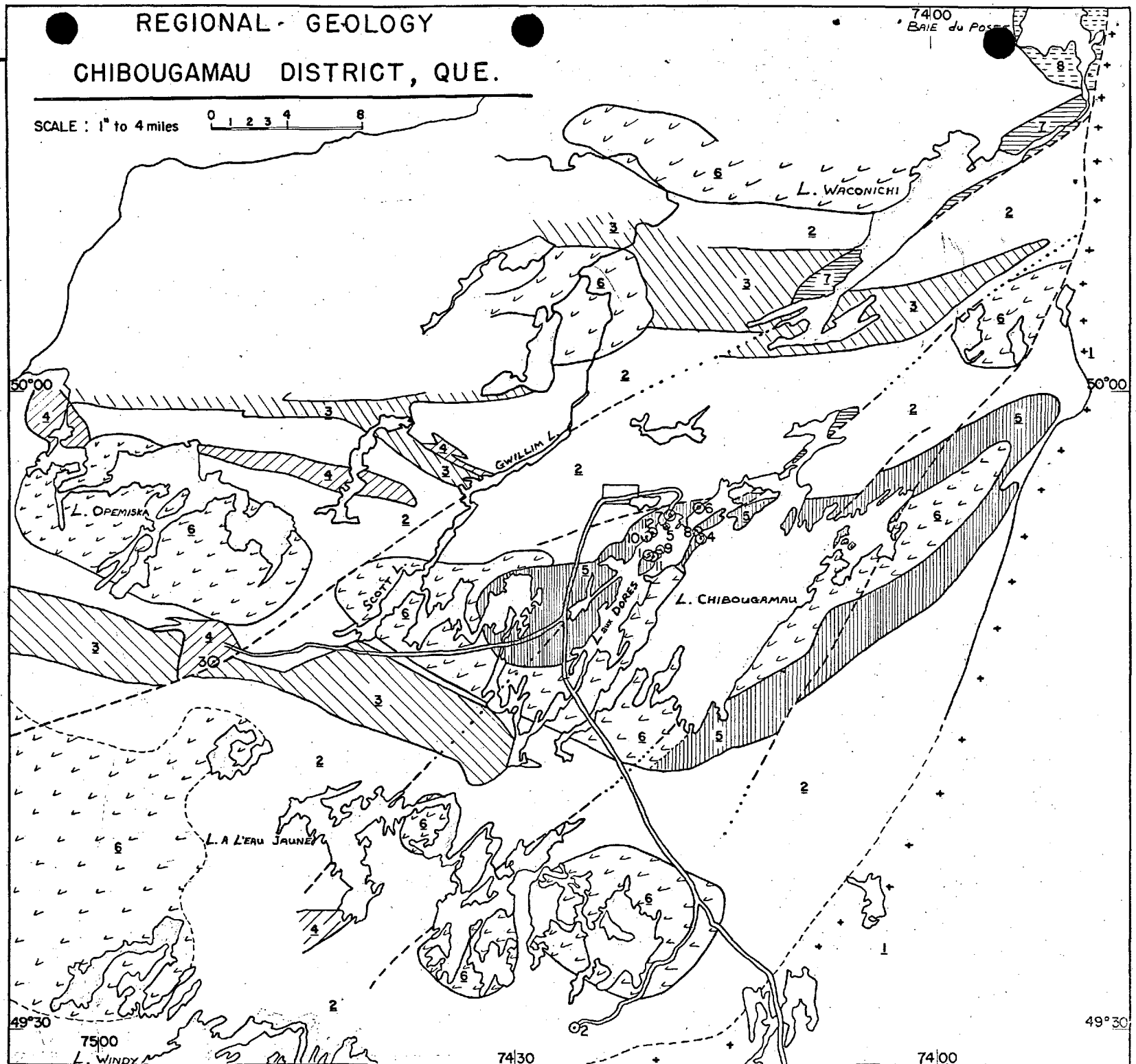
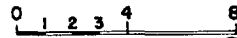
Quebec Chib. Gold-fields

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REGIONAL GEOLOGY

CHIBOUGAMAU DISTRICT, QUE.

SCALE: 1" to 4 miles



7400
BAIE du POISSON

50°00'

50°00'

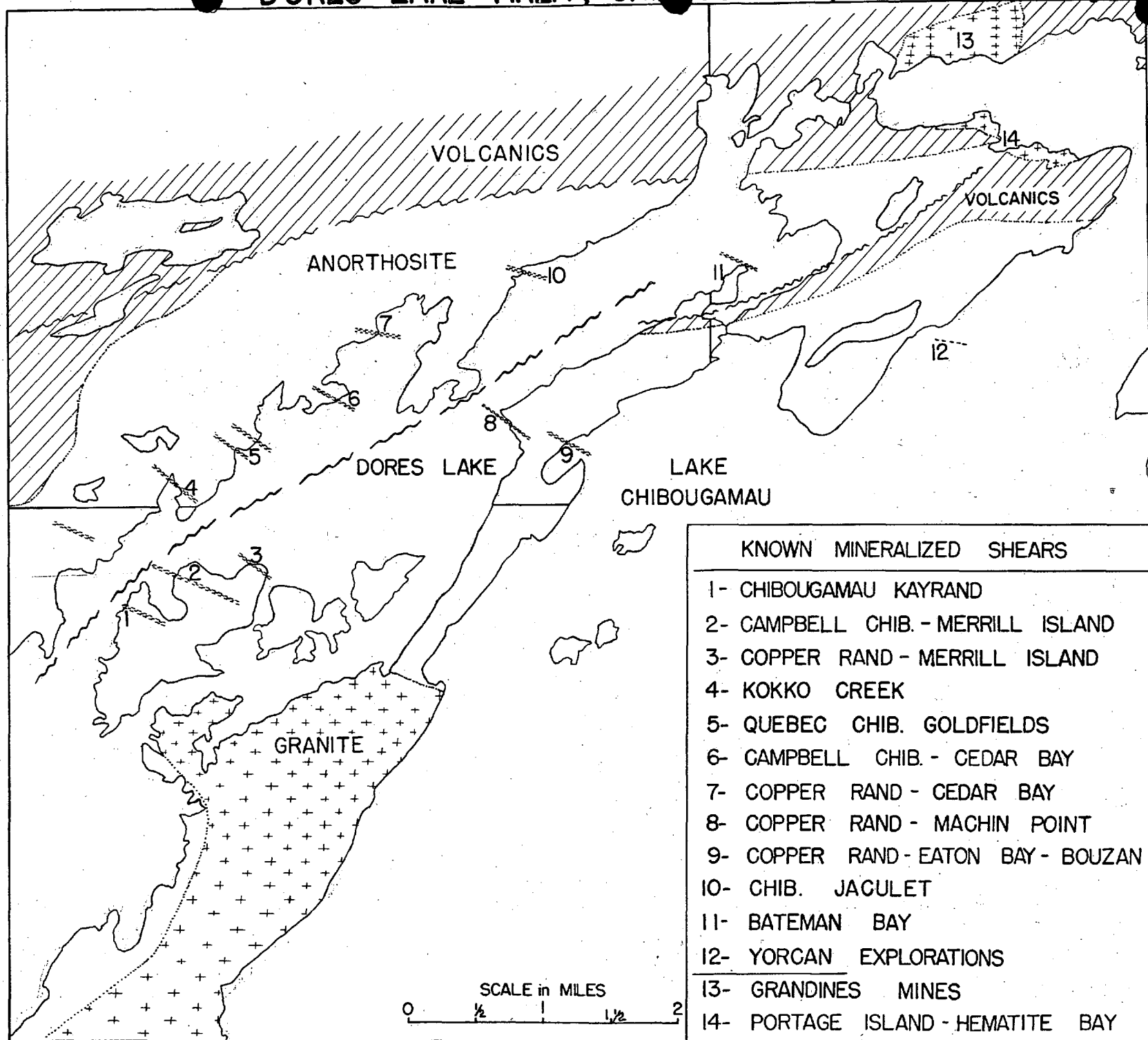
49°30'

49°30'

7500

7430

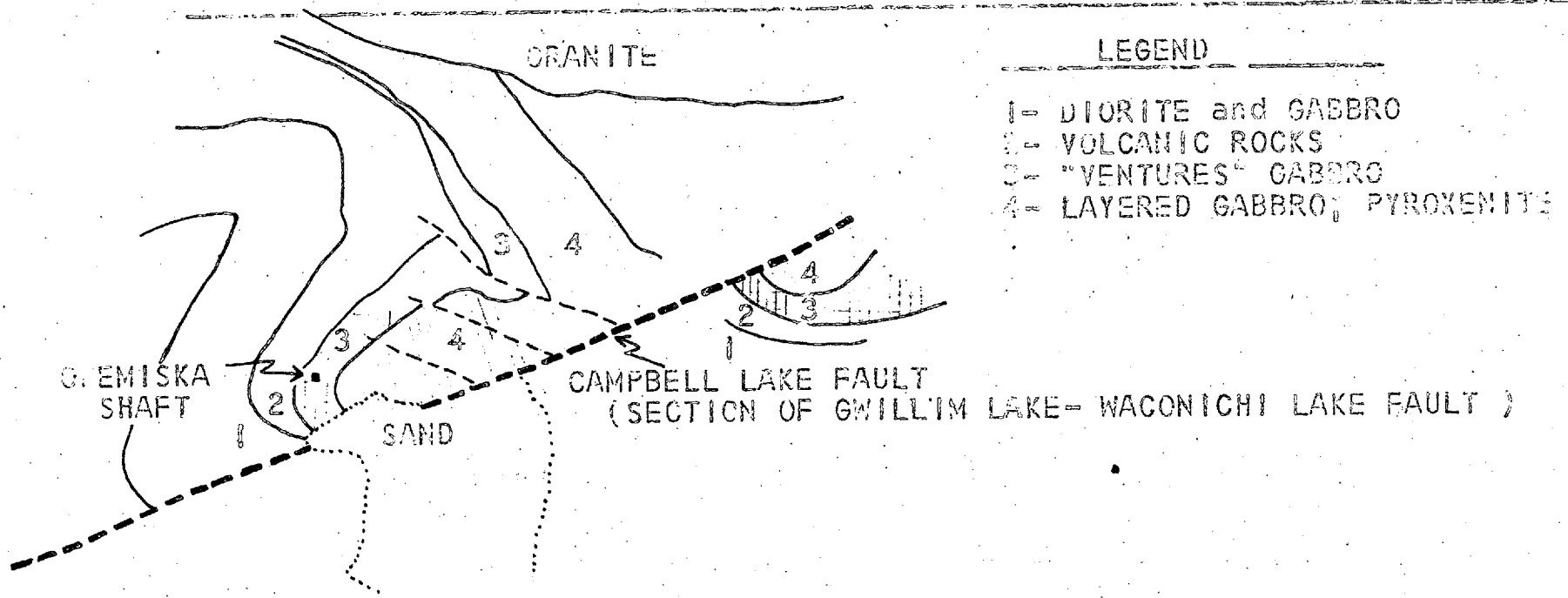
7400



(Fig. 3)

--OPENISKA AREA--

SKETCH TO SHOW OFFSET SEQUENCE OF ROCKS ACROSS CAMPBELL LAKE FAULT



SCALE : 1 inch to 1 mile