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ONTARIO
DEPARTMENT OF MINES

SUMMARY OF FIELD WORK, 1961
by the
GEOLOGICAL BRANCH
ONTARIO DEPARTMENT OF MINES

Edited by
J. E. THOMSON

P.R. 1961-5
November, 1961
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SUMMARY OF FIELD WORK 1961

by the

GEOLOGICAL BRANCH

ONTARIO DEPARTMENT OF MINES

INTRODUCTION

by

J. E. THOMSON

The Geological Branch had 15 geological survey parties in the field during the summer of 1961. A brief summary of the results of these surveys is given in this report. Emphasis is placed on the economic aspects of the investigations. The summaries contain information that might be of assistance to those who are interested in mineral exploration in Ontario. The location of each field party and the name of the party leader is shown on the outline map of the province on page 2. Resident geologists who were not in charge of field parties have also reported on their summer's investigations.

Most of the detailed mapping in Precambrian field areas (Nos. 3, 5, 6, 7, 8, 9, 11, 12) was done at the scale of one inch to 1/4 mile, for publication at one inch to 1/2 mile. Geological maps covering reconnaissance surveys (Nos. 1 and 4) will be published at the scale of one inch to one mile. Detailed maps of the Red Lake mining camp will be published at the scale of one inch to 1,000 feet.

Uncoloured preliminary geological maps of most of the areas will be published during the winter of 1961-62. Notices of the release of these preliminary maps will be announced by postcards mailed to all persons and organizations on the Department of Mines notification list.

Eventually coloured maps and detailed reports will be published to cover most of these field projects.

 Chief Geologist, Ontario Department of Mines, Toronto.
1961 LOCATION OF FIELD PARTIES
GEOLOGICAL BRANCH, ONTARIO DEPARTMENT OF MINES

No. LOCATION LEADER
1. Big Trout Lake - Severn River Area P.P. Hudec
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3. Ewart and Forgie Townships J. C. Davies
4. Metailo Lake Area D. P. Rogers
5. Burchell Lake Area P. E. Giblin
6. Townships 30 and 31, Range XIX L. D. Ayres
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10. Aurora, Edwards, Colvert, Teefy, Dundonald, Clergue, Willie and Coulson Townships R. M. Ginn
11. Catherine and Meriter Townships J. A. Grant
12. Tudor Township S. B. Lumber
14. Guelph Area, Scarborough Area P. F. Karrow
No. 1  BIG TROUT LAKE-SEVERN RIVER AREA  
PATRICIA PORTION, DISTRICT OF KENORA  
by  
P. P. Hudec

Location of Area - The area is bounded by longitudes 89° and 91° West and latitudes 53°30' and 54°30' North and is located in the District of Kenora, Patricia Portion, about 300 miles north of Sioux Lookout. The area mapped comprises 5,000 square miles and is the result of field work in 1960 and 1961.

Mineral Exploration - Two prospectors spent the summer examining the volcanic belts. Mining Corporation of Canada staked 36 claims early in 1961 in the vicinity of a zinc showing discovered and reported by the author in 1960. Trenching and general examination of this property was carried out.

General Geology - For an outline of the geology of Big Trout Lake and vicinity see Preliminary Report 1960-4 of the Ontario Department of Mines. The belt of volcanic rocks splits at the west end of Big Trout Lake. The southern branch, 1 to 2 miles wide, continues westward through Kino Lake and is again seen along the south end of Severn Lake. Westward the lithology changes from banded tuffs and pillowd volcanic rocks at Big Trout Lake through interbanded metasediments and tuffs to mainly metasediments with thinly banded iron formations at Severn Lake.

The northern or main volcanic belt trends in a north-westerly direction. North of Mopabrow Lake it is about 10 miles wide, but at Severn River the belt narrows abruptly, splits, and crosses the River as two partially granitized extensions, the southern 2,000 feet wide and the northern about 1,000 feet wide. The rocks comprising this belt grade from predominantly pillowd and massive volcanic rocks at Big Trout Lake to increasingly tuffaceous volcanic rocks at Winnin Lake. The narrow extensions crossing Severn River are predominantly tuffs.

Three narrow and partially granitized belts of tuffs and metasediments are found along the Severn River, the northernmost occurring at the last fork of the Severn River.

The southern belt of volcanic rocks is a semi-circular feature along the northern boundary of a great granite batholith. The northern belt is more interesting from the
structural and economic point of view, as it narrows suddenly and splits. The divided belt probably extends into the Mooreson-Schmitt lakes and Hanson River - Stables Lake gold belts to the west. The belts' northern boundary would seem to be a very favourable area for prospecting.

Economic Geology - The zinc showing on the southern volcanic belt has been mentioned in Preliminary Report 1960-4. The mineralized areas give a high magnetic response, a fact which may be useful in exploration. However, the small, slightly mineralized iron formations, located further west, should give much the same effect.

There are two main areas of interest within the northern belt. To the east-northeast of Winnin Lake, on the portage route, an area of mineralized tuffs is found. Mineralization is disseminated, mainly pyrite and pyrrhotite. Prospecting is warranted in this vicinity.

A three-foot wide body of massive sulphides outcrops on the south shore of a small lake and is visible only at low water level. The lake, named Derniere Lake, is located by coordinates longitude 90°16' and latitude 54°31'. The massive sulphides are found in brecciated volcanic rocks and tuffs. The entire mineralized zone is of undetermined width, but estimated to be at least 30 feet; the northern boundary of the zone is in the lake. The mineralization has been traced for about 1,000 feet along strike before it disappears under the lake. Pyrite, pyrrhotite and minute specks of chalcopyrite make up the massive sulphides. The disseminated mineralization has a greater proportion of pyrite and contains small seams of chalcopyrite up to \( \frac{1}{4} \)-inch wide. Grab samples of the sulphides, taken by the writer, were assayed and found to contain only traces of copper and nickel. A granite contact is indicated within 500 feet to the north of the mineralized area.

Numerous quartz veins cut the volcanic rocks of all belts. The majority of them are barren, but some contain a little pyrite.

No. 2 DOME TOWNSHIP

PATRICIA PORTION, DISTRICT OF KENORA

by

S. A. Ferguson

Location of Area - Dome township is located in the Red Lake Area, which is about 180 miles by road east and north of Kenora.

†Geologist, Ontario Department of Mines, Toronto.
The settlement of Red Lake is partly within the township. Other main centres of population are at McKenzie and Cochenour, which are the townsites for two of the mines. About one quarter of the township, including the area adjacent to McKenzie Red Lake Gold Mines Limited and Cochenour Willans Gold Mines Limited was mapped during the previous field season, and the balance of the township was mapped during the 1961 field season.

Mineral Exploration - McKenzie Red Lake Gold Mines and Cochenour Willans Gold Mines are in production at the present time. Past producers are Marboy Mines Limited, Goldray Mines Limited and Hasaga Gold Mines Limited (Red Lake Gold Shore Property). A drive from Campbell Red Lake Mines property on the 2,050-foot level has been extended into the Craibbe-Fletcher property, and surface and underground drilling has been in progress. Drifting and underground drilling is in progress at the Wilmar mine from the end of a drive extended into the property from Cochenour Willans mine, on the 1,300-foot level. Another drive from Cochenour Willans mine, also on the 1,300-foot level, has been driven to beyond the eastern boundary of the property and is to be extended 9,600 feet into the adjoining property held by Consolidated Marcus Mines Limited. During the early part of the year geophysical surveys and drilling was carried out by Howey Consolidated Mines Limited on claims optioned from Ventures Limited, and from Lewis Red Lake Mines Limited. Cable Mines and Oils Limited proposes to do further surface drilling on their property. Underground workings have located a shear zone containing gold-bearing stringers near the eastern edge of the Dome granite stock. Prospecting, stripping and trenching was being carried out on a group of claims at the southwestern end of Mackenzie Island, held by Lode Mines Limited.

General Geology - The three main stratigraphic rock units are a sequence of older basic lavas, an intermediate unit of porphyritic rhyolite and rhyolite breccia, with associated lean iron formations, and a younger unit of slate and greywacke. Persistent, major sills or dikes of altered hornblendite and gabbro are present in the northeastern part of the township. The Dome stock of granite is located in the southwestern part of the township and on Mackenzie Island is the McKenzie stock of granodiorite with a border phase of diorite. Minor intrusives are dikes of quartz-feldspar porphyry and diorite. A rock formerly mapped as Howey diorite is believed to be a metamorphosed phase of the rhyolite.

Structural Geology - The general trend is toward the southwest. Some cross folds are present and in detail the folding is complex.

Economic Geology - Gold is the only mineral that has been recovered in the township in economic amounts. The
gold-bearing veins of McKenzie Red Lake Gold Mines are found in shears near the contact of the diorite and granodiorite within the McKenzie stock. At Goldray Mines the veins are partly within the igneous rocks of the McKenzie stock but dip across a large inclusion of greywacke. At the Red Lake Gold Shore section of Hasaga Gold Mines the vein occurred at the intersection of two sets of shears within the granite of the Dome stock. The ore at the Cochenour Willans mine is adjacent to a tuff bed contained in basic lavas. Native gold is associated with quartz and frequently with arsenopyrite, stibnite, sphalerite and rarely pyrite. Fine-grained quartz veins are enclosed in a large carbonate vein within basic lavas at Marboy Mines. Gold and arsenopyrite are frequently associated in the veins as well as smaller amounts of stibnite, pyrite and pyrrhotite.

No. 3 EWART AND FORGIE TOWNSHIPS
DISTRICT OF KENORA

by

J. C. Davies

Location of Area - The area mapped during the 1961 field season includes most of Ewart and Forgie townships, and a part of Indian Reserve 39a. The eastern edge of the area is about 21 miles west of Kenora; the western edge is the boundary between Ontario and Manitoba. The Trans-Canada highway passes through the two townships.

Mineral Exploration - Early in 1961 almost all of Ewart township was staked, following the encouraging results obtained by Electrum Lake Gold Mines, Limited, in the drilling of several copper and gold bearing zones. Though work on this group was discontinued in the spring of 1961 a group of claims lying immediately to the west optioned by Selco Exploration, Limited, was thoroughly prospected in the summer and a number of gold-copper showings were discovered. West of this, Bardyke Mines Limited, working on both sides of the interprovincial boundary, found interesting gold values in several places. McIntyre Porcupine Gold Mines Limited did some drilling on a group of claims immediately east of Electrum Lake Gold Mines Limited, but the results were not favourable. Perhaps the most encouraging results were obtained by Evenlode Mines Limited on a property at the east end of High Lake, optioned by them in 1959. Drilling in the first year of option extended the length of a known molybdenite-bearing zone from 400 to 1,250 feet, and additional drilling during 1961 has extended this still further to 1,750 feet. Assays are reported by the company to be consistent to a depth of at least 400 feet.

1 Resident Geologist, Ontario Department of Mines, Kenora.
Some staking occurred in Forgie township this year, but there is no evidence that any recent prospecting or other exploration has taken place.

**General Geology** - The oldest rocks are basalts, andesites, agglomerates, tuffs, and possibly sediments and intrusive gabbros. These occur in the vicinity of High Lake and have been faulted, and intruded by granitic rocks, possibly representing three distinct intrusions. An unconformity separates these rocks from a second group, but the unconformity is so difficult to follow that some of the rock types listed below may belong to the oldest rock series.

A basal conglomerate of the second group contains rounded pebbles and boulders which in part are identical with rocks in the High Lake area. Of particular significance is a quartz-feldspar porphyry having characteristic blue and white quartz eyes, and in places containing large phenocrysts of pink or white feldspar. This rock is associated with a number of the gold-bearing zones examined by Electrum Lake Gold Mines Limited, and is also found in the conglomerate. However, the quartz-tourmaline veins which seem to carry some of the gold are later than the conglomerate, thus eliminating the porphyry as a possible source of at least a part of the gold. Arkose occurs interbedded with, but dominantly above the conglomerate and because its source is largely from the porphyry, it is extremely difficult to distinguish the two rock types. Careful examination usually reveals angular fragments in the arkose, but bedding is rare. Associated with these sedimentary rocks north of Crowduck Lake is a sequence of cherty shales, intimately interbanded with tuff or arkose.

Other sediments are found within a thick sequence of volcanic rocks which includes lavas and tuffs and agglomerate of basic, intermediate and acid composition. Probably most significant from an economic standpoint in this rock group are cherty rhyolite, agglomerate and tuff, in places very thick, and confined largely to Forgie township. These are very brittle rocks and have been sheared, silicified and re-sheared, and contain secondary pyrite in numerous localities. A few quartz-tourmaline veins were noted in these acid rocks.

**Structural Geology** - In Forgie township a series of folds are mapped or postulated; the fold axes strike approximately east-west. All dips are very steep. Evidence of faulting and shearing is abundant. It appears that the major regional faults strike east-west, but the pattern of minor faulting varies in different parts of the area.
Economic Geology - The area, particularly Ewart township, contains a number of economically interesting deposits of gold, copper, molybdenum and silver. Most of the prospects in the vicinity of High Lake contain at least two of these metals. The most important properties lie within an area of older rocks although it is believed that the mineralizing solutions are much later in age. It would appear that the control is structural.

The best gold values are obtained in volcanic rocks lying just southwest of Electrum Lake. Gold is associated with quartz-carbonate veinlets in a fractured magnetite-bearing rock. This association of gold and magnetite has been used to advantage in exploration; for example, Bardyke Mines Limited found gold in magnetically anomalous zones. It is suggested that in the area of older rocks, a detailed study of the major structural features might outline zones more favourable for prospecting, and that ground magnetic surveys might also be useful.

Nickel has been reported south of Crowduck Lake but was not noted in the present survey. Copper occurs in numerous places, largely associated with quartz veins.

No. 4 METIONGA LAKE AREA

DISTRICT OF THUNDER BAY

by

D. P. Rogers

Location of Area - The Metionga Lake area is bounded by longitudes 90°10' and 91°00' West, and latitudes 49°30' and 50°00' North; it covers approximately 1,200 square miles. The centre of the area lies about 70 air miles southeast of Sioux Lookout. The survey was largely reconnaissance in nature.

Mineral Exploration - Evidence of prospecting in the Sturgeon Lake area of volcanics and sediments for gold and sulphides dates back to the 1920's. Staking within the past five years was noted in the vicinity of Bell, Glitter, Quest and Sassafras Lakes. The most extensive exploration carried out to date, is on a belt of banded iron (magnetite) formation, which extends west and east of Sassafras Lake for a distance of about 16 miles. Geological mapping and geophysical surveys followed by limited diamond drilling in the vicinity of Sassafras Lake was done in the period 1957 to 1960 by N. A. Timmins Explorations (Ontario) Limited and under C. H. Hopper Option.

Geologist, (part time), c/o Ontario Department of Mines, Toronto.
General Geology - The consolidated rocks underlying this area are considered to be of Precambrian age. Extensive Pleistocene glacial deposits cover the area.

The oldest rocks in the area are metamorphosed volcanic and sedimentary rocks which appear to be intercalated. This group forms a belt which stretches from Sturgeon Lake eastwards to Hilltop and Mountairy lakes. The eastern portion of this belt is highly metamorphosed and folded. It grades into lit-par-lit and migmatitic granitic gneiss from Hilltop Lake, eastward through Rude Lake to Brightsand River area, and along its southern boundary.

In the Sturgeon Lake area minor "metadiorites" intrude the metavolcanic and metasedimentary rocks. A coarse-grained, black, gabbroic intrusive underlies the eastern portion of Twinning Lake in the south-central part of the map area. A similar gabbro intrusive occurs about 1 mile east of Empire Lake.

The northeastern, eastern and southwestern portions of the map area are mainly underlain by hybrid granitic rocks comprising migmatite, lit-par-lit gneiss, hybrid granitic gneiss and minor associated coarse-grained amphibolite of unknown origin. Minor metavolcanic gneiss and schist bands are intimately associated (gradational) with the lit-par-lit gneiss and migmatite. Pegmatite and aplitic dikes commonly cut this group.

A circular plug approximately 2½ miles by 5 miles underlies the northern part of Bell Lake. It is a differentiated intrusive of monzonitic (?) composition. A pink leucosyenite outcrops on some of the islands in the middle of this complex. A pink, porphyritic quartz syenite underlies much of Vista Lake, as a crescent-shaped intrusive body, which is bordered by sediments (plus iron formation) on the west and south, and by lit-par-lit gneiss and migmatite on the east and north.

An elongate body of nepheline augite syenite (alkaline complex) trending northeast, underlies Sturgeon Narrows and the southeast shore of Sturgeon Lake (see O.D.M. Map 39b). It is approximately 9 miles in length and varies from 3/4 mile on the southwest to about 2½ miles in width on the north. The western-central area of the body is a white nepheline-bearing complex of medium-grained porphyritic to pegmatitic phases.

Two areas of abundant pegmatite dikes, up to 100 feet wide, were mapped. One area underlies the southwest portion of Harmon Lake where they intrude migmatite and lit-par-lit gneisses. The other area is at the termination of the volcanic-sedimentary belt in the vicinity of Mountairy Lake.
Quartz porphyry dikes cut the metavolcanics in the Sturgeon Lake-Sixmile Lake area. A large stock of quartz porphyry intrudes the metavolcanics in the area between Bell Lake and Darkwater Lake.

**Structural Geology** - No major faulting was recognized, although there are a number of prominent linears. Broad regional folding in a sinuous manner occurs in the central portion of the map area. This is apparent in the W-shaped configuration of the volcanic-sedimentary belt enclosed by the granitic rocks. Intense drag-folding accompanies a more gently folded anticlinal structure, plunging north-northeast and underlying the area between Hilltop and Mountairy lakes. The large pegmatite dikes have been intruded into this fold area.

**Economic Geology** -

**Gold** - The quartz porphyry stock, north of Bell Lake, offers possibilities for gold prospecting. The old Darkwater Mine (4 miles west of the map area) is located near the north contact of this porphyry body (previously called granodiorite at the mine).

**Sulphides** - Some pyrite-pyrrhotite gossans were noted in the area between Glitter, Post, Quest and Vista lakes. These would bear investigation.

**Iron** - Banded iron (magnetite) formation, of varied magnitude, has been traced intermittently northwest of Vista Lake; southwest between Quest and Vista lakes; southeast through Div Lake; east-northeast along the south shores of Sassafras, Gridiron, and Hilltop lakes, and continues south-southeast from Hilltop to Rude lakes. The iron occurs in metasediments along the contact with, and within, syenite and "syenitic" gneiss. Minor amounts of iron formation were noted in sedimentary rocks along Add, Willet, and Post lakes.

**Pegmatite** - Although nothing of economic importance was recognized in the huge pegmatite dike (quartz, feldspar, traces of muscovite, garnet and magnetite) areas of Mountairy and Harmon lakes, they may warrant closer examination.

**Alkaline Complex** - The Sturgeon Lake (Narrows) nepheline syenite and associated contact rocks warrant closer examination. Low radioactivity is associated with both the syenite and the contact rocks.
No. 5 BURCHELL LAKE AREA
DISTRICT OF THUNDER BAY

by

P. E. Giblin

Location of Area - The Burchell Lake map area lies near Kashabowie and is approximately 65 miles west of Port Arthur. It is bounded by latitudes 48°30' and 48°42' North, longitudes 90°30' and 90°42' West. Approximately 130 square miles were mapped.

Mineral Exploration - Prospecting has been carried out intermittently since the 1870's, with activity reaching a peak during the years 1953 to 1957. No field exploration was conducted in the area during the 1961 field season.

The property of North Coldstream Mines Limited is located within the map area. The mine has produced copper from 1960 to date. Predecessor organizations recovered copper in the years 1903, 1906-7, 1916-17, and 1957-58.

General Geology - Consolidated rocks are Precambrian in age. They consist of rhyolitic and basic volcanic rocks, iron formation, and greywacke, which have been intruded by gabbro, diorite, syenite, granite, and diabase.

Rhyolitic rocks occur in a band approximately 1 1/2 miles wide, which strikes northeasterly across the central portion of the map area, from the Wawiag River in the southwest, through Burchell Lake to the eastern border.

In other respects the distribution of rock types is very much as indicated by T. L. Tanton (1938, Map 432A, Geological Survey of Canada).

Structural Geology - Major rock units strike northeasterly and dip steeply north to steeply south. Meagre data suggest a general plunge to the northeast.

Schistosity is pronounced in the volcanic rocks. In general, schistosity strikes northeast and dips steeply north to steeply south.

Economic Geology - Copper and iron deposits occur within the area.

1Geologist, Ontario Department of Mines, Toronto.
Copper is produced by North Coldstream Mines Limited. During the 10-month period, March through December, 1960, the average milling rate was 870 tons per day, with an average grade of 2.35% copper.

The North Coldstream mine lies 3/4 mile east of Burchell Lake, approximately upon the southern border of the rhyolitic band at a point where the rhyolite-basic volcanic contact has been intruded by gabbro.

Lenticular orebodies occur within an irregular-shaped mass of rock previously, tentatively, identified as "chert", which lies between a footwall of basic volcanic rocks, and a hangingwall of gabbro and basic volcanic rocks.

The orebodies consist of disseminated to massive pyrite and chalcopyrite, which replace and fill fractures within the "chert". In general, orebodies strike easterly, dip about 85° N., and plunge easterly.

Recent work suggests the "chert" may be a rhyolite. Thus the rhyolitic rocks, particularly near their contacts with basic volcanic rocks, may merit further prospecting. Much of the southern border zone of the main rhyolitic band has been covered by detailed geophysical surveys, with, in some cases, a certain amount of drilling.

Iron occurs as magnetite in banded iron formations, intercalated with tuffaceous sedimentary rocks, north of Grouse and Squeers lakes. Exposed individual iron formation zones are lenticular, do not appear to exceed 300 feet in length, and do not exceed 60 feet in thickness. The iron formation zones constitute a minor portion of the tuff-iron formation assemblage.

No. 6 TOWNSHIPS 30 AND 31, RANGE XIX
DISTRICT OF ALGOMA

by

L. D. Ayres

Location of Area - The area is located on the east shore of Lake Superior within Lake Superior Provincial Park. Highway No. 17 passes through Township 30 and the centre of this township is approximately 115 miles north of Sault Ste. Marie.

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1 Graduate student, Department of Geology, Princeton University, Princeton, N.J., U.S.A.
Mineral Exploration - Prospecting and staking have been prohibited in the provincial parks since 1956. During the past five years, however, diamond drilling and geophysical work have been carried out on three properties staked before the present regulations came into effect.

General Geology - An Early Precambrian metavolcanic and metasedimentary sequence underlies approximately one-third of the map area. The metavolcanic rocks are mainly andesite and basalt but locally thick lenses of tuff and acidic to intermediate lava occur. The metasedimentary sequence consists of mudstone, siltstone, sandstone and conglomerate.

The intrusive rocks range from pyroxenite to granite. A gabbro stock, three miles in diameter, intrudes andesite and basalt in the eastern part of the area. Three small ultrabasic stocks intrude the metasedimentary and gabbroic rocks. Granitic intrusions are abundant and occur as syntectonic sill-like bodies and as post-tectonic stocks. In the western third of the area quartz-feldspar-biotite gneiss is intimately intruded by granitic rocks forming a migmatitic complex. Small stocks, sills and dikes of quartz-feldspar porphyry intrude all of the above rocks.

Diabase dikes are numerous and form two distinct sets trending N.45°W. and N.60°E.

Approximately 2,000 feet of Keweenawan amygdaloidal basalt outcrops along the shore of Lake Superior at Cape Gargantua. Two clastic units, 10 to 100 feet thick and composed of conglomerate and coarse sandstone, occur within the basalt sequence. A flow or sill of felsite, with a minimum thickness of 700 feet, overlies the basalt.

Structural Geology - The Early Precambrian metavolcanic and metasedimentary sequence is isoclinally folded. Pillows and graded bedding indicate that these folds are complex and that some refolding has occurred. The Keweenawan rocks dip toward Lake Superior due to post-depositional tilting.

Faults are numerous but there is no definite trend to the shearing. Many of these faults were active during, or later than, the Keweenawan.

Economic Geology - Gold, copper, nickel, manganese and iron are found in Townships 30 and 31.

In the northeastern corner of Township 30 a gold-bearing quartz vein trends N.45°E. along a fault zone in the gabbro. The quartz occurs either as a series of veins, forming a zone up to fifteen feet wide, or as a single vein but the total width of the quartz is rarely greater than five feet. This prospect is owned by Coutu Gold Mines, Limited.
Several other large quartz veins occur in the area but no mineralization was observed.

In the eastern part of Township 30 a copper-nickel showing, known as the Renner Property, is presently under option to Empire Explorations, Limited. Pyrrhotite, pentlandite and chalcopyrite are disseminated in the gabbro near the volcanic-gabbro contact. Veinlets of massive sulphide also occur.

Calcite breccia zones, containing narrow and discontinuous lenses of hematite, manganite and pyrolusite, occur in the Keweenawan felsite. These breccia zones have a maximum width of twenty feet and trend N.10 W. The manganite-rich lenses are rarely more than a foot wide and can be traced laterally only for short distances.

A few narrow quartz-calcite veins, containing minor bornite and chalcopyrite, are found along the shore of Lake Superior. These veins trend approximately N.40°W. and occur only in the sheared margins of diabase dikes.

Pyrite, pyrrhotite, chalcopyrite and magnetite are locally disseminated in the metavolcanic and metasedimentary rocks.

No. 7 GENOA, MARION AND HEENAN TOWNSHIPS
DISTRICT OF SUDBURY
by
A. M. Goodwin

Location of Area - The map area covered, which includes the Woman River iron range, comprises the northwest half of Genoa township, Marion township and the southeast quarter of Heenan township, Sudbury district. The centre of the area lies 110 miles northwest of Sudbury.

Mineral Exploration - Evidence of old trenching and drilling are common throughout the length of the iron range particularly west of Woman River. A test shaft was sunk in a small lead-zinc concentration near the northeast end of Rush Lake. The central and eastern portions of the range were explored recently by Stackpool Mining Company Limited. Geophysical and drilling investigations were recently conducted in the west portion by Joburke Gold Mines Limited.

1 Geologist, Ontario Department of Mines, Toronto.
With the exception of brief visits by prospectors of Anaconda Copper Company there was no staking or prospecting activity in the area during the 1961 field season.

**General Geology** - Assorted rhyolite breccias, tuffs and flows which constitute the oldest rocks in the area are conformably overlain by the Woman River iron formation. This formation ranges from a thick, extensive, banded chert-jasper-magnetite unit in the west, to thin, discontinuous, chert-siderite-sulphide units in the east. In general, the iron content of the iron formation increases towards the base, or lower side. The iron formation is conformably overlain by andesitic flows and tuffs, the former containing numerous pillow structures. The stratigraphic sequence presented in previous geological reports has thereby been reversed.

The volcanic-sedimentary complex has been intruded by a) granite sills, stocks and large regional masses, and b) younger diorite masses. In addition, numerous diabase dikes are present in the older rocks.

**Structural Geology** - The rocks have been folded about an east-west trending, steeply west plunging anticline. The north limb, on which most of the iron formation lies, has been extensively overturned to the north. Thus, rock units commonly dip to the south but have their stratigraphic tops to the north.

Northwesterly trending, steeply dipping faults with left-hand horizontal offsets are common.

**Economic Geology** - Economic aspects of the area pertain to iron and base metal mineralization in the iron formation and to sulphide-bearing fracture zones in diorite.

- **Iron** - Zones of fine-grained magnetite of varying purity and possible significant dimension are present along the south side of a large hill of iron formation situated in Heenan township 1 1/2 miles west of the junction of Opeepeesway and Woman Rivers.

A lens of good grade siderite-pyrite material ranging up to 60 feet wide and roughly 1,000 feet long occurs in Marion township on the south side of a banded chert unit 3/4 mile east of Rush River.

- **Lead-Zinc-Copper** - Scattered traces of lead-zinc-copper sulphides were noted in the iron formation, particularly east of Rush River. A galena-sphalerite concentration in iron formation near Rush Lake to the northeast was previously prospected by trenching, drilling and shaft sinking. Nothing of equivalent encouragement was observed in the map area.

- **Gold** - A northwesterly trending fracture zone containing disseminated pyrite over a width of 6 to 10 feet is exposed on the east shore of Rush River 3,000 feet north of Rush Lake.
A grab sample from this zone contains traces of Au, Cu, Pb and Ni. Significant concentrations may be present in this zone or in similar zones nearby.

No. 8 ESTEN AND SPRAGGE TOWNSHIPS

DISTRICT OF ALGOMA

by

J. A. Robertson

Location of Area - In 1961 the writer mapped the townships of Esten and Spragge and the west half of the Serpent River Indian Reserve (I.R. 7). The area lies half-way between Sudbury and Sault Ste. Marie and is crossed by the Trans-Canada Highway (No. 17) and the C.P.R. (Sault Branch). Highway No. 108 connecting Elliot Lake with Highway No. 17 follows the eastern boundary of the area.

Mineral Exploration - During the Blind River uranium boom most of the area was staked and explored. No important uranium deposits were found but attention was drawn to two copper showings. One of these, the Pater showing, is now in production; the other is the Twin Lakes showing.

During the 1961 field season there was considerable interest in the known copper showings in the vicinity of the North Shore of Lake Huron. There was also some exploration for gabbro (trap rock) suitable for road-aggregate where located close to the navigable waters of Lake Huron.

General Geology - Algoman granitic rocks underlie the whole area except for a mile-wide strip running along the southern part of Spragge township. Keewatin (?) sedimentary rocks are found in the northeast corner of Esten township. The granitic area is crossed by numerous diabase dikes.

Huronian sedimentary rocks, dipping steeply south, are exposed in a belt, a half-mile-wide located north of Highway No. 17. They consist of the Mississagi and Bruce formations which are overlain unconformably by the Gowganda formation. The sediments were deposited from the northwest and the tops of the beds face south.

A strip south of the highway, half a mile in width, is underlain by metasedimentary rocks of the Sudbury Group. The beds dip steeply south and tops normally face south.

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1 Geologist, Ontario Department of Mines, Toronto.
In the western part of Esten township chlorite- and hornblende-bearing rocks, possibly of volcanic origin, underlie the sedimentary rocks.

The Indian Reserve is underlain by the Cutler granite, formerly considered to be Post-Huronian in age, but now believed to be Algoman. Two northwest-trending olivine diabase dikes of doubtful age cut the Cutler granite.

**Structural Geology** - The area straddles the Chiblow anticline of the Blind River reverse-S structure. The area is crossed by two major fault systems. The Murray Fault follows Highway No. 17 across the southern part of Spragge township. Some copper showings in the North Shore District are located close to the fault. The central part of Esten township is crossed by a series of east-striking, strike-slip faults. These faults seem to have formed late in the tectonic history and probably had no influence on the localization of copper deposits.


In 1954 surface exploration by Pater Uranium Mines Limited revealed chalcopyrite and pyrrhotite in a silicified shear zone in Sudbury Group volcanic (?) and sedimentary rocks south of the Murray Fault east of Spragge station. Drilling and underground development were carried out but operations were suspended in 1957.

Pronto Uranium Mines Limited (now Rio Algom Mines Limited, Pronto Division) obtained the property in August 1959. In early 1960 the mine was re-opened and copper production was commenced in January, 1961; the Pronto mill was modified and flotation cells were installed.

By 31 August 1961 the company announced that copper concentrate totalling 4,347,252 lbs. had been trucked from the Pronto mill to Sault Ste. Marie. Two shipments (approximately 5,000 wet tons each and grading 21% and 22.35% copper) have been shipped from Sault Ste. Marie to foreign ports.

The company has recently informed the writer that diamond-drilling and underground development indicate reserves of one million tons grading 2.00% copper, remain above the 2,150-foot level.

Rio Algom Mines Limited (Pronto Division) have announced their willingness to mill suitable ores delivered to Pronto mill on a customs basis.
b) Cadamet Mines Limited: Twin Lakes showing

Chalcopyrite-quartz stringers and disseminations were found in an east-striking silicified chlorite schist zone in Algoman granite northwest of Twin Lakes in south central Esten township. The showing was trenched and 25 drill-holes totalling 7,780 feet were drilled in 1956 by Federal Kirkland Mining Company Limited over a strike-length of 380 feet and to a depth of 400 feet. Reserves were calculated by the company at 76,900 tons grading 1.73% copper over a width of 8.04 feet. The property is now owned by Cadamet Mines Limited.

No. 9 HYMAN AND DRURY TOWNSHIPS

DISTRICT OF SUDBURY

by

K. D. Card¹

Location of Area - Part of Hyman and all of Drury township was mapped in detail during the 1961 season. The area comprises about 42 square miles, located approximately 30 miles west of Sudbury.

Mineral Exploration - The area includes part of the Sudbury nickel irruptive, and therefore it has been intensively explored for nickel and associated metals, especially by the International Nickel Company of Canada Limited and Falconbridge Nickel Mines Limited. No mining is being carried on at present although the Chicago mine and the Worthington mine have produced in the past.

Extensive exploration for uranium was carried out in the area in the mid 1950's and several bodies of low-grade uranium and relatively high thorium mineralization were outlined.

Falconbridge Nickel Mines is currently diamond-drilling in northeast Drury township near the nickel irruptive contact and diamond-drill exploration is planned for the showings staked by C. Grimsell in central Drury.

General Geology - All the consolidated rocks in the region are of Precambrian age. The map area is situated on the contact between granitic and metavolcanic rocks to the north and metasedimentary rocks to the south. The granite-metavolcanic complex is of Pre-Huronian age and the

¹ (1961) Geologist, (part time) c/o Department of Mines, Toronto. (1962) Graduate student, Department of Geology, Princeton University, Princeton, N.J., U.S.A.
metasediments are possibly Huronian. An unconformity separates the granitic rocks from the younger metasediments but the nature of the contact between metavolcanics and metasediments is very obscure.

The metavolcanic complex consists of an assemblage of greenstones, amphibolites, "hornblende syenite" and porphyritic and amygdaloidal basalts. Granitic rocks, including quartz monzonite and granodiorite, intrude this complex.

The Huronian (?) metasediments consist of a well-bedded sequence of quartzites, conglomerates, argillites and greywackes, the latter being now represented by staurolite, biotite, garnet and sericite schists.

Sills and dikes of hornblende metagabbro with minor remnants of fresh pyroxene gabbro, intrude all older rocks. The Sudbury nickel irruptive intrudes the granite-metavolcanic complex in northeast Drury township. It is divisible into an outer basic portion, which includes massive to foliated, light grey diorite and dark gabbro, and dioritic and gabbroic phases with abundant pink feldspar (noritic phase), and an inner acid part, consisting of pink aplitic phases and darker phases with abundant mafics and pink feldspar (granophyric phase). Several large areas of polymict breccia with a gabbroic matrix are present near the contact.

The "Worthington Offset" a narrow, northeast-trending, sinuous breccia dike cuts metagabbro and metasediments in the southeastern part of Drury township.

Structural Geology - Structural trends, including foliation in granite and metavolcanics, bedding, cleavage and schistosity in the metasediments, and a major fold axis are all more or less east-west. There are two major fault directions, one approximately N.40°E. and the other approximately N.25°E. As far as can be determined, these faults all dip steeply to the southeast and are probably high-angle reverse faults. Movement on these faults has apparently been repetitive. Small east-west and north-west shears are present.

Economic Geology - The most important metals found in the area are nickel and copper. Abundant disseminated to massive sulphide mineralization, mainly pyrrhotite (nickeliferous) and chalcopyrite are found along the norite contact, especially in brecciated areas and in the Worthington Offset. Numerous, but small, zones of mineralization are associated with the metagabbro especially where these bodies are faulted. Here, also, the mineralization consists of massive to disseminated pyrrhotite, pyrite and chalcopyrite.
A slightly different type of mineralization occurs on the claims of C. Grimsell in central Drury township, where silicified metasediments in a shear zone contain disseminations and fracture-fillings of chalcopyrite only.

Numerous uranium-thorium occurrences were found in oligomictic quartz-pebble conglomerate near the base of the Huronian (?) sequence but these are all low-grade and quite discontinuous.

No. 10 AURORA, EDWARDS, CALVERT, TEEFY, DUNDONALD, CLERGUE, WILKIE AND COULSON TOWNSHIPS

DISTRICT OF COCHRANE

by

R. M. Ginn

Location of Area - The townships listed above were mapped during the 1961 field season. These form a block shaped like an inverted "T", with the town of Iroquois Falls in the stem. Dundonald township, the southwesternmost of the group, is 27 miles by motor road from Timmins. Coulson township, the southeasternmost of the group, is 10 miles by motor road to the northeast of Matheson.

Mineral Exploration - The Alexo Nickel mine, on the boundary between Dundonald and Clergue townships, produced nickel during the two World Wars, and has been responsible for sporadic exploration of the surrounding area for a number of years. A number of generally low values in gold were obtained on the Montclerg and Wilcar properties in Clergue, Walker, and Wilkie townships during the 1930's and 1940's. Some drilling was carried out in 1950 to investigate an asbestos-bearing ultrabasic mass in Calvert township. A number of old pits on quartz veins and small gossans indicate rather thorough prospecting of outcrops across the whole area. Considerable underground development work was done sporadically from 1918 to 1940 at the Aljo mine in the southern part of Coulson township.

General Geology - The area is underlain by volcanic rocks of Keewatin age, with a number of narrow bands of interflow greywacke and siltstone, locally intruded by basic, ultrabasic, and acid rocks. Northerly trending quartz diabase dikes are common. A northeasterly trending olivine diabase dike, the youngest Precambrian rock in the region, crosses the southeastern corner of Coulson township. The volcanic rocks are for the most part metabasalts, commonly well-pillowed. Two

1 Resident Geologist, Ontario Department of Mines, Timmins.
distinctively porphyritic pillowed flows served as excellent marker strata, and one was traced for a strike length of 17 miles from Clergue to Coulson township.

Structural Geology - The flows and almost horizontal fold axes in the southern part of the area trend in a generally east-west direction, or within 20° of east-west. In Calvert, Aurora, Edwards, and Teefy townships, however, the flows are folded about northerly-trending fold axes. A dominant structural feature is the Pipestone fault, trending east-west, at the extreme southern part of the area. It is in this fault zone that the Montclerg and Wilcar gold prospects were investigated. A number of northeasterly and northerly trending faults were observed or inferred in Clergue and Coulson townships.

Economic Geology - Many quartz-calcite-epidote-axinite veins were observed in the southern part of the area, and at Twin Falls in Teefy township. These have not yielded assay values of economic interest. Several quartz-tourmaline veins in Teefy township at Iroquois Falls and quarta-carbonate-arsenopyrite veins in southwestern Coulson township may be of interest. Samples taken by the writer from these veins have not as yet been analysed.

The change in trend of structure from northerly north of Iroquois Falls to east-west south of Porquis Junction is interesting. No outcrops were found in the intervening area.

No. 11 CATHARINE AND MARTER TOWNSHIPS
DISTRICT OF TIMISKAMING

by

James A. Grant

Location of Area - Catharine and Marter townships lie immediately north of Englehart and about 15 miles southeast of Kirkland Lake. The map-area is traversed by Highway No. 624.

Mineral Exploration - Catharine lies within the Boston-Skead gold area, and has been extensively prospected since about 1914. The peak of mineral exploration was in the late twenties when several small mines were active. Recently there has been considerable staking and work on claims including geophysical and geological surveys and diamond-drilling. In 1961 the property of Cathroy Larder Mines, Limited, located at the north boundary of Catharine township, was optioned by Mirado Nickel Mines, Limited, and the underground workings of the Cathroy Larder gold mine were

1 Graduate student, California Institute of Technology, Pasadena, California, U.S.A.
re-examined. The little prospecting attention that has been paid to Marter township was largely in the northern part, the southern part being underlain mainly by fluvioglacial deposits.

**General Geology** - The area is largely underlain by Keewatin volcanic rocks. To the west lies the Round Lake granite batholith, with its margin convex to the east. In general conformity with the border of this intrusive are (a) banded tuff, (b) basic to intermediate lavas and intrusives, (c) intermediate to acid fragmental rocks, and (d) coarse-grained volcanic rocks.

These Keewatin rocks are intruded by a variety of small acid and basic dikes. In the southeastern part of Marter the Keewatin rocks are overlain unconformably by Gowganda sedimentary rocks, with which Keweenawan diabase is associated.

**Structural Geology** - The Keewatin volcanic rocks form part of an anticline plunging steeply to the east, with the Round Lake batholith as a core. Several faults are found, these are radially arranged with respect to the batholith. Strong shearing is intermittently found in a zone extending north and south from the junction of the Misema and Blanche rivers.

**Economic Geology** - Gold has provided the major prospecting interest in the area. It generally occurs in quartz or quartz-carbonate-sulphide veins associated with shearing in the volcanic rocks. Magnetite is found in the small occurrences of iron formation associated with the banded tuff adjacent to the Round Lake batholith and also in a thick gabbro sill (?) about 3/4 mile west of the Misema River in Catharine township.

There is a tendency for mineralization to be associated with the intermediate to acid rather than with the basic volcanic rocks. A zone of shearing favourable for mineralization runs from the northwest corner of Catharine township towards the southeast corner. This lies 1/4 to 1/2 mile southwest of the contact between the acid and basic groups of volcanic rocks.

A band of serpentinized peridotite occurs in the northeast corner of Catharine township; traces of asbestos have been noted in this rock formation.
Location of Area - Tudor and parts of the southern border of Limerick township, Hastings County, were mapped during the 1961 field season. The centre of the map area is about 15 miles north of Madoc.

Mineral Exploration - Prospecting, staking, exploration, and mining in the region have been carried out periodically from the 1860's to the present. Some mineral production, chiefly iron and gold, occurred between the 1880's and 1910. Small ore tonnages found at all the existing workings have discouraged their further exploration and development. During the 1961 field season, 6 claims were staked in the area.

General Geology - Except for a small outlier of Paleozoic rocks in the southeast corner of Tudor township, the bedrock formations are of Precambrian age.

Quartzitic and argillaceous limestones, sandstone, and acid to basic volcanic rocks, all metamorphosed to low or intermediate grades, predominate in the area. A prominent belt of clastic rocks, which overlies limestone and volcanic rocks in northeastern Tudor township, contains numerous conglomerate layers that resemble "Hastings-type" conglomerates.

The sedimentary and volcanic rocks have been intruded and metamorphosed by a variety of igneous rocks ranging in composition from gabbro to granite. Small gabbro stocks and dikes associated with fine-grained syenite are common in the northern part of the area. Many of the igneous bodies appear to be associated with anticlinal structures and are complex, consisting of two or more phases.

Structural Geology - The predominant structural trend in the area is northeasterly. Two major folds occur in the southern half of the area, both of which appear to have undergone a second period of folding. The plunge of both folds is north to northeast. At least one major fold occurs in the north half of the area where structures generally plunge southwest.

Although many minor faults occur, no major faulting is apparent. The limestones have yielded to pressure by shearing and flowage, with flowage being best developed in the vicinity of intrusions.

1 Graduate student, Department of Geology, Princeton University, Princeton, N.J., U.S.A.
Economic Geology - Gold, silver, lead, zinc, copper, nickel, iron, and arsenic mineralization are present in the area.

Except for copper, nickel, and iron, all the mineralization occurs in quartz and quartz-carbonate veins. Most of the veins are narrow and discontinuous and where sampled for assay, they commonly show only traces of the elements listed. The largest mineralized quartz vein found in the area is at the Craig mine in southeastern Tudor township, where well-mineralized grab samples collected by the writer from each of three dumps assayed from 0.04 oz. per ton to 0.11 oz. per ton gold, trace to 1.95 oz. per ton silver, and 0.17% to 0.48% copper. Material from the quartz vein collected by the writer in a trench, about 200 feet south of the mine workings, assayed 0.65 oz. per ton gold, 0.41 oz. per ton silver, and 0.76% copper. Chalcopyrite, pyrite, and pyrrhotite are disseminated throughout the deposit.

Galena, barite, pyrite, and chalcopyrite are common in veins cutting the metasediments in many parts of Tudor township. Most of the veins appear to fill tension fractures and pinch out at shallow depths. Some of these veins assay low in silver and zinc.

Altered dioritic to gabbroic rocks in southeastern Tudor township commonly contain disseminated pyrite and pyrrhotite, and in places chalcopyrite. Grab samples of the best mineralized material found by the writer show upon assay, trace amounts of gold, trace to 0.16% copper, and 0.02 to 0.48% nickel.

Iron deposits, consisting of magnetite and magnetite-ilmenite, occur in contact aureoles developed in the limestones or as segregation products of gabbro. The deposits are too small to be of economic value at present.

No. 13 FIELD WORK, 1961

by

D. F. Hewitt

A. MADOC-GANANOQUE AREA

Two months were spent completing a geological map of the Madoc-Gananoque area for publication on the scale of two miles to the inch. This sheet, which adjoins the Haliburton-Bancroft area, Map 1957B, covers an area of 3,700 square miles lying between 76° and 76° 40' west longitudes and 44° 15' and 45° north latitudes.

1 Senior Geologist, Ontario Department of Mines, Toronto.
The principal mining activity is in the Madoc area where talc and marble deposits are operated. A minor amount of mica mining was carried out in the Sharbot Lake and Sydenham areas. Exploration for iron was continued in the Westport area.

B. SAND AND GRAVEL INDUSTRY

The latter two months of the field season were spent in examination of over 200 sand and gravel operations in central and eastern Ontario. The sand and gravel industry in Ontario has expanded to yield an annual production of over $40,000,000 and there is an increasing need for information on the location, characteristics, quality and quantity of gravel available in Ontario, particularly in the vicinity of urban areas.

C. OTHER PROJECTS

In addition to these two principal projects, visits were made to asbestos and salt mines and limestone quarries.

No. 14 PLEISTOCENE GEOLOGY

by

P. F. Karrow

A. GUELPH AREA

Location of Area - Lat. 43°30' to 43°35' N., Long. 80°00' to 80°30' W.

Mineral Exploration - Several gravel operations produce from outwash or spillway gravels.

General Geology - Bedrock consists of reefy dolomites of the Guelph and Amabel formations and dolomite and shale of the Salina Formation. Pleistocene deposits consist of sandy Wentworth till in the Galt and Paris moraines to the east and three tills to the west along the Grand River. Outwash spillway gravels occur along the Grand and Speed rivers and as lenticular sheets between drumlins north of Guelph. The field checking of 500 water wells revealed the presence of a buried bedrock valley under the city of Guelph and another near Elora.

Structural Geology - Reef ridges in the dolomites trending north-south partly control the surface and subsurface drainage. The latter has developed caves and sinkholes along joints which are believed to carry a significant portion of the water supply of the area.

1 Geologist, Ontario Department of Mines, Toronto.
Economic Geology - There are large reserves of gravel in the area in the form of kames (associated with the end-moraines), eskers, and outwash plains. The concentration of industry in the urban areas has created water-supply problems. Information on the buried bedrock valleys and subsurface drainage through caverns may ease the water situation.

B. GRAVEL INDUSTRY

Location of Area - Southwestern Ontario west of 80 degrees west longitude.

Economic Geology - 65 gravel localities were visited to obtain information on the nature of deposits, types of products, and processing equipment. Pebble counts were made for each gravel locality.

C. SCARBOROUGH AREA

Location of Area - All of Scarborough township, and parts of Pickering and Markham townships contained in Highland Creek and Agincourt 1/25000 topographic sheets.

Mineral Exploration - Sand and gravel were produced from beach deposits and buried kame and outwash deposits. Most known deposits are nearing depletion.

General Geology - Bedrock is shale of the Collingwood, Blue Mountain, and Dundas formations. Illinoian till and bedrock are overlain by interglacial deltaic deposits (Don beds and Scarborough beds) about 150 feet thick. These are followed by up to 200 feet of Wisconsinan tills (four distinct sheets and interbedded sands and clays. Glacial Lake Iroquois cut a prominent bench about 180 feet above Lake Ontario and deposited large masses of sand, gravel, and some clay. Recent stream dissection has cut deep valleys.

Economic Geology - Beach deposits of Lake Iroquois are almost worked out. Kame deposits buried under till of the last ice advance are the most promising sources of gravel at present. However, they are difficult to locate. Minor placer gravel deposits along present streams are worked occasionally as they accumulate. The large mass of clay in the Scarborough beds is exploited for ceramic products outside the area and presumably would be suitable within the area as well. The chief hindrance to its exploitation is the great thickness of overburden in most places.
A. THE STRUCTURAL CLAY PRODUCTS INDUSTRY

As the first stage in a general review of Ontario's ceramic industries the writer completed a survey of the producers of structural clay products during the 1961 field season.

The present work has included descriptions of the individual plants and their equipment, but the emphasis has been on detailed studies of the raw material. Vertical sections of individual pits have been carefully measured and described. About 150 samples have been collected for analytical and ceramic testing.

The total value of structural clay products manufactured in 1960 was close to twenty-two million dollars. Two-thirds of this was due to the burned-clay brick industry which at the present time has an annual capacity in excess of 350 million brick. (Actual production has been substantially lower in the last several years due to a slower rate of construction activity.) Drain tile for agricultural purposes has been a strong market in recent years, due in part to farm education programs and low-interest government loans. Current rate of production is some 50 million tile annually valued at $3 million. Sewer pipe, flue-linings, and structural tile complete the list of principal structural products.

In 1961, 57 plants were manufacturing heavy clay products (exclusive of pottery and artware) from domestic clays and shales. The Queenston and Dundas shales of Ordovician age in the Toronto-Hamilton area were the major sources for brick manufacture, and 17 plants representing about 90 per cent of total brick production were located in the area. Thirty-one plants, largely concentrated in southwestern Ontario and using various surface clays of Pleistocene and Recent age, accounted for most of the drain tile production.

From the ceramic point of view Ontario has not been endowed with widespread resources of high-quality shales and clay. Materials in common use are of the high-lime variety, with the result that firing behaviour is critical. A variable content of soluble salts in the shales has made the control of efflorescence on face brick a difficult problem. The occurrence of limestone pebbles in or associated with many of the tile clays

1 Geologist, Ontario Department of Mines, Toronto.
has been a potential threat to the soundness of the ware. It is a tribute to the industry that products with a high standard of quality have been consistently produced from these materials.

With the present survey as a background of industry practice and requirements, future programs are planned to evaluate clay and shale resources not presently being utilized. In these connections facilities have been provided for a limited amount of ceramic testing at the Provincial Assay Laboratories in Toronto.

B. VERMICULITE

In response to a continued public interest in the properties and uses of vermiculite, the writer spent several weeks examining the more important showings in the province. Four principal areas were visited:

1) North Burgess township, County of Leeds.
2) Cavendish township, County of Peterborough.
3) Township 107, District of Sudbury.
4) Butler township, District of Nipissing.

In the first three areas vermiculite is widely distributed in metamorphosed Precambrian carbonate rocks or associated pyroxenites. In Butler township and in some parts of North Burgess township vermiculite occurs in altered dark gneisses. In some cases association with later syenite or dioritic intrusives is obvious. In others the vermiculitization is on a more regional scale. Always it can be seen that the vermiculite is an altered mica, commonly biotite or phlogopite. Usually the alteration is incomplete however, with the result that the exfoliated material may vary in bulk density from place to place, so influencing its value for insulation or light-weight structural applications.

Except for zones of limited extent the Ontario occurrences are generally finer grained and of lower tenor than commercial deposits in U.S.A. and Africa. Imported vermiculite is exfoliated at plants in Ontario but no domestic deposits are presently being worked.
The principal activities of the Resident Geologist at Port Arthur during the field season of 1961 were in connection with the preparation of: (1) a final report on the lithium deposits in the Georgia Lake area north of Nipigon; and (2) a guidebook, intended primarily for amateur geologists, lapidaries, and tourists, explaining features of geological interest along Highways No. 61, No. 17-11, and No. 17, which skirt the Lake Superior shoreline between Pigeon River and Sault Ste. Marie. Examinations of several mining properties also were carried out. Of these properties the ones which merit comment herein are:

1. the Ogema lead-zinc mine;
2. the West gold deposit; and
3. the Giles lithium deposit.

The Ogema lead-zinc mine was first opened in 1890, to investigate a strong quartz-vein zone in mica schist, along and close to the contact with granitic rocks. It occurs in mining locations E 80 and E 157, Dorion township, Thunder Bay district. It is accessible by a 3-mile wagon road, which extends westward from the Ouimet Canyon motor road, at a point about 6 miles west of the Ouimet railway crossing on Highway No. 17-11.

In the spring of 1961 the property was optioned by Sogemines Development Company Limited. This company undertook a program of detailed mapping and diamond drilling. The vein system, which strikes N.60° - 75° E. and dips 75° S., was traced intermittently in surface exposures for about 2 miles. It was tested by two drill holes. One hole was bored to intersect the vein below the shaft, at the bottom of which high grade ore was reported to occur; the second hole was drilled to cut the deposit about 100 feet to the east of the shaft. Nothing of commercial significance was encountered.

The West gold deposit is found in Houck township, Thunder Bay district. It is located at the Control dam being constructed by the Ontario Department of Public Works on the Kenogamiisis River, and is reached by a 6-mile motor road which branches from Highway No. 11 at a point 12 miles east of the Geraldton turn-off. The deposit was discovered during the construction of the dam and was staked by A. West early in 1961. It is a narrow quartz vein, not more than 6 inches in width, in a wide zone of chlorite schist. This vein
strikes N.55⁰E. for 125 feet and dips 70⁰SE. It is well mineralized with pyrrhotite, pyrite, and chalcopyrite, and is said to contain visible gold. According to C. Penney¹

¹ C. Penney, personal communication.

assays of samples indicate grades of 0.3 - 0.8 ounces of gold per ton.

The Giles lithium deposit is located in the Georgia Lake area, and crops out on Treasure Island about midway along, and close to the south shore of, Jean Lake. The deposit, a spodumene-bearing pegmatite dike, lies in biotite gneiss. It strikes N.85⁰E. for a known length of 600 feet and dips 70⁰ - 80⁰S.; and it ranges from 13.5 - 50.0 feet in true width, averaging about 25 feet. Surface sampling is reported to have indicated the 600-foot length to average 1.25 per cent lithia.² In June, 1956, the deposit was acquired by Towagmac


Explorations Limited, and a program of diamond drilling was initiated. Five holes, aggregating 2,406 feet, were bored. Of these, it is interesting to note, only one intersected material containing any significant amount of spodumene.

RESIDENT GEOLOGIST'S OFFICE, KIRKLAND LAKE

by

W. S. Savage

During the field season of 1961 the Resident Geologist at Kirkland Lake visited properties in the Timagami, Matachewan, Boston Creek, Englehart and Larder Lake areas.

Several visits were made to Timagami Island in Phyllis township where Temagami Mining Company Limited operates a small copper mine. Current underground exploration and development work was investigated in May and it was evident that additional space for the disposal of tailings would soon be required. The mill on the Island produces copper concentrates and is limited by Government order to processing not more than 150 tons of ore per day. On June 6 the writer was a member of a committee consisting of representatives of several Departments of the Provincial Government who visited Timagami Island to investigate the natural basin in the south half of the Island which lies
outside the lease holdings of Temagami Mining Company and which the company had applied for as a tailings disposal area.

A number of small copper showings uncovered by prospecting were examined by the Resident Geologist on Timagami Island in July. These showings occur in Keewatin rhyolite on Crown land south of Temagami Mining Company's holdings (Lease 11446).

The writer again visited Timagami Island in October to examine and report on certain new copper showings specifically indicated on a map accompanying Temagami Mining Company's application for the mining rights of all that part of the Island south of the company's Lease 11446. The examination was made on October 17th and a report confirming the presence at several locations of chalcopyrite, an ore mineral of copper, was forwarded to the Deputy Minister of Mines.

The former Ryan Lake mine in Powell township was visited in April. This property is now held by Min-Ore Mines Limited who leased it to International Ranwick Limited (which later became International Molybdenum Mines, Limited) in 1958. A small tonnage of copper and molybdenite was produced by International Ranwick, but eventually the option was dropped and the property has been idle since 1959.

Early in June a visit was made to the property of Lake Beaverhouse Mines, Limited in Gauthier township on which is located the old Argonaut mine. The core from several diamond drill holes was examined. The exploration program on this property was being carried out by Augustus Exploration Limited.

The former Cathroy Larder mine close to the south boundary of McElroy township was also visited in June. This property is under option to Mirado Nickel Mines Limited who have also acquired a large group of adjoining claims. The de-watering of the mine had been completed and a program of detailed underground remapping and sampling was underway.

Another property visited in June was the Ethel Copper prospect in James township where the core from several holes recently diamond drilled was examined. The "vein" consists of irregular stringers and lenses of calcite mineralized with chalcopyrite, bornite and specular hematite which occur in a zone of fracturing and alteration in Nipissing diabase. An adit was driven to the west with a 20° dip on this vein zone in 1960. To June 16, 1961 eight angle holes dipping from the north had been drilled on six sections 100 feet apart to the west of the adit.

The property of Keemo Mines Limited in the southeast corner of Chamberlain township was visited early in July. The holdings of Keemo Mines consist of the former Handley-Gerlach ground and the adjoining Ruckwood property. On the
latter the old trenches across the north-trending main vein had been cleaned out and new trenching to the east had exposed another quartz vein parallel to the main vein. The latter is a wide quartz vein with spotty mineralization consisting chiefly of pyrite with some chalcopyrite and galena. It was sampled by Kerr-Addison Gold Mines Limited in 1949 and by Noranda Mines, Limited in 1950. A diamond drilling program was being considered by the directors of the company.

Strathagami Mines Incorporated at Timagami was visited on July 14th. Strathagami is the wholly-owned subsidiary of Cleveland-Cliffs Iron Company to take over and develop the Iron Lake and Timagami iron ranges. The drilling program to outline and determine the grade of the two iron ranges was nearing completion and a 150 ton bulk sample was being extracted from the Timagami range.

Further details regarding the above mentioned properties are on file at the writer's office.

Considerable time was spent in consultation with prospectors and other mining men who visited the Kirkland Lake office to examine the records on file and discuss the geology and economic potentialities of properties in the district.

RESIDENT GEOLOGIST'S OFFICE, COBALT

by

Robert Thomson

During the year the Resident Geologist completed five additional reports describing the geology and mining properties in the Cobalt area. These were issued in the preliminary report series as P.R. 1961-2, 1961-3, 1961-4, 1961-6, and 1961-7.

No specific area was mapped by the Resident Geologist at Cobalt during the 1961 field season. Routine examinations were made of properties under development.

To the present there have been four highly productive silver-cobalt camps in the Timiskaming Silver-Cobalt Area. These are the Cobalt Camp, Miller Lake Basin-Gowganda Camp, Casey-Harris Townships Camp, and South Lorrain Camp. The first three have been active in recent years and in and near them the usual prospecting and exploration was carried on in 1961. The South Lorrain Camp has been dormant in recent years but in 1961 an ambitious program of exploration was started at the Keeley-Frontier Mines Limited in the formerly most productive part of the Camp. This is possibly the most significant exploration at present in the Timiskaming Silver-Cobalt Area.