PAPER 70-50

ROCKS AND MINERALS FOR THE COLLECTOR

Ottawa to North Bay, Ontario; Hull to Waltham, Quebec

Ann P. Sabina

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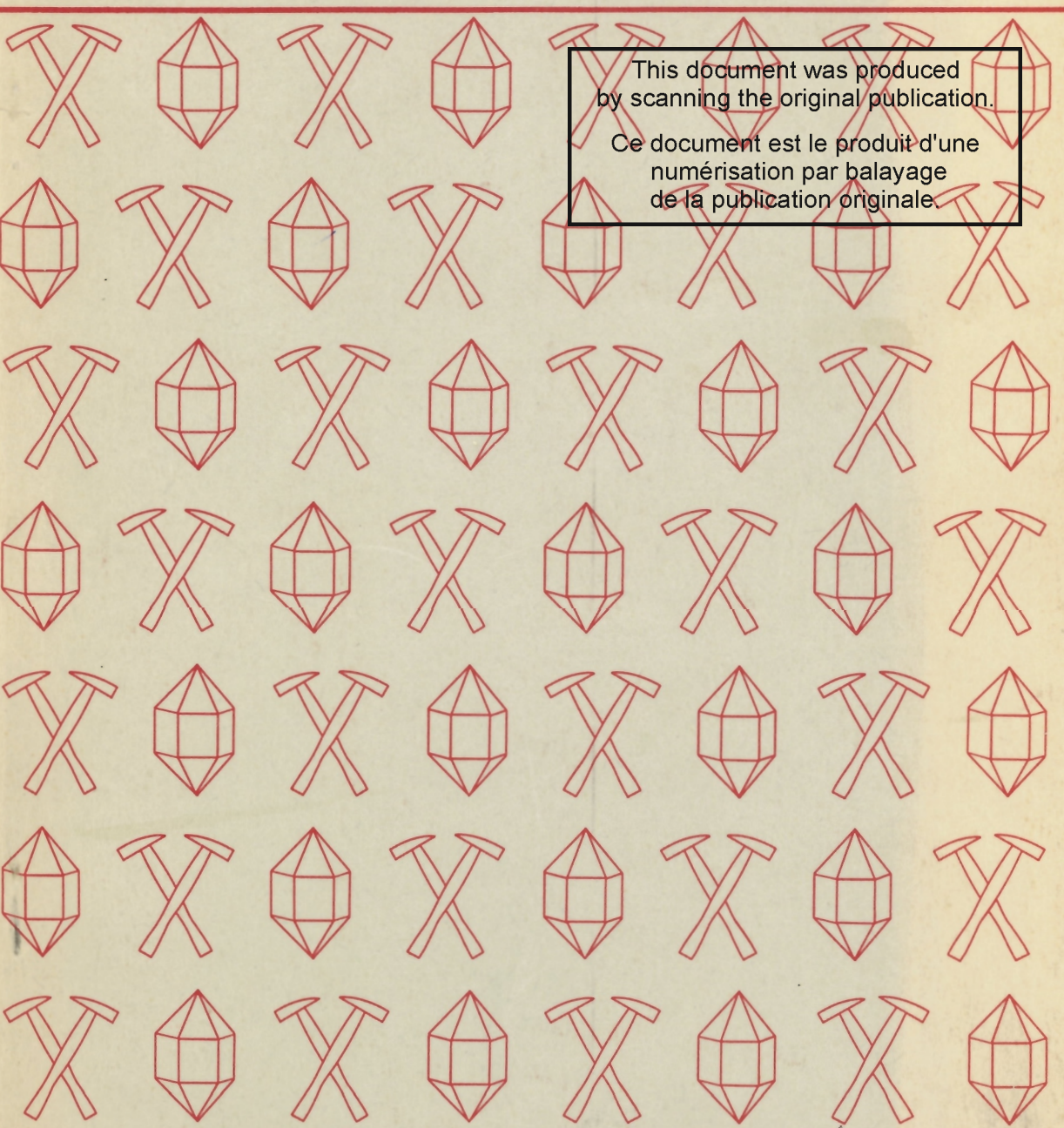

DEPARTMENT OF ENERGY, MINES AND RESOURCES

CANADA

GEOLOGICAL SURVEY

OF CANADA

PAPER 70-50

ROCKS AND MINERALS FOR THE COLLECTOR
OTTAWA TO NORTH BAY, ONTARIO;
HULL TO WALTHAM, QUEBEC

Ann P. Sabina

W. L. DAVISON
GEOLOGICAL SURVEY
OTTAWA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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ABSTRACT

Occurrences of minerals, rocks, and fossils are described from about two hundred easily accessible localities on either side of the Ottawa River from Ottawa - Hull to North Bay. They are reached by following Highway 17 in Ontario and Highway 8 in Quebec.

Most of the collecting localities are in Renfrew County, Ontario. A wide variety of minerals are found in this area, and some localities are known for the museum-type specimens collected from them. The earliest mines were the apatite and iron mines that were operated in the 1880s. Other deposits that were subsequently worked include corundum, molybdenite, zinc, celestite, garnet, pyrite, beryl, marble, limestone, feldspar, rare-element minerals, and dolomite. The only mine currently in operation is that of Dominion Magnesium Limited at Haley Station.

In the Nipissing District there are numerous former feldspar mines as well as deposits of kyanite, garnet, muscovite, niobium, and brucite. Some of these deposits are accessible only by boat.

The region north of the Ottawa River was formerly mined for mica, apatite, uranium, lead-zinc, feldspar, molybdenite, and limestone. The Hilton iron mine is the only current producer. In addition, there are occurrences of brucite, pyroaurite, szájbelyite, cordierite, and asbestos.

Minerals and/or rocks that could possibly be used for lapidary purposes include: feldspar (peristerite, sun-stone), rose quartz, graphic granite, and corundum from Renfrew County; feldspar (peristerite, amazonite), jaspilite, and graphic granite from the North Bay area; peristerite and cordierite from the Quebec side of the Ottawa River. Ordovician fossils may be collected from numerous road-cuts and quarries in the Ottawa-Pembroke and Aylmer areas.

Frontispiece: Spinel-bearing crystalline limestone, Ottawa River at Chenaux Dam. The main road logs parallel the Ottawa River in Ontario and Quebec. (GSC photo 153191)

ROCKS AND MINERALS FOR THE COLLECTOR:

OTTAWA TO NORTH BAY, ONTARIO; HULL TO WALTHAM, QUEBEC

INTRODUCTION

This booklet describes mineral, rock, and fossil occurrences between Ottawa and North Bay, Ontario, and between Hull and Waltham, Quebec. It supplements Geological Survey of Canada Paper 69-50 which describes occurrences north of Hull and southwest of Ottawa.

Most localities are easily accessible from main highways and from side roads, but in some cases, a hike of up to 5 miles is required. A few localities are only accessible by boat. Directions to reach each of the occurrences are given in the text and are designed for use with official provincial road maps. Locality maps are included where deposits may be difficult to find. Additional detailed information can be obtained from the appropriate topographic and geological maps listed for each locality. These maps are available from the agencies listed on page 107.

Most of the inactive mines have not been operated for many years so that entering shafts, tunnels, and other workings is dangerous. Some of the occurrences are on private property, and the fact that they are listed in this booklet does not imply permission to visit them. Please respect the rights of property owners at all times.

The localities were visited during the summer of 1969 by the author ably assisted by Miss Louise Bevington. The field investigation was facilitated by information received from Mr. M.R. Dence, Dominion Observatory; Dr. D.D. Hogarth, University of Ottawa, Mr. Louis Moyd, National Museum of Canada, Mr. Adolf Vogg of Arnprior; Mr. Adolph Zimmerling of Otter Lake; and Mr. Jeffrey of Cecebe Lake. The laboratory identification of minerals by X-ray diffraction was performed by M. Bonardi, Geological Survey of Canada. Specimens for photography were obtained from the National Mineral Collection courtesy of H.R. Steacy, Curator. This assistance is gratefully acknowledged.

A BRIEF GEOLOGICAL HISTORY

Most of the collecting area is within the geological region known as the Canadian Shield – an immense shield-shaped body of Precambrian rocks occupying over half of Canada and part of the northeastern United States. Another geological province – the St. Lawrence Lowland – is represented in

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Ottawa 4, Canada.

TABLE I

AGE (millions of years)	ERA	PERIOD	ROCKS FORMED	WHERE TO SEE THEM
	Cenozoic	Quaternary	Gravel, sand Clay Peat	Lake and river shores and gravel pits throughout the area. Renfrew, Arnprior, Pembroke, North Bay pits. Meath and Westmeath bogs.
60				
230	Mesozoic		Not represented	
	Paleozoic	Permian Pennsylvanian Mississippian Devonian Silurian	Not represented	
		Ordovician	Limestone	Highway 17 road-cuts between Ottawa and Pembroke; Bonnèchere Cave and nearby quarries; Deschênes, Levine, Pembroke, Pakenham quarries.
		Ordovician or Cambrian	Sandstone	MacMillan quarry, Highway 17 outcrops near South March.
600				
		Precambrian	Pegmatite	Feldspar quarries at South March, Madawaska, Caribou Lake, Cecebe Lake, Waltham; Quadeville beryl, rose quartz mines; Hunt Mine.
			Crystalline limestone	Highway 132 road-cuts; Bryson road-cuts; Jamieson, Biederman, Carswell, Foresters Falls quarries; Virgin Lake celestite occurrence; Renprior, Hunt Mines.
			Dolomitic crystalline limestone	Portage-du-Fort, Legendre, Dominion Magnesium quarries.
			Pyroxenite	Hunt, Spain, Squaw Lake Mines.
			Biotite gneiss	Bluff Point, Radnor, Sunset, Ruby Mines; River Valley garnet occurrence.
			Hornblende gneiss	Renfrew quarry; Buckhorn Mine.
			Feldspar gneiss	Crocan Lake kyanite occurrence.
			Hornblende schist	Caldwell Mine.
			Biotite schist	River Valley garnet occurrence.
			Syenite	Moss, Beaucage Mines; road-cuts on Highways 11 and 17 near North Bay.
			Syenite gneiss	New Golden Rose Mine.
			Syenite pegmatite	Craig Mine; Jewellville, Gutz occurrences.
			Anorthosite	Craig, Burgess Mines.
			Iron-formation	Nipissing Black Granite quarry.

the region between Ottawa and Arnprior. This is a flat area of unfolded Paleozoic rocks south of the Shield and north of Lake Ontario and Lake Erie.

During Precambrian time there were repeated cycles of inundation, sedimentation, mountain-building, intrusion, and erosion, producing a variety of igneous, metamorphic, and volcanic rocks. The rocks on both sides of the Ottawa Valley from Arnprior westward were formed during this era. The Precambrian rock formations contain deposits of feldspar, mica, apatite, molybdenite, pyrite, uranium, garnet, iron, gold, celestite, and brucite.

At the close of the Precambrian Era, a long period of erosion reduced the Shield to a nearly featureless plain and set the stage for uplift, inundation, and deposition that took place during the long Paleozoic Era that followed. Great thicknesses of sediments were deposited by Paleozoic seas over much of the Shield particularly along its margins including the St. Lawrence Lowland where the accumulated sediments have formed the existing sandstone and limestone deposits between Pembroke and Ottawa, and in the Aylmer (Quebec) area.

In more recent times – during the Pleistocene Period – great ice sheets spread southwards across the Shield and the Lowland moulding the landscape as we know it today and leaving behind accumulations of sand, gravel, and till. As the ice withdrew, marine waters flooded the Ottawa Valley and formed the Champlain Sea which extended as far north as the Eardley escarpment. Upon its retreat, the sea left unconsolidated deposits of clay and sand over the Paleozoic strata. Other deposits of recent times include beach sands and stream detritus. The Bonnechère Cave is an example of an erosional feature of recent times.

The geological history with examples of rocks formed, is summarized in Table I.

COLLECTING ALONG THE ROUTE

The route as shown in Figure 1, is divided into two sections: (1) Ottawa to North Bay via Highway 17; (2) Hull to Waltham via Highway 8. There are numerous side trips leading from these main routes.

Information on each locality is systematically listed as follows: mileage along the highways starting at the beginning of each section; name of the locality, mine or occurrence; minerals or rocks found in the deposit (shown in capital letters); mode of occurrence; brief notes on the locality with specific features of interest to the collector; location and access; references to other publications indicated by a number and listed at the end of the booklet; references to maps of the National Topographic System (T), and to geological maps (G) of the Geological Survey of Canada, the Ontario Department of Mines, and the Quebec Department of Natural Resources (scale 1 inch to 1 mile unless otherwise noted).

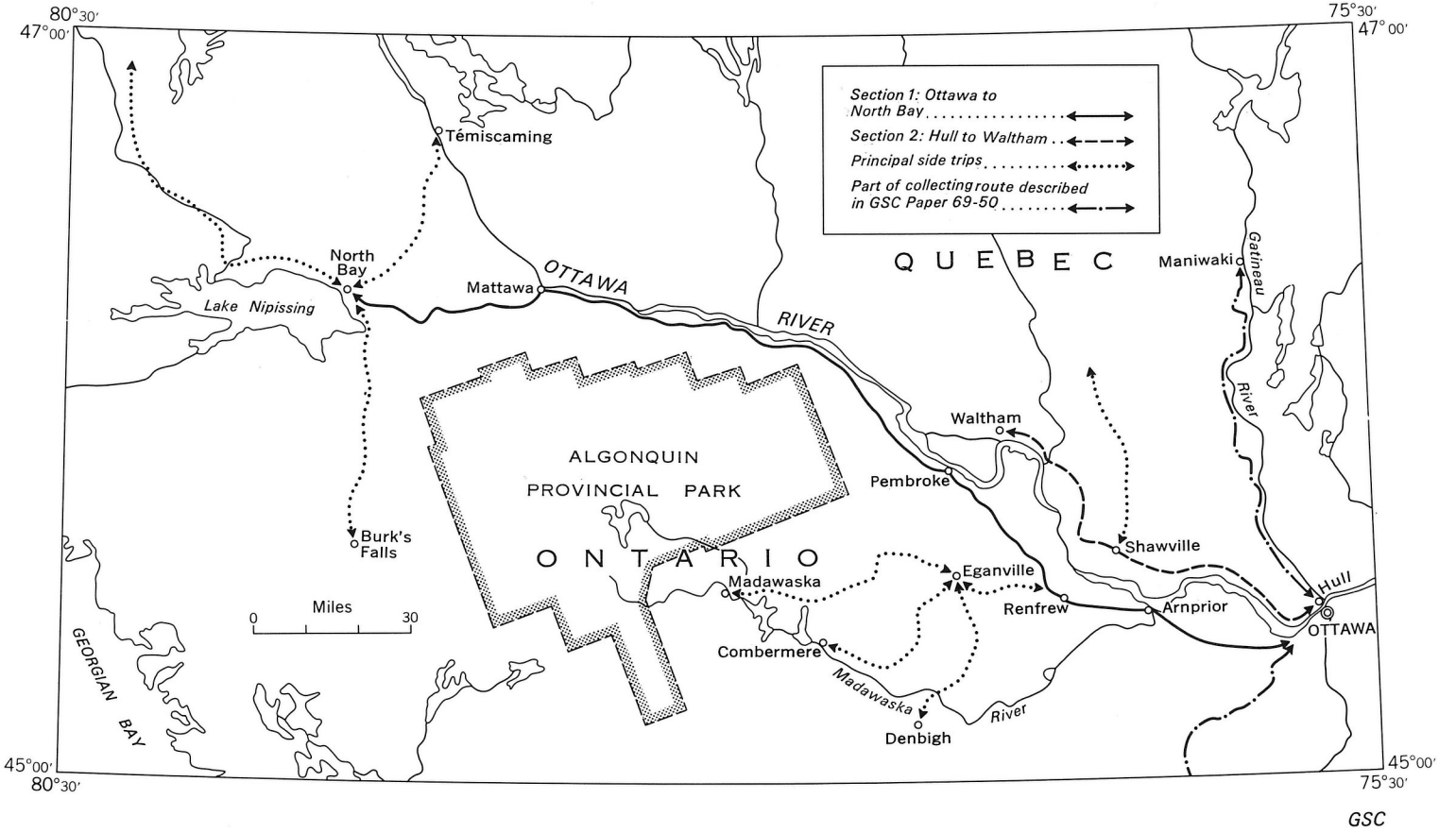


Figure 1. Index map showing collecting routes.

SECTION 1

OTTAWA - NORTH BAY

Mile 0.0 Ottawa, at intersection Carling Avenue (Highway 17) and Richmond Road (Highway 7/15). The main road log proceeds west along Highway 17. Occurrences along Highway 7 are described in Geological Survey of Canada Paper 69-50.

3.1 Junction, on left, Moodie Drive.

8.2 South March, at junction gravel road on left.

South March Quarry

FELDSPAR, QUARTZ, MICA, TOURMALINE, CHLORITE, HEMATITE, PYRITE, MAGNETITE, URANINITE, CALCITE, FLUORITE, GRAPHIC GRANITE

In pegmatite

Pink to orange-red microcline feldspar was formerly quarried here. Much of it has a rusty appearance due to iron stains derived from the hematite and magnetite. The feldspar along with white to colourless quartz and black mica are the chief constituents of the pegmatite. The most common accessory minerals are black tourmaline, dark green chlorite, and hematite; less abundant are pyrite and magnetite. Uraninite, as black nodules measuring up to 1/2 inch in diameter, and a little calcite and fluorite have been reported from the deposit. A coarse pink graphic granite is also present.

The deposit has been known for about 70 years. The quarry was operated from 1919 to 1921 by O'Brien and Fowler of Ottawa. About 3,000 tons of feldspar for use as stucco material was produced from a pit that measures 130 by 30 feet and 30 feet deep. It is now water-filled.

Road log from Highway 17 at Mile 8.2:

Mile 0.0 South March, at grocery store; turn left (south).

0.2 Junction; turn left.

2.5 Junction; turn left.

2.6 Quarry on left.

Refs.: 9 p. 238; 62 p. 36.

Maps (T): 31 G/5 W Ottawa.
(G): 414 A Ottawa Sheet (west half), Carleton and Hull Counties, Ontario and Quebec (G.S.C.).

Mile 10.1 Junction Constance Bay Road.

MacMillan Quarry

SANDSTONE

The sandstone is generally cream-coloured to grey with tinges of pink, rust, brown or yellow. Because of its attractive, warm tone it is highly regarded as a stone for facing fireplaces, homes and public buildings. It has been named Nepean Sandstone for the township in which quarries were worked to obtain stone for the Parliament Buildings and other large buildings in Ottawa. The Nepean Formation is of Ordovician or Cambrian age and lies immediately above the Precambrian rocks. Its thickness varies from a few inches to about 500 feet.

This quarry was opened in 1969 by Mr. Allan MacMillan, the present operator.

Road log from Highway 17 at Mile 10.1:

Mile 0.0 Proceed west along Constance Bay Road.

2.0 Junction; turn left.

2.8 Junction; turn right.

3.7 Turn-off to quarry on right.

Ref.: 68 pp. 10-12.

Map (T): 31 F/8 E Arnprior.

Mile 16.5 Junction Highway 44.

20.3 Road-cuts, on both sides of highway, expose Ordovician limestone containing crinoids. White calcite (massive and dog-tooth crystals) in the limestone fluoresce yellowish white (brighter under 'long' ultraviolet rays).

21.9 Junction gravel road on right.

Hanna Quarry

FOSSILS, MARCASITE, CALCITE

In limestone

Ordovician fossils (shells, crinoids) are common in the limestone. White calcite, in places coated with marcasite, occurs in the limestone.

The quarry, now water-filled, is located on the property of Mr. S. Hanna of Kinburn.

Road log from Highway 17 at Mile 21.9:

Mile 0.0 Turn right onto gravel road.

1.4 Quarry in pasture on left, just beyond gate.

1.6 S. Hanna farmhouse on right. Obtain permission here to enter quarry.

Map (T): 31 F/8 E Arnprior.

Mile 24.3 Road-cuts, at intersection, expose Ordovician fossiliferous (crinoids) limestone similar to the cut at Mile 20.3.

33.1 Junction Highway 29.

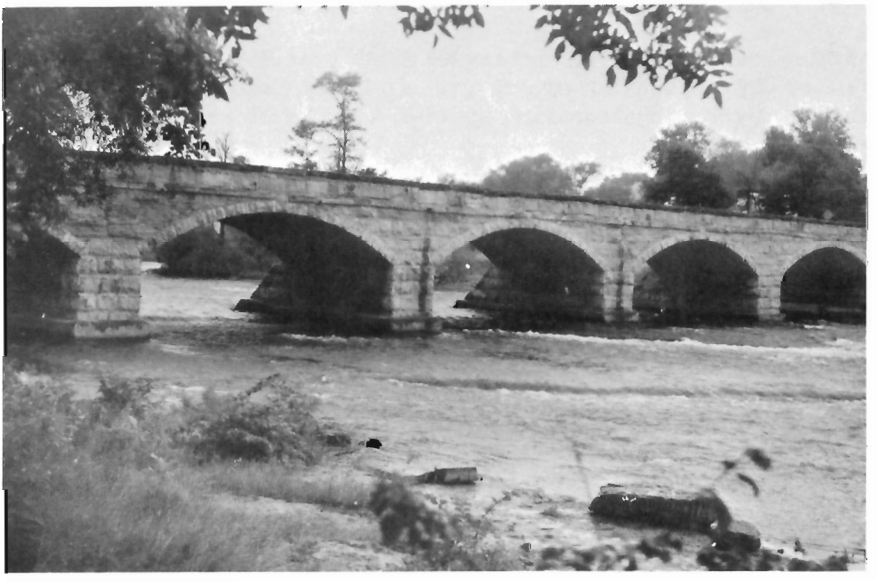


Plate I. Bridge over Mississippi River in Pakenham (GSC 153197).

Pakenham Quarry

FOSSILS, CALCITE, CHERT

In Black River limestone

Ordovician fossils are abundant in this quarry and in rock exposures nearby; they include corals, cephalopods and trilobites. Chert and calcite occur sparingly.

The quarry was worked for road metal and for building stone. The stone was used in the construction of the five-span stone bridge over the Mississippi River in Pakenham. The bridge was built in 1901 and is said to be the only one of its kind in North America. The largest single stone measures 9 feet by 2 1/2 feet square.

Refs.: 14 p. 111; 67 p. 38.

Map (T): 31 F/8 W Arnprior.

Mile 34.4 Arnprior, at junction Elgin Street.

44.5 Junction to Calabogie (Highway 508).

Bluff Point Mine

MAGNETITE, ACTINOLITE, CHLORITE, PYRITE

At contact crystalline limestone and hornblende gneiss

Magnetite, the ore mineral, occurs as finely granular compact masses. It is associated with masses of silvery green foliated chlorite and dull green bladed actinolite. Pyrite, chalcopyrite, calcite, and quartz are present in small amounts.

The deposit was worked for iron intermittently from 1881 until 1901. The openings consist of four shafts (deepest is 300 feet) and several open pits. In 1952 diamond drilling was conducted by Algoma Ore Properties Limited. The deposit is currently held by the Algoma Steel Corporation Limited. The openings and dumps (small) are now partly overgrown.

Road log from Highway 17 at Mile 44.5:

Mile 0.0 Turn left (south) onto road to Calabogie.

4.8 Burnstown, at junction Renfrew-White Lake road; continue straight ahead along Highway 508.

14.2 Calabogie, at junction Highway 511; turn left (south).

15.3 Junction single lane road on right; turn right onto it.

15.8 End of road. Turn left and follow trail for approximately 200 yards to a lightly wooded bluff on the left side of the trail. The first opening is located on the slope a few yards from the trail; the remaining ones extend over a distance of 1,000 feet to the northeast.

Refs.: 24 pp. 55-57; 33 pp. 129-130; 46 p. 25; 53 pp. 56-57.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Caldwell Mine

PYRITE, CALCITE, QUARTZ, PYRRHOTITE, ROZENITE, APATITE, TITANITE, ZOISITE

In hornblende-biotite schist

Pyrite was formerly mined from this deposit. It is massive and occurs with calcite and quartz. A small amount of pyrrhotite is associated with the ore. White powdery rozenite is found as an encrustation on specimens on the dumps. Apatite, titanite and zoisite are also reported from the deposit, the zoisite being abundant in the dumps adjoining No. 1 shaft.

The deposit was discovered in about 1885 by gold prospectors. It was not worked until World War I which brought a demand for pyrite. Mr. T.B. Caldwell, the original operator, worked the deposit from 1915 until 1917 when the Grasselli Chemical Company of Hamilton took over operations until 1920. Mining ceased in that year but ore shipments were made until 1928. Canadian Pyrites Limited then acquired the property and continued shipments until 1930. The workings consist of two inclined shafts (75 and 234 feet deep) connected by a 460-foot drift, and a few small pits. Specimens are available from the dumps adjoining the shafts.

Road log from Highway 17 at Mile 44.5:

Mile 0.0 Turn left onto road to Calabogie and follow road log toward Bluff Point Mine.

15.3 Turn off to Bluff Point Mine.

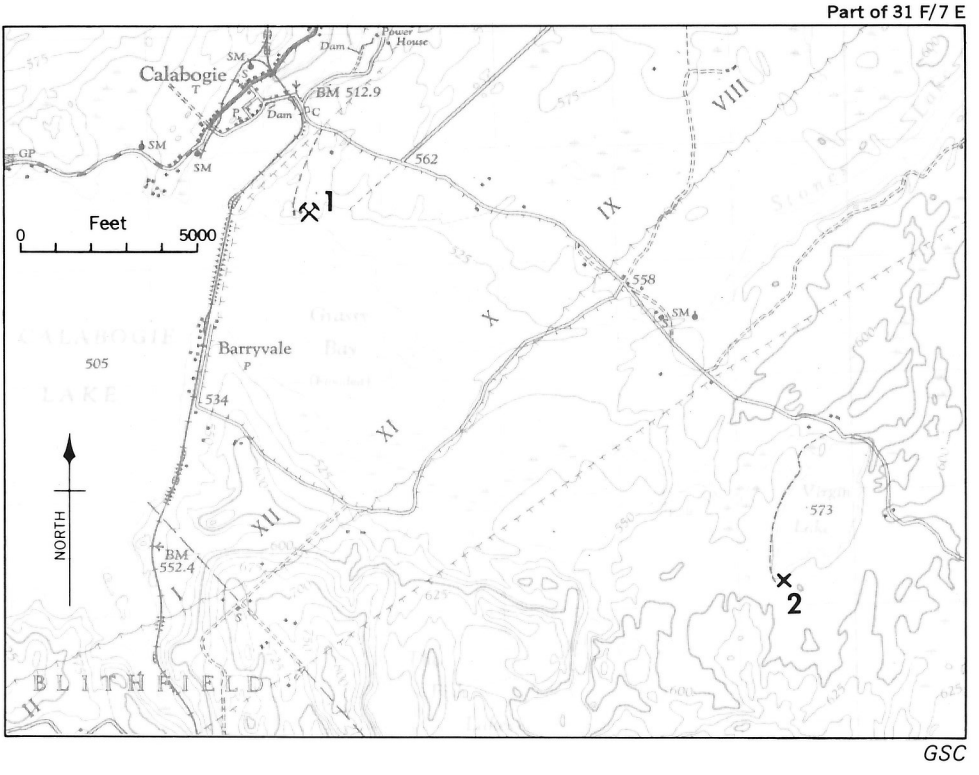
17.2 Junction road to Barryvale; turn right.

19.3 Junction; turn left.

21.2 Railway crossing. Proceed on foot for approximately 4 miles to Clyde Lake siding (0.35 miles south of Mile-post 22). Follow an overgrown trail for 1 1/4 miles east to the mine. At the mine site, the trail forks left to shaft No. 1 and right to shaft No. 2.

Refs.: 53 pp. 93-96; 69 pp. 30-35.

Maps (T): 31 F/2 E Clyde.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).



1. Bluff Point Mine. 2. Virgin Lake celesite occurrence.

Map 1. Calabogie area.

Virgin Lake Celestite Occurrence

CELESTITE, DOLOMITE, CALCITE, PYRITE

In crystalline limestone

Celestite occurs as white fibrous to columnar radiating masses measuring up to 1 foot in diameter. Closely associated with the celestite is dolomite which fluoresces yellowish white when exposed to 'long' ultraviolet rays. Calcite and pyrite occur sparingly in the deposit.

This occurrence has been known since 1888. Mining from three open-cuts was conducted from 1918 until 1921 and again in 1941. The openings along the side of a low ridge measure 4 by 10 feet, 70 by 60 feet, and 40 by 10 feet. A grinding plant was installed at the site during early mining operations. The strontium ore had been intended for use in the refining of beet sugar, and as a substitute for barite in the paint, paper and rubber industries; it was found to be unsuitable for these purposes.

Road log from Highway 17 at Mile 44.5:

Mile 0.0 Turn left onto road to Calabogie and follow road log toward Bluff Point Mine.

14.2 Calabogie, at junction Highway 511; turn left (south).

15.3 Junction road to Bluff Point Mine; continue straight ahead.

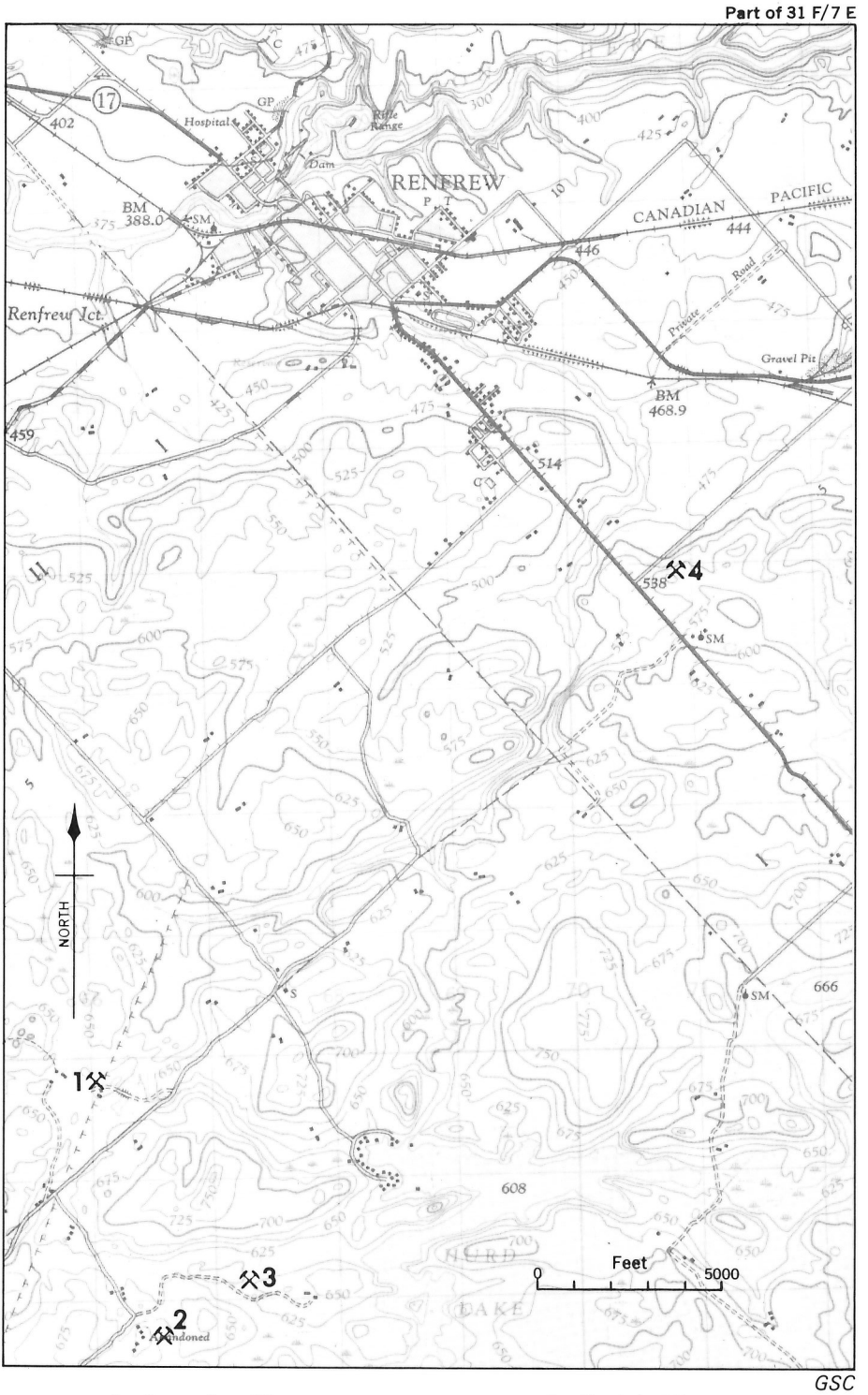
17.2 Junction road to Barryvale; continue straight ahead.

18.6 Gate and wagon-road on right to celestite occurrence. To pass through gate and property obtain permission from Mr. John Cookson whose house is on Highway 511 about 100 yards beyond Mile 18.6. To reach the occurrence proceed along the wagon-road for about 1 mile to a fork just beyond a small beaver dam; take the left fork and continue 40 yards to first cut on right. The next and largest cut is located 70 yards farther down the road and a small pit is another 50 yards down the road.

Refs.: 53 pp. 111-113; 61 pp. 80-82.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Mile 55.1 Renfrew, at junction Raglan and Hall Streets.



1. Renprior Mine.
2. Buckhorn Mine.
3. Zenith Mine.
4. Jamieson quarry.

Map 2. Renfrew area (south).

Plate II.

Lime kilns at Jamieson quarry (GSC 153196).

Jamieson Quarry

TOURMALINE, TREMOLITE, TITANITE, SERPENTINE, PYROXENE, MICA, PYRITE, PYRRHOTITE, GRAPHITE, VESUVIANITE, FLUORITE

In crystalline limestone

Golden brown transparent tourmaline crystals measuring 3/4 inch in diameter are common in the limestone. They are generally too fractured to be used for lapidary purposes. Colourless, light green and yellow tremolite crystals are also abundant. Other minerals identified from the deposit are: titanite, as small dark brown grains; light green serpentine; deep green pyroxene; mica (muscovite and phlogopite); pyrite; pyrrhotite; and graphite. Vesuvianite and fluorite have also been reported. The limestone is white with grey to blue bands.

The quarry was formerly operated by the Jamieson Lime Company for the production of lime. It measures 500 feet by 250 feet with a 30-foot face. It is now partly overgrown and there are rock piles scattered throughout the floor of the quarry. Two lime kilns were operated on the site.

Road log from Highway 17 at Mile 55.1:

Mile	0.0	Renfrew, at junction Raglan and Hall Streets; turn left onto Raglan Street.
	1.9	Junction; turn left.
	2.05	Gate to quarry on right.

Refs.: 14 p. 169; 53 p. 103.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Renprior Mine

SPHALERITE, TREMOLITE, DIOPSIDE, MICA, APATITE, PYRITE, GALENA, GRAPHITE, PYRRHOTITE, CHALCOPYRITE

In crystalline limestone

Dark brown sphalerite displaying a brilliant lustre occurs as granular aggregates in crystalline limestone. Crystals, measuring up to 3/4 inch in diameter, and bladed aggregates of light green, grey, and light brown tremolite are very common. Occurring in relatively small amounts are light green and massive diopside, amber and pale blue mica, light green apatite, pyrite, galena, and graphite. Pyrrhotite and chalcopyrite have also been reported.

The deposit has been worked for zinc spasmodically from about 50 openings (pits, trenches and strippings) over a distance of 2,700 feet. It was discovered in 1922 by Mr. Joseph Legree who with Mr. William Dean opened the first pit. The property was subsequently worked by Coniagas Mines Limited (1935), Ottawa Valley Mines Limited and British Metal Corporation (1926), New Calumet Mines Limited (1947), Cadieux Mines Limited (1950) and Renprior Mines Limited (1951). Many of the openings are now water-filled and partly overgrown. There are numerous small dumps. The deposit is on the John Hisko farm.

Road log from Highway 17 at Mile 55.1:

Mile	0.0	Renfrew, at junction Hall and Raglan Streets; turn left onto Raglan Street.
	1.1	Junction; turn right onto gravel road.
	2.5	Junction; turn left.
	5.7	Junction single lane road to the John Hisko farm; turn right.
	6.3	The pits extend in a northeasterly direction from this point.
	6.7	John Hisko farmhouse. Obtain permission to visit deposit.

Refs.: 1 pp. 132-135; 44 pp. 73-75; 53 pp. 114-118; 59 p. 226.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Zenith (Phoenix) Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, MAGNETITE, DIOPSIDE, CALCITE, BIOTITE, TITANITE, APATITE, SCAPOLITE, CHLORITE, SERPENTINE, TOURMALINE, ANHYDRITE, GARNET, MARTITE

In pyroxenite, pegmatite, and paragneiss

Molybdenite occurs as coarse flakes measuring up to 2 inches across in this former molybdenum mine. It is closely associated with abundant pyrite and with smaller amounts of pyrrhotite and magnetite. Dark green diopside crystals (about an inch in diameter) occur with pink to white calcite and biotite. Less common in the pyroxenite are brown titanite (small grains), massive light green apatite, grey scapolite, chlorite and serpentine. Black tourmaline is found in the pegmatite. Anhydrite, garnet and martite have also been reported from the orebody.

The deposit was discovered by Mr.. William Warren while digging a well on his farm. The mineral rights were sold to Sir Henry Pellat in 1914. Mining operations were conducted at intervals from 1914 until 1943. The Phoenix Molybdenite Corporation worked the deposit between 1923 and 1937; during this period a two-compartment shaft was sunk to 205 feet and a 150-ton mill was installed. Subsequent operators were the Zenith Molybdenite Corporation (1938-1940) and Wartime Metals Corporation (1942-43). In 1955 Goldyke Mines Limited examined the deposit for radioactive mineralization. The property is owned by Goldyke Mines Limited of Toronto.

Road log from Highway 17 at Mile 55.1:

Mile	0.0	Renfrew at junction Hall and Raglan Streets; proceed south along Raglan Street and follow road log toward Renprior Mine.
	5.7	Junction to Hisko farm and Renprior Mine; continue straight ahead.
	7.3	Junction single lane road on left at bend; turn onto this road and proceed straight ahead after passing through gate.
	7.4	Fork; bear left.
	7.5	Mine.

Refs.: 6 pp. 83-86; 11 pp. 16-20; 28 p. 56; 44 pp. 58-59; 53 pp. 73-75.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Buckhorn Mine

MOLYBDENITE, PYRITE, JAROSITE, AMPHIBOLE, TALC, GARNET, QUARTZ, SPECULARITE

In pyroxenite

Molybdenite, the ore mineral, occurs as flakes measuring up to 3/4 inch across. Massive pyrite is associated with it. Yellow jarosite is found as a powdery coating on ore-bearing specimens. Green massive amphibole partly altered to talc was found on the dumps. Garnet, and vugs lined with alternating bands of smoky and amethystine quartz, carbonate and specularite have been reported from the deposit. The property belongs to Mr. John Hisko of Renfrew.

The property was worked by Buckhorn Mines Limited between 1939 and 1943. The workings consist of three pits (largest is 23 by 30 feet and 16 feet deep) and several trenches in two areas 1,750 feet apart. The pits are water-filled but specimens are available from small adjacent dumps.

Road log from Highway 17 at Mile 55.1:

Mile 0.0 Renfrew, at junction Hall and Raglan Streets; proceed south along Raglan Street and follow road log toward Zenith Mine.

7.3 Junction single lane road on left at bend; turn left and proceed through gate.

7.35 Junction; turn left.

7.6 Trail on left leads to pit in lightly wooded area.

7.9 Largest pit and dump to left of road.

Refs.: 28 p. 57; 44 p. 57; 53 pp. 72-73.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Mile 55.6 Renfrew, at junction Highway 132.

Hunt Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, PYROXENE, SCAPOLITE, HORNBLENDE, CALCITE, ROZENITE, SERPENTINE, DIOPSIDE, MICA, APATITE, TITANITE, OLIVINE, GRAPHITE, PYRITE, MAGNETITE, GRAPHIC GRANITE, STILBITE

At contact of crystalline limestone and pegmatite

Molybdenite occurs as coarse flakes in yellowish green pyroxenite. Closely associated with it are pyrite, pyrrhotite, grey massive scapolite, massive hornblende, and coarse, smoky calcite. Yellowish to smoky green crystals of pyroxene measuring up to 3/4 inch in diameter are common in the pyroxenite. Rozenite occurs as a white powdery coating on rusty weathered ore specimens. The crystalline limestone associated with the orebody contains the following minerals: charcoal-grey serpentine, pale yellow to light green diopside, amber mica, light blue apatite (uncommon), dark brown titanite, grey granular olivine, graphite, and pyrite. Magnetite is found in the pegmatite. Pink graphic granite composed of microcline and quartz is associated with the pegmatite. Stilbite, as white platy aggregates, has been reported to occur with massive and crystalline pyrite.

This molybdenite deposit was discovered in about 1910 by a youth, Cornelius Hunt, on his father's farm. A specimen was taken to the Black Donald Mine for identification. Some time prior to 1914, a small amount of ore was mined from small pits. From 1915 until 1918 Renfrew Molybdenum Mines Limited operated the mine and a mill producing 96,990 pounds of concentrates, 85 per cent of which averaged 95 per cent MoS_2. The underground workings consist of an inclined adit leading to approximately 2,000 feet of crosscuts and drifts, and two shafts. During mining operations 60 to 70 men were employed. The underground workings are now inaccessible but specimens may be obtained from the dumps.

Road log from Highway 17 at Mile 55.6:

Mile	0.0	Renfrew, at junction Highways 17 and 132; turn left onto Highway 132.
	6.1	Road-cut right exposes crystalline limestone and pegmatite. Tourmaline (brown granular), light brown amphibole, graphite, pyrite, pyrrhotite, mica, and pink calcite occur in the limestone, titanite, mica and amphibole in the pegmatite.
	10.6	Shamrock, at junction Admaston Concession XI Road; continue straight ahead.
	11.7	Road-cuts expose crystalline limestone disseminated with pyrite, pyroxene, and titanite.
	12.2	Junction Mount St. Patrick Road; turn left.
	15.5	Mount St. Patrick village, at church.
	16.6	Junction road to Dacre; continue straight ahead.
	16.8	Junction; turn left.
	17.8	Junction; turn right.

Mile 18.4 Junction; continue straight ahead (road on left leads to fire tower).

19.0 Mine on right.

Refs.: 6 pp. 89-94; 28 p. 58; 44 pp. 61-62; 64 pp. 146-150; 65 p. 47; 69 pp. 36-41.

Maps (T): 31 F/7 W Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Sunset Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, MOLYBDITE, SCAPOLITE, TREMOLITE, TITANITE, MICA

In pyroxenite

This property was formerly worked for molybdenite. The orebody consisted of molybdenite, pyrite, and pyrrhotite in pyroxenite. Molybdite has been reported to occur as a yellow powder on molybdenite. Scapolite, tremolite, titanite, and mica are associated with the ore.

This deposit was worked briefly during World War I, first by the Legree Brothers of Dacre and later by Steel Alloys Corporation which also operated the Spain Mine. The openings consist of a main pit (70 by 30 feet and up to 10 feet deep) with a 70-foot vertical shaft in the centre, a small pit on the opposite side of the road, and an open-cut (100 by 6 feet) with a 10-foot pit in the centre. The open-cut is located approximately 400 yards east-northeast of the main pit. These openings and small dumps are now partly overgrown and ore-bearing specimens are not plentiful.

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew, at junction Highways 17 and 132; proceed along Highway 132 following road log toward Hunt Mine.

12.2 Junction Mount St. Patrick Road; continue straight ahead.

13.9, 15.3 Road-cuts expose siliceous crystalline limestone containing disseminations of graphite, pyroxene, serpentine, pyrite, pyrrhotite, and titanite.

17.3 Dacre, at junction Highway 513; continue straight ahead.

18.2 Road-cut on left is similar to the cuts at Mile 13.9, 15.3. White graphic granite was noted here.

18.9 Junction Highway 41; proceed south along Highway 41.

Mile 21.7 to 24.6 Road-cuts on right expose crystalline limestone containing graphite, mica, pyrite, pyrrhotite, pyroxene, apatite (uncommon), titanite, amphibole (light green, pale yellow and black), serpentine, and pink calcite. In the road-cut at Mile 24.6, monazite (deep orange grains in mica), zircon (tiny pink crystals in calcite), and black massive tourmaline were noted in addition to the minerals already listed.

25.2 Junction single lane road on left; proceed along this road toward mine.

25.9 Bridge over creek.

26.05 Main pit of mine on left side of road, small pit on right.

Refs.: 6 pp. 99-100; 43 p. 291; 64 pp. 158-160.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Spain Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, MAGNETITE, ROZENITE, PYROXENE, CHLORITE, SCAPOLITE, TITANITE, EPIDOTE, MICA, CALCITE, AMPHIBOLE, FELDSPAR, QUARTZ, AMETHYST

In pyroxenite and pegmatite

The orebody consists of molybdenite, pyrite, pyrrhotite, and magnetite. It occurs in pyroxenite at the contact of gneiss and crystalline limestone. Pegmatite dykes cutting the pyroxenite contain a small amount of molybdenite. During mining operations crystals of molybdenite measuring up to 1 foot in diameter were found and much of the ore was hand-picked. In the dumps, rozenite occurs as a white coating on rusty weathered specimens. Crystals of pyrite are common. Other minerals found in the deposit are chlorite, light green to white scapolite, titanite, epidote, mica, pink calcite, green amphibole, feldspar, and amethystine and smoky quartz. Some of the scapolite is suitable for lapidary purposes.

The deposit was discovered in 1912 by Mr. Joseph Legree of Renfrew who did a small amount of surface work. From 1915 until 1917, Mr. W. J. Spain of New York operated the deposit and a mill which he installed at the mine site. The workings consisted of a pit (75 by 120 feet and 10 to 25 feet deep) with a 35-foot shaft at its northeastern corner, and two small pits located 100 feet to the west and 400 feet to the northeast of the main pit. The mill, office, and bunkhouses were located north of the main pit. Steel Alloys Corporation took over operations from 1918 until 1919. Recent exploration work was done by North American Molybdenite Corporation Limited (1939) and by New Far North Exploration Limited (1965-66).

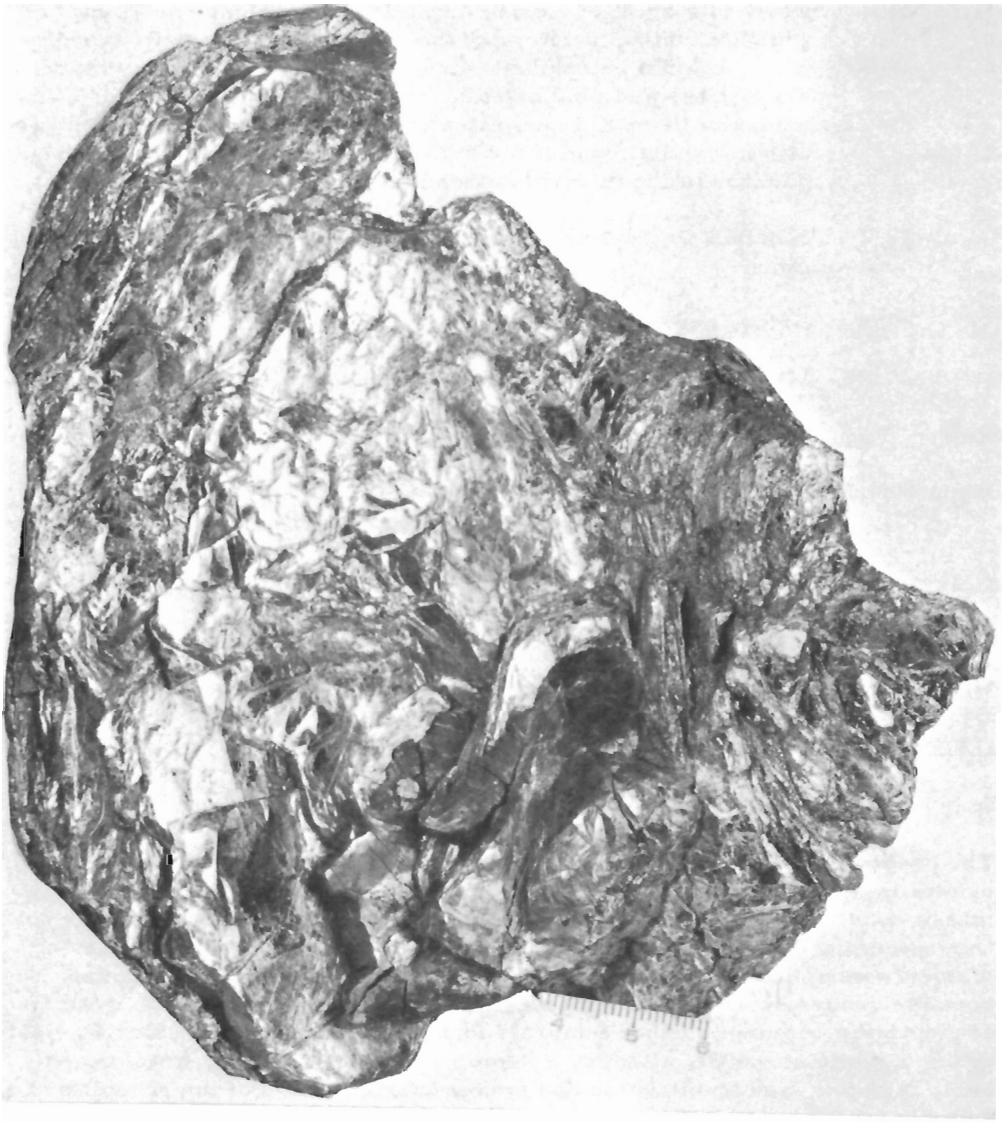


Plate III. Molybdenite, Spain Mine (GSC 201420-I, scale in mm).

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew, at junction Highways 17 and 132; proceed along Highway 132 following road log toward Sunset Mine.

25.2 Junction road to Sunset Mine; continue straight ahead.

26.0 Road-cut on right exposes crystalline limestone containing amber mica, and grains of pyroxene, titanite and reddish orange garnet.

Mile 26.5 Turn-off (left) to Spain Mine.

26.6 Mine.

Refs.: 6 pp. 101-103; 28 p. 61; 43 p. 297; 64 pp. 155-158; 69 pp. 41-43.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Jamieson Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, MOLYBDITE, PYROXENE, MICA, TITANITE, CALCITE, ROZENITE, JAROSITE, APATITE, SPHALERITE, GALENA, CHALCOPYRITE

In pyroxenite and pegmatite at contact of crystalline limestone and gneiss

Large crystals of molybdenite were mined from this deposit some 60 years ago. They were found with pyrite and pyrrhotite; molybdite, a yellow powder, is reported to have been present as a coating on the ore specimens. Green granular pyroxene, amber mica, and titanite occur in pink calcite which is associated with crystalline limestone. Powdery coatings of white rozenite and yellow jarosite were noted on ore specimens in the dumps. A breccia composed of calcite and pink pegmatite fragments in a fine-grained greenish brown matrix and containing green apatite crystals has been reported to occur in the dumps; vugs in the breccia are lined with sphalerite, pyrite, galena, tiny quartz crystals, calcite crystals and chalcopyrite.

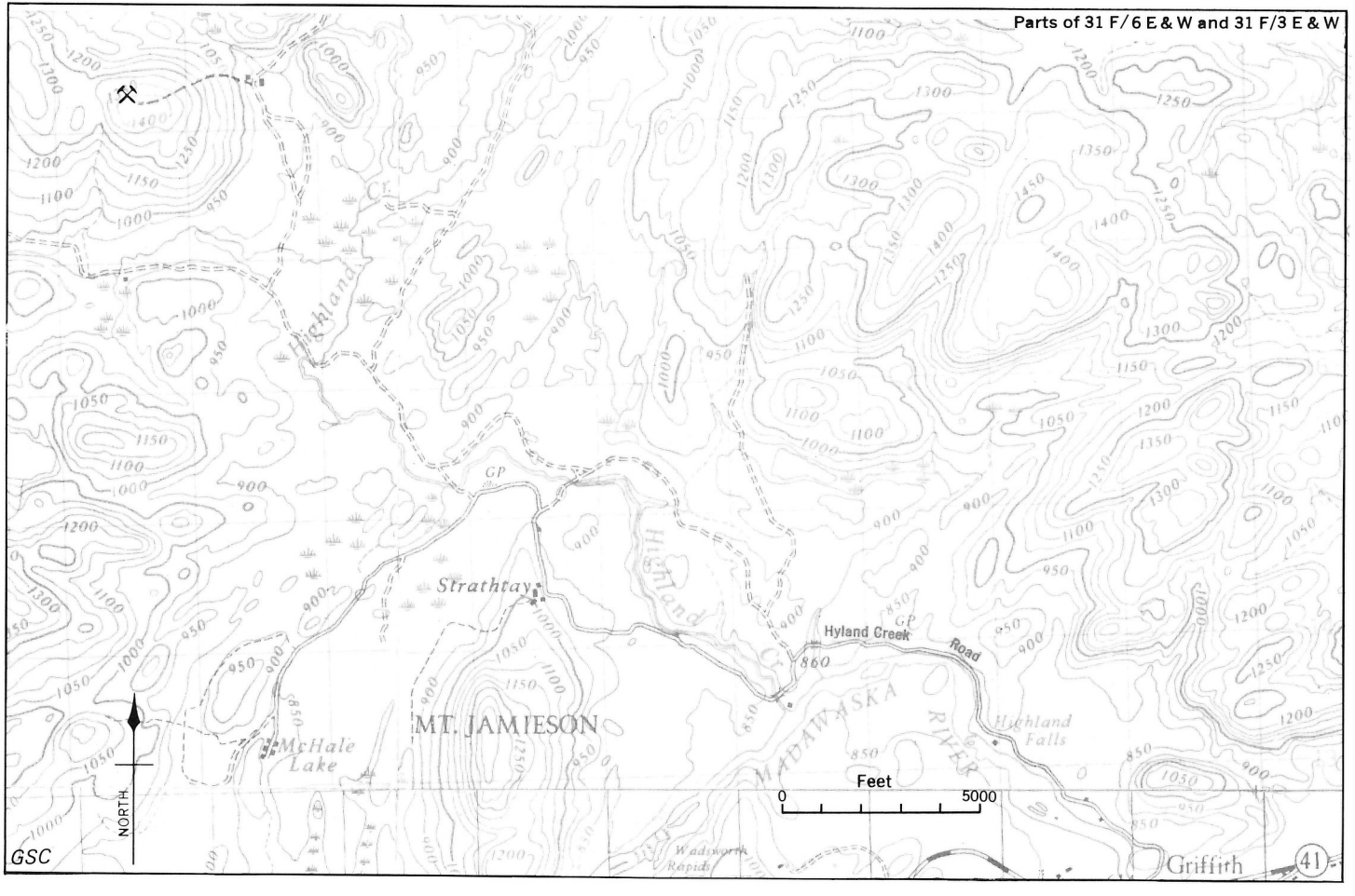
The deposit was discovered by Mr. R. A. Jamieson in 1907. He extracted an estimated 1 ton of hand-cobbed molybdenite without the use of machinery. It was later (1915-16) worked by the International Molybdenum Company Limited. An estimated total of 12,760 pounds of pure molybdenite was mined from this deposit. The mine consists of two pits (45 by 25 feet, and 60 by 20 feet) connected by a 200-foot trench with a 40-foot inclined shaft midpoint between the pits. Both pits are about 20 feet deep, there are small dumps near the openings.

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew, at junction Highways 17 and 132; proceed along Highway 132 following road log to Spain Mine.

26.5 Junction road to Spain Mine; continue straight ahead.

26.55 Road-cuts expose crystalline limestone and pegmatite. Magnetite, pyrrhotite, mica, fluorite, serpentine, epidote, titanite and hornblende occur in the pegmatite. White heulandite and stilbite were found lining fractures in the pegmatite. The crystalline limestone contains disseminated grains of magnetite, amphibole, pyrrhotite and flakes of mica and talc. Titanite and pyroxene occur in pink calcite.



Map 3. Jamieson Mine.

Mile 27.0 Junction Merchand-Lacourse Road, continue along highway.

32.9 Griffith, at junction Hyland Creek Road (on east side of Griffith Bridge); turn right onto Hyland Creek Road.

38.0 Junction; turn right.

38.2 Junction; turn left.

39.8 Junction; turn left.

41.2 Junction single lane road on left; turn left.

41.5 End of road at Dan Maddigan farmhouse. From the farmhouse proceed north along the partly overgrown mine road that leads up the hill to a clearing at the summit. At the clearing proceed to the right, then straight ahead for about 20 yards to the mine in a wooded area. The distance from the farmhouse to the mine is approximately 1/2 mile.

Refs.: 6 pp. 103-105; 28 pp. 62-63; 43 pp. 303-304; 53 p. 86; 65 pp. 45-46.

Maps (T): 31 F/6 W Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Ruby Mine

GARNET, TITANITE

In hornblende-biotite gneiss

Pinkish red garnets measuring up to 1/2 inch in diameter occur in the gneiss which averages 30 per cent garnet. Small grains of titanite are associated with it. Much of the hornblende in the gneiss is fibrous.

The deposit was opened for garnet in 1910 by J. H. Jewell and Company who sank a shaft. From 1922 until 1924, Bancroft Mines Syndicate Limited operated a quarry and a mill to the north of the original opening. The quarry is on the northeast side of a ridge and measures 40 by 50 feet and 15 feet deep. Production amounted to 1,560 tons of garnet ore and concentrates which were shipped to the Carborundum Company, Niagara Falls, New York for the manufacture of sandpaper. Operations ceased soon after the mill was destroyed by fire. The quarry is now quite densely overgrown and rather difficult to locate.

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew, at junction Highway 132; proceed along Highway 132 following road log toward the Jamieson Mine.

Mile 32.9 Griffith, at junction Hyland Creek Road; continue straight ahead along highway.

42.6 Junction Highway 500; turn right onto Highway 500.

43.1 Denbigh, at junction; continue straight ahead.

53.1 Junction wagon-road (in valley on left) to Ruby Mine. Proceed along this road to the second fork; turn right and continue along the road. At each succeeding fork follow the right fork until you reach a steep ridge on the right. The quarry is located on the northeast side of the ridge about 60 yards from the road at the point where the road bends slightly to the left. The total distance from Highway 500 is about a mile.

Refs.: 8 pp. 13-14; 53 p. 126.

Maps (T): 31 F/3 W Denbigh.
(G): 2031 Ashby Township, County of Lennox and Addington (Ont. Dept. Mines, 1 inch to 1/2 mile).

McCoy Property

MOLYBDENITE, PYRITE, TOURMALINE

In pegmatite

Molybdenite was formerly mined from this deposit. It occurs as coarse flakes with pyrite and black tourmaline in hornblende and pyroxene pegmatite.

The deposit was originally (1916-17) worked from a pit and open cuts which yielded about 10 tons of ore. A two-compartment shaft was sunk to a depth of 40 feet in 1937-38 by McCoy Molybdenite, Limited. The main pit measures 10 by 50 feet and 6 to 12 feet deep. The openings are now overgrown but some ore specimens can be found in the dumps.

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew, at junction Highways 17 and 132; proceed along Highway 132 following road log to Ruby Mine.

51.3 Turn-off to Ruby Mine; continue straight ahead.

55.4 Junction gravel road; turn right.

57.6 Junction; turn right.

57.8 Rock exposure on right. Light green radiating columnar tremolite occurs with mica and pink calcite in crystalline limestone.

Mile 58.3 End of road at the Eldon Hiller farmhouse from which a wagon-road leads 1 mile to the mine. From the farmhouse proceed south and continue along the main road (there are numerous forks to the left) to a swampy area. The openings are to the left of the swamp.

Ref.: 53 pp. 84-85.

Maps (T): 31 F/3 W Denbigh.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1953-2 Brudenell-Raglan area, County of Renfrew (Ont. Dept. Mines).

Keyfortmore Mine

TOURMALINE, GRAPHIC GRANITE, FELDSPAR, QUARTZ, MICA, GARNET, PYROXENE, TITANITE, ZIRCON, GYPSUM

In pegmatite

Black tourmaline crystals and pink graphic granite are abundant in this deposit. The tourmaline crystals measure up to 2 inches in diameter and several inches long. The graphic granite is medium textured and is suitable for lapidary purposes. Pink microcline, colourless to smoky quartz and, less abundantly, grey plagioclase are the chief components of the pegmatite. Other minerals present include silvery to pale yellow mica, brownish red garnet, dark green pyroxene, brown titanite, and reddish orange zircon (prisms). Gypsum occurs as a white coating on feldspar specimens.

The deposit was worked for feldspar in 1943 by Mr. G. Colautti of Barry's Bay. Production amounted to 1,174 tons. The mine consists of two open-cuts (70 by 15 feet and 8 feet deep, and 20 by 4 feet and 5 feet deep) and two strippings. The property is on the L. St. Louis farm.

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew, at junction Highways 17 and 132; proceed onto Highway 132.

18.9 Junction Highway 41; turn right.

21.5 Road-cut on left exposes hornblende gneiss containing red garnets.

22.3 Road-cut on left exposes crystalline limestone cut by calcite veins containing mica, titanite, pyroxene, and hornblende.

22.6 Junction Constan Lake Road; continue straight ahead.

Mile 24.0 Turn-off (left) to the St. Louis farmhouse. Obtain permission to enter property, then proceed along the farm-road leading west. (This turn-off is 8.6 miles south of the junction of Highways 41 and 60.)

26.25 Clearing on left. The mine is located at the edge of the wooded area on the west side of the clearing and approximately 100 feet from the road.

Refs.: 19 p. 12; 53 pp. 37-38.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Radnor Mine

MAGNETITE, PYRITE, JAROSITE, PYROXENE, TITANITE, ZIRCON, CHLORITE, BIOTITE

In hornblende-feldspar gneiss

Magnetite occurs as coarse granular masses and disseminations in greenish grey gneiss at this former iron mine. Pyrite occurs sparingly with the magnetite; specimens from the dump are coated with yellow powdery jarosite. Other minerals occurring in the gneiss are: dark green pyroxene, brown titanite, turbid pink zircon (prisms about 1/8 inch long), chlorite, and biotite.

The deposit was worked by numerous open pits that are now water-filled. There are extensive dumps adjoining them. The largest pits measure 165 by 35 feet and over 30 feet deep. 340 by 15 to 40 feet and 40 feet deep, 290 by 10 to 20 feet and 20 to 30 feet deep, 100 by 25 feet and 25 feet deep. The mine was operated by Canada Iron Furnace Company from 1901 until 1907. An estimated 19,000 tons of ore grading more than 48 per cent iron was shipped to Radnor-des-Forges. The property belongs to Mr. Joe Larmond of Eganville.

Road log from Highway 17 at Mile 55.6:

Mile 0.0 Renfrew at junction Highways 17 and 132; proceed onto Highway 132.

18.9 Junction Highway 41; turn right.

24.0 Turn-off to Keyfortmore Mine; continue straight ahead.

25.4 Junction Perrault Road; turn right. (This junction is 7.2 miles south of the junction of Highways 41 and 60 in Eganville.)

26.2 Junction single lane road on right; turn right.

Mile 27.1 Fork; bear right and proceed uphill.

27.3 Mine on right. The pits extend for a distance of 1,300 feet.

Refs.: 46 pp. 49-50; 53 pp. 59-60.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Mile 56.3 Renfrew, at junction Renfrew County Road 4 (Bruce Avenue).

Road-cut

TOURMALINE, TREMOLITE, TITANITE, PYROXENE, GRAPHITE, PYRITE, MICA, CALCITE

In crystalline limestone

Orange-brown granular tourmaline and colourless bladed tremolite occur with smoky brown titanite, green pyroxene, graphite, pyrite, amber mica, and pink calcite in grey marble. The road has been cut through a ridge of crystalline limestone which was originally quarried some 40 years ago by J.A. Jamieson for use as a building, monument and foundation stone, and for the production of lime. The Renfrew post office is built of this stone. The quarries, now overgrown, are on the south side of the ridge just south of Renfrew County Road No. 4 at a point 1.5 miles east of Mile 56.3.

Refs.: 14 p. 170; 53 p. 104.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Mile 57.3 Junction gravel road on right.

Gneiss Quarry

HORNBLENDE GNEISS

The quarry was opened to furnish rock for road construction. White calcite veins cutting the rock fluoresce pink when exposed to ultraviolet rays. Crystalline limestone associated with the gneiss contains disseminations of pyrite, graphite, mica, and titanite. The quarry has been opened on the west side of a ridge facing Highway 17.

Road log from Highway 17 at Mile 57.3:

Mile 0.0 Turn right (east) onto gravel road.

0.1 Junction; continue straight ahead.

0.2 Junction; turn left.

0.5 Quarry on right.

Ref.: 53 p. 103.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Mile 59.4 Turn-off (on right) to Jamieson quarry.

Jamieson Quarry

SERPENTINE, TREMOLITE, MICA, TITANITE, GRAPHITE, PYRITE, PYRRHOTITE, MAGNETITE, CHLORITE, TALC, TOURMALINE

In dolomitic marble

Dull green serpentine is common as masses and bands in the limestone. Also abundant are bladed aggregates and crystals of smoky light brown tremolite which also forms bands in the limestone. Other minerals found in the deposit include: amber and greenish blue mica, dark brown titanite, graphite, pyrite, pyrrhotite, magnetite, chlorite, talc, and tourmaline (orange grains). The quarry was opened into a steep hill facing Highway 17. It is 275 feet long with a 20- to 30-foot face and was formerly operated by the Jamieson Lime Company.

Access is via a road, 0.1 mile long, leading east from Highway 17 at Mile 59.4.

Refs.: 14 p. 170; 53 p. 103.

Maps (T): 31 F/7 E Renfrew.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).
1046A Renfrew, Renfrew and Lanark Counties (G.S.C.).

Mile 60.9 Road-cuts expose magnetite-bearing gneiss.

61.4 Junction Highway 60.

Bonnechère Quarry

FOSSILS, CALCITE, CHERT

In limestone

Fossils including corals, bryozoans, crinoids and shells are abundant in fine-grained grey Ordovician limestone. Crystals of white calcite occur in cavities in the limestone; the calcite fluoresces yellow when exposed to ultraviolet rays. Black and white chert has been reported from the deposit.

The quarry was opened on the top of a 100-foot escarpment overlooking the Bonnechère River. Kilns formerly used for lime burning are located across the road from the quarry and are connected to it by an overhead tramway. The tops of the kilns are at the same elevation as the floor of the quarry. The deposit was operated by various companies from 1933 until 1965.

The road log to this quarry is given following the description for the Kneichel quarry.

Refs.: 14 pp. 166-67; 53 p. 101.

Maps (T): 31 F/11 E Golden Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Kneichel Quarry

FOSSILS, CALCITE

In limestone

Ordovician limestone containing corals, gastropods, and crinoids was formerly quarried here. The limestone is fine grained, dark grey and belongs to the Chazy Formation. White crystalline calcite (fluoresces yellow when exposed to ultraviolet rays) occurs in the rock.

The deposit was formerly worked for lime-making and for use in the pulp industry. Two shallow quarries (75 by 150 feet, and 325 by 190 feet) and two kilns were operated. The property belongs to Mr. S.G. Nielson of Bancroft.

Road log from Highway 17 at Mile 61.4:

Mile	0.0	Junction Highways 17 and 60; proceed west along Highway 60.
	1.6	Junction Bonnechère River Road; continue straight ahead.
	7.5	Road-cuts (both sides) expose crystalline limestone containing massive pyroxene and serpentine, pink calcite, light brown tremolite, pyrite, graphite, amber mica, and small grains of light blue apatite, black tourmaline, blue anatase (rare), and brown titanite.

Mile 8.1 Douglas, at junction County Road 5; continue along highway.

11.8 Road-cuts (both sides) expose crystalline limestone and pink pegmatite. The crystalline limestone contains massive pyroxene, bright salmon-pink calcite, greyish green tremolite, amber mica, serpentine, titanite, and hornblende. Red earthy hematite was observed filling spaces between mica flakes. Allanite, pyrite, magnetite, actinolite, mica, titanite, and pyroxene occur in the pegmatite. Rusty-weathered, pyrite-bearing rock is encrusted with white botryoidal rozenite, white acicular gypsum, and yellow powdery jarosite.

12.8 Junction to Pembroke, Cobden; continue along Highway 60.

14.0 Road-cut on right exposes syenite pegmatite containing bronze-yellow prismatic aggregates of scapolite, dark green pyroxene, pyrite, and titanite.

15.7, 16.3, 16.5 Road-cuts expose pegmatite and gneiss. Pegmatite contains sunstone (Mile 16.3, 16.5), pyroxene, titanite, garnet, magnetite, peristerite, serpentine, biotite, and calcite (fluoresces pink).

16.6 Road-cuts (both sides) expose granite gneiss containing pyroxene, titanite, magnetite, and bronze-yellow scapolite.

18.3 Eganville, at junction Highway 41; turn left onto Highway 41.

18.7 Junction; proceed straight ahead onto gravel road.

22.7 Bonnechère quarry on right and kilns on left. To reach Kneichel quarry, continue straight ahead.

23.8 Junction; continue straight ahead.

23.9 Turn right onto quarry road.

24.0 Kneichel quarry.

Refs.: 14 pp. 165-166; 53 pp. 100-101.

Maps (T): 31 F/11 E Golden Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Bonnechère Caves

The Bonnechère caves have been known since 1853 and have been accessible to the public through guided tours since 1955. The cavern consists of three chambers (approximately 10 by 20 feet and 10 feet high, 25 by 15 and 10 feet high, and 15 feet in diameter and 15 feet high) connected by passages that are from 10 to 20 feet high. There are minor passages (2 to 3 feet high) branching from the main channels. The total distance covered by the chambers and

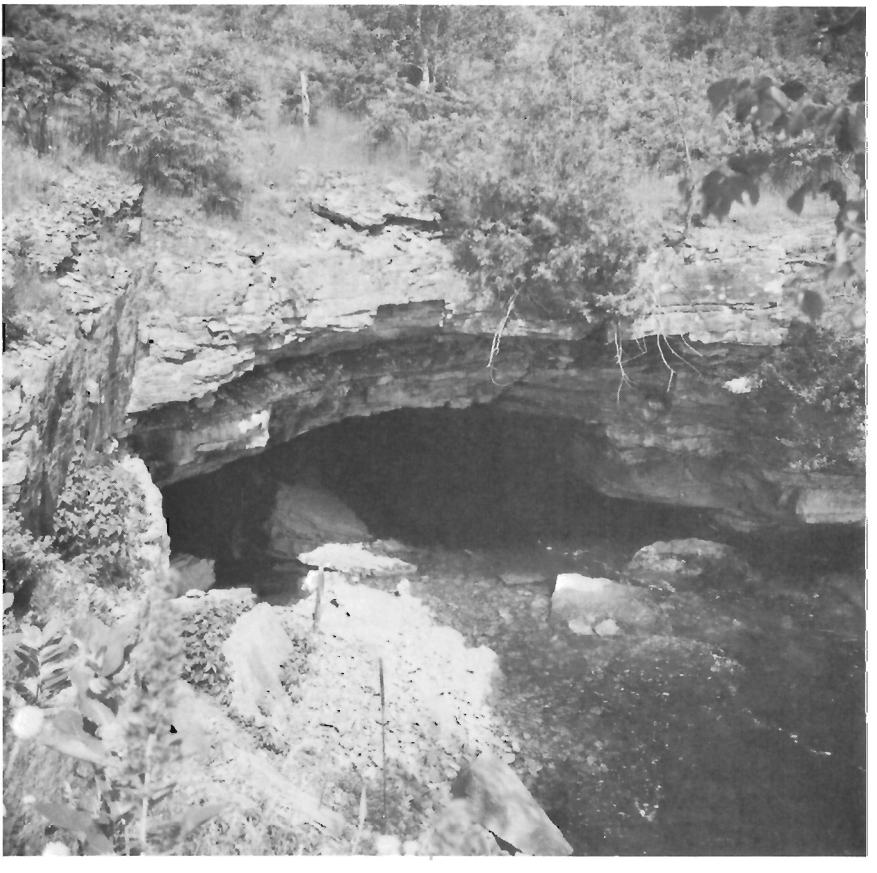


Plate IV. Entrance to Bonnechère Cave at Bonnechère River (GSC 153189).

passages is approximately 1,000 feet making this the most extensive cavern in Ontario. A subterranean stream connects the caves with the Bonnechère River but the entrance used by visitors is a short distance from it and is man-made.

Road log from Highway 17 at Mile 61.4:

Mile	0.0	Junction Highways 17 and 60; proceed along Highway 60 following road log toward Kneichel quarry.
	23.8	Junction; turn left.
	24.1	Entrance to caves.

Ref.: 10 pp. 22-25.

Maps (T): 31 F/11 E Golden Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Road log for side trip to Eganville-Quadeville-Combermere area (underlined localities are described in the text following road log). An alternate route is given on pages 50 and 64.

Mile 0.0 Eganville, at junction Highways 41 and 60; proceed south onto Highway 41.

0.7 Junction; turn right onto Highway 512.

6.6 Junction Lake Clear cottage road to Smart and Meany Mines.

8.9 Road-cuts expose mica-apatite-calcite veins cutting red syenite. Small brown titanite crystals occur in the calcite and syenite. A trail on the left side of the highway leads 100 feet to a small pit exposing a calcite vein containing red apatite and dark green pyroxene crystals, and brown titanite. The calcite is pale pink and it fluoresces pink when exposed to ultraviolet rays.

9.1 to 9.2 Road-cuts expose pink syenite containing titanite, magnetite, and pyroxene. On the right side of the road, just beyond a house, and up a slope facing the road there is a pit exposing a calcite vein in syenite. Crystals of deep red apatite, black hornblende, and dark green pyroxene, and some titanite and mica occur in the calcite. The apatite crystals measure up to 2 inches in diameter. To reach the occurrence proceed up the hill along an outcrop area for about 100 yards to the pit in a lightly wooded area.

9.5 Junction to Lake Clear and Turner's Island Mine. A small road-cut opposite this junction exposes green epidote veinlets in hornblende gneiss.

15.5 Junction to C.F.S. Foymount; continue straight ahead.

16.0 Road-cuts expose syenite pegmatite containing abundant maroon-red apatite in massive form and as crystals measuring up to 1 1/2 inches in diameter. Dark brown titanite crystals (1/2 inch in diameter), magnetite, and large hyacinth-red zircon crystals are also present. Red sunstone, an orthoclase feldspar with gold flecks, was observed in coarse pegmatite at the west end of the cut.

16.1 Junction Highway 515; proceed along Highway 515.

18.4 Red syenite exposure on left contains small red apatite crystals with titanite, tourmaline, and pyroxene.

19.3 Road-cuts on left opposite Anderson Lake. Red apatite occurs in a pink calcite vein cutting red syenite. Titanite, pyroxene, mica, and greyish pink sunstone occur in the syenite.

Mile 27.3 Quadeville, at junction Letterkenny Road to Quadeville beryl mine. The road log continues along Highway 515.

28.3 Road-cuts expose crystalline limestone containing grains and aggregates of amber mica, graphite, green serpentine, diopside, amber tourmaline, light green amphibole, brown titanite, tan dolomite, and colourless columnar scapolite.

28.8 Turn-off (left) to the G.E. McCoy residence where arrangements may be made to visit the Quadeville beryl and rose quartz mines.

28.9 Junction single lane road on right to the Quadeville rose quartz mine.

30.6 Junction road to Rosenthal and to Gutz and Michaelis occurrences.

32.9 Junction gravel road to Edgemont Mine.

36.9 Jewellville, at junction on north side of bridge over Madawaska River and turn-off to Jewellville corundum occurrence.

43.1 Junction Highway 62 and turn-off to Craigmont and Burgess Mines.

Meany Mine

APATITE, HORNBLENDE, PYROXENE, SCAPOLITE, TITANITE, MICA, CHLORITE, CALCITE, ZIRCON

In crystalline limestone

Maroon-red apatite (massive and crystals) is associated with black hornblende, dark green pyroxene, yellowish green scapolite, dark brown titanite, and less abundantly, with amber mica and chlorite in bright salmon-orange coarsely crystalline calcite. During mining operations, large well-formed crystals of hyacinth red zircon, titanite, and apatite were found.

The deposit was worked briefly for apatite from several small pits, the deepest measuring 25 feet deep. Between 1880 and 1883, 300 tons of apatite were removed. The workings are now partly overgrown. Fairly large dumps lie adjacent to the pits. The mine is on the property of Frank and August Miller of Eganville.

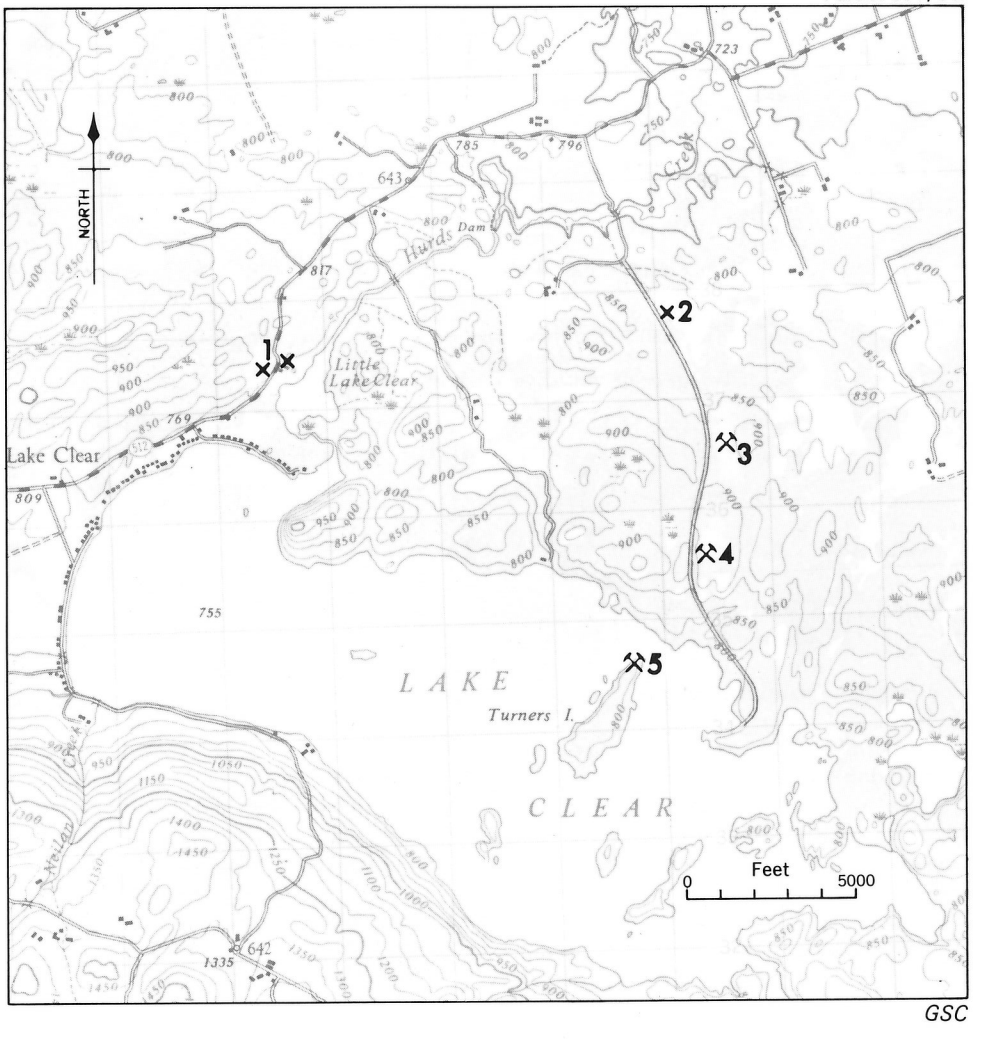
Roadlog from Mile 6.5 of side trip to Eganville-Quadeville-Combermere area (see page 32):

Mile 0.0 Turn left onto the Lake Clear cottage road.

0.7 Fork; bear left.

0.75 Junction single lane road on left. This road leads 100 feet to a small pit and dump. Pinkish red apatite crystals (about 1/2 inch in diameter) occur with dark amber mica, actinolite, chlorite, and dark green pyroxene crystals in light pink calcite.

2.55 Junction mine trail in clearing on left. Beyond the clearing the trail is overgrown and obscure. From the clearing proceed



1,2. Apatite pits.
3. Meany Mine.
4. Smart Mine.
5. Turner's Island Mine.

Map 4. Lake Clear area.

Plate V. Twinned zircon crystal with pyroxene in calcite, Turner's Island Mine (GSC 201420-E, scale in mm).

Mile 2.55 along the north side of a low wooded ridge (there is a swampy area to the left) for approximately 500 yards to the mine.

Refs.: 60 p. 59; 66 p. 7.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Smart Mine

APATITE, TITANITE, ORTHOCLASE, HORNBLENDE, PYROXENE, MICA, ZIRCON, CHLORITE, PYRITE, CALCITE, CROCIDOLITE

In crystalline limestone

Large crystals of apatite, titanite, zircon and orthoclase have formerly been recovered from this deposit. The apatite crystals are similar in colour to those occurring at the Meany Mine. Dark brown titanite crystals and

orthoclase crystals are associated with the apatite in pink calcite. Hornblende and pyroxene are common. Other minerals associated with the deposit include amber mica, pink zircon (crystals averaging 1/2 inch long), dark green chlorite, and pyrite. Silvery green fibrous crocidolite occurs on feldspar. Crystal specimens from both the Meany and Smart Mines have been acquired by numerous important museums.

The mine was worked briefly some time before 1880. It consists of a few small pits, now overgrown. Small dumps surround the openings located along the west side of a low ridge overgrown with junipers. The mine is on the property of Frank and August Miller of Eganville.

Road log from Mile 6.5 of side trip to Eganville-Quadeville-Combermere area (see page 32):

Mile 0.0 Turn left onto Lake Clear cottage road.

2.55 Junction trail to Meany Mine.

3.1 Smart Mine on left 100 yards from road. Proceed east through woods to mine on ridge.

Both the Meany and Smart Mines may be reached by proceeding south from Mr. Herb Lenser's farm located 1.4 miles south of Highway 512 at Mile 5.5 (of side trip to Eganville-Quadeville-Combermere area).

Refs.. 60 p. 59; 66 p. 7.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Turner's Island Mine

APATITE, SCAPOLITE, PYROXENE, HORNBLENDE, TITANITE, MICA, CALCITE, ZIRCON

In veins cutting hornblende gneiss

Maroon-red to brownish red apatite crystals measuring up to 3 inches in diameter can readily be found in the dumps at this former apatite mine. Larger crystals are less common. Also abundant are greyish white to yellowish green scapolite (fluoresces pink under 'short' ultraviolet rays) and dark green pyroxene, both as crystals and in massive form. Less common are hornblende, titanite (dark brown brilliant crystals measuring up to 2 inches long), and dark brown mica. These minerals occur in salmon-orange to pale pink calcite. Outstanding crystals formerly found in this deposit include: a 700-pound apatite crystal; a zircon crystal measuring 1 foot in diameter; a titanite crystal measuring over 1 foot long, now in the Harvard University collection; titanite crystals each weighing 40 pounds; and twinned crystals of zircon.

The mine, consisting of several pits, was worked between 1879 and 1882. In 1943 one of the pits was re-opened for rare-element minerals. The pits measure 175 by 3 to 15 feet and 2 to 12 feet deep, 10 by 15 feet and 5 feet deep, and a 40-foot trench with a pit 20 feet wide at one end. The mine is located in the north end of Turner's Island in Lake Clear, approximately 3 miles east of the west end of the lake.

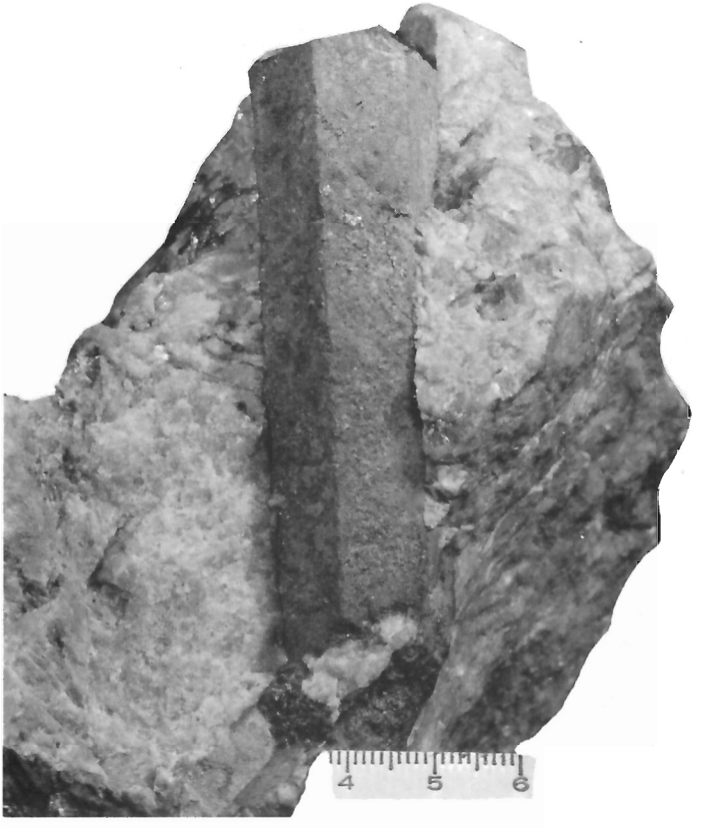


Plate VI.
Beryl crystal in pegmatite, Quadeville beryl mine.
(GSC photo 201420-U, scale in mm)

Access is by boat which may be rented from the lodge on Lake Clear 0.05 miles south of Mile 9.5 of the side trip to the Eganville-Quadeville-Combermere area (page 32).

Refs.: 53 pp. 18-19; 66 p. 7.

Maps (T): 31 F/6 E Brudenell.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Quadeville Beryl Mine

BERYL, PERISTERITE, CLEAVELANDITE, AMAZONITE, MICA, QUARTZ, LYNDOCHITE, ZIRCON, ALLANITE, TOURMALINE, GARNET, FLUORITE, APATITE, MAGNETITE, CYRTOLITE, MONAZITE

In pegmatite dyke cutting hornblende gneiss and granite

Beryl was formerly mined from this deposit. It occurs as blue-green crystals generally less than 1 inch in diameter, although during mining operations, crystals measuring up to 8 inches in diameter and 3 feet long were encountered. Some of the beryl grades to an emerald green colour but most

Plate VII.

Curved tourmaline crystal and tourmaline crystal aggregates in quartz, Quadeville beryl mine. (GSC photo 201420-F, scale in mm)

of it is not of gem quality. It occurs in pegmatite consisting of white peristerite (shows blue play of colour), cleavelandite, amazonite (uncommon), microcline, mica, and quartz (smoky and pinkish). Accessory minerals include: dark brown lyndochite, zircon, columbite, black platy allanite, black tourmaline crystals, reddish brown garnet, purple fluorite, green apatite, and magnetite. Dull brown monazite has also been reported.

The mine consists of an open cut measuring 225 feet by 30 feet and 6 to 26 feet deep. The occurrence has been known since 1897 and was opened for beryl in 1926 by Mr. T.B. Caldwell of Perth. An estimated 2 to 4 tons of beryl crystals were recovered. A further shipment of 4,456 pounds of beryl was made to Germany in 1927. Canadian Beryllium Mines and Alloys Limited operated the deposit in 1939 and is responsible for most of the development of the property which belongs to Mr. G.E. McCoy of Quadeville. Arrangements for visits to the mine should be made with Mr. McCoy.

Road log from Mile 27.3 of side trip to Eganville-Quadeville-Combermere area (see page 32):

Mile 0.0 Quadeville; proceed north along Letterkenny Road.

Mile 1.2 Junction mine road; turn right.

1.5 Mine.

Refs.: 9 pp. 228-230; 11 p. 30; 21 pp. 36-41; 37 pp. 25-26; 47 p. 25; 53 pp. 20-22, 97-98.

Maps: (T): 31 F/6 W Brudenell.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Quadeville Rose Quartz Mine

ROSE QUARTZ, BERYL, PERISTERITE, COLUMBITE, EUXENITE, FERGUSONITE, GARNET, TOURMALINE, FLUORITE, HORNBLENDE, MICA, SPECULARITE, MAGNETITE, PYRITE, GRAPHIC GRANITE

In pegmatite

Massive rose quartz that exhibits the star effect (asterism) when cut en cabochon occurs in this former feldspar-beryl mine. The rose quartz has an attractive mauve tint. The principal constituents of the pegmatite are pink microcline, white, smoky and rose quartz, pink and white peristerite, light green muscovite, and biotite. The beryl was found as bluish green to deep green crystals measuring up to 8 inches in diameter. Among the rare-element minerals occurring in the deposit are: columbite, as dark brown platy aggregates; dark brown to black euxenite; and fergusonite. Other minerals found in the deposit include red garnet, black tourmaline, purple fluorite, black hornblende, specularite, magnetite, and pyrite. Pink graphic granite with a medium texture is found in thepegmatite; it is suitable for lapidary purposes.

The deposit was opened for beryl in 1935 by Renfrew Minerals Limited but results proved to be disappointing. The company, however, operated the deposit for feldspar and extracted 675 tons in a two-year period. From 1948 until 1950 Canadian Beryllium Mines and Alloys Limited worked the deposit for beryl and feldspar. Rose quartz is now being extracted by Mr. G. E. McCoy. The openings, extending from west to east, consist of a T-shaped cut in which the rose quartz is exposed, an open-cut measuring 130 feet by 80 feet, and an open-cut (20 feet by 75 feet) from which the beryl was obtained. The property belongs to Mr. G. E. McCoy of Quadeville who conducts visits to the mine.

Road log from Mile 28.9 of side trip to the Eganville-Quadeville-Combermere area (see page 32):

Mile 0.0 Turn right (north) onto single lane road.

0.3 Fork; follow the left fork.

1.2 Mine.

Refs.: 9 p. 230; 11 pp. 30-31; 21 pp. 42-45; 47 p. 25; 53 pp. 23, 98-99.

Maps (T): 31 F/6 W Brudenell.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Plate VIII. Gutz corundum occurrence (GSC 153184).

Gutz Corundum Occurrence

CORUNDUM, SCAPOLITE, PYRITE, SODALITE, CANCRINITE

In syenite pegmatite

Bronze to blue-grey corundum crystals averaging about 1 inch in diameter occur in white pegmatite. Crystals measuring up to 5 inches in diameter have been reported. Greenish yellow turbid scapolite impregnated with pyrite crystals was found in the dump near the pit. In a nepheline pegmatite outcrop 40 yards north of the pit, slender crystals of corundum occur with small patches of sodalite and cancrinite.

The deposit was discovered by Provincial geologists in about 1897 soon after the corundum deposits at Carlow became known. The outcrop was blasted and the rock was shipped to the Kingston School of Mining for mill tests. Further shipments were made to the mill at Palmer Rapids. Prior to the discovery of this corundum deposit, the nepheline syenite was recovered from the outcrops and burned in a kiln located near the farm lane; the syenite was, however, mistaken for crystalline limestone. The property belongs to Mr. E. Gutz.

Road log from Mile 30.6 of side trip to Eganville-Quadeville-Combermere area (see page 32):

Mile 0.0 Turn right (north) onto road to Rosenthal.

5.1 Junction at Rosenthal church; continue straight ahead.

5.7 Turn-off to Gutz farm on right. The pit is on the hill facing the road and about 200 feet from the road. To visit the deposit, enquire at the farmhouse.

Refs.: 21 p. 50; 34 p. 222; 53 pp. 28-29.

Maps (T): 31 F/6 W Brudenell.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew, Ontario (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Michaelis Corundum Occurrence

CORUNDUM, MAGNETITE

In syenite gneiss

Corundum crystals occur with small magnetite grains in white and red syenite. The crystals average about 1/2 inch in diameter and range in colour from pinkish brown to bluish and brownish grey.

The deposit has been exposed by a small pit (60 by 15 feet and 6 to 10 feet deep) in a pasture on the farm of Mr. A. Michaelis. The pit is water-filled and is surrounded by small piles of corundum-bearing rock.

Road log from Mile 5.1 of road log to the Gutz occurrence:

Mile 0.0 Junction at Rosenthal church, turn left (west).

0.6 Junction at school; turn right.

0.9 End of road at the Michaelis farmhouse. Arrangements may be made here to visit the pit located at the edge of a wooded area approximately 300 yards north of the barn.

Refs.: 21 p. 54; 53 pp. 30-31.

Maps (T): 31 F/6 W Brudenell.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew, Ontario (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Edgemont Mine

MOLYBDENITE, GRAPHIC GRANITE, PYRITE, MAGNETITE, PYRRHOTITE, HORNBLENDE, CALCITE, PYROXENE, TREMOLITE, MICA, APATITE

In pegmatite dyke cutting crystalline limestone

Molybdenite occurs in the pegmatite and, less commonly, in crystalline limestone. The pegmatite is composed of pink graphic granite, plagioclase feldspar and biotite. In the pegmatite, pyrite, pyrrhotite, magnetite, hornblende, and calcite are associated with the molybdenite. Disseminated grains of pyroxene, light brown amphibole, amber mica, apatite, and molybdenite occur in the crystalline limestone.

This mine, also known as the Liedke and Windle Mine, was operated for molybdenite in 1917 and between 1939 and 1942. During the latter period, Edgemont Molybdenite Mines Limited did most of the development of the deposit and produced 27 tons of 0.75 per cent molybdenite. The mine consists of two trenches (100 feet and 70 feet long) and a 40-foot shaft extending over a distance of about 250 yards in a north-south direction along the side of a lightly wooded low ridge. The deposit is on the farm of Mr. Gordon Liedtke.

Road log from Mile 32.9 of side trip to the Eganville-Quadeville-Combermere area (see page 32):

Mile	0.0	Turn left (south) onto gravel road.
	2.3	Junction at Cedar Grove School; turn right.
	2.35	Junction single lane road opposite school; turn left.
	2.65	Trench on right at bend in road.
	2.80	Drill-shed on left; the second trench is located on the slope about 100 yards above the shed.

Refs.: 11 pp. 15-16; 21 pp. 76-77; 28 p. 63; 53 p. 87.

Maps (T): 31 F/6 W Brudenell.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew, Ontario (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Jewellville Corundum Occurrence

CORUNDUM

In syenite gneiss

A series of pits have been opened along a wooded ridge northeast of the bridge at Jewellville. The corundum occurs as grains and as bronze crystals averaging 1/2 inch in diameter. The pits and connecting roads are now largely overgrown and are not readily found.

Numerous pits were worked between 1901 and 1907 and between 1915 and 1918. In the latter period, Manufacturers Corundum Company operated the deposit and a nearby mill which was transferred from Burgess Mines.

Road log from Mile 36.9 of side trip to Eganville-Quadeville-Combermere area (see page 32):

Mile 0.0 Jewellville at north end of bridge over Madawaska River; turn right (east).

0.5 Old mill-site on right. Park here and proceed up trail on opposite side of road. The trail leads to the pits along the crest of the ridge. The first pit is located about 350 yards from the road.

Refs.: 21 pp. 60-61; 53 pp. 34-35.

Maps (T): 31 F/5 E Barrys Bay.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew, Ontario (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Craigmont (Craig) Mine

CORUNDUM, SCAPOLITE, FELDSPAR, HORNBLENDE, PYROXENE, GARNET, MICA, TITANITE, MAGNETITE, CHLORITE, PYRITE, MOLYBDENITE, MONAZITE, ZIRCON, APATITE, SPECULARITE, EPIDOTE, JAROSITE, EUXENITE, ALLANITE, ZEOLITES

In syenite pegmatite

Corundum, which was formerly recovered from this deposit, occurs as crystals measuring up to 3 inches in diameter and as grains and aggregates. The colour ranges from blue-grey, greenish grey, brownish grey to bronze. It generally occurs in feldspar or in light green scapolite. The largest crystal found measures 8 inches by 6 1/4 inches and is now in the Royal Ontario Museum, Toronto. Other minerals that can readily be found on the dumps include hornblende, pyroxene, dark red garnet (1/2 inch crystals, and crystal aggregates), muscovite, biotite, brown titanite (small crystals), chlorite, magnetite (crystals), pyrite, and molybdenite. Occurring less abundantly are: monazite (yellow grains), zircon (pink prisms), apatite (light green), specularite, and epidote. Jarosite occurs as an earthy yellow to rusty coating on the rock. Euxenite, allanite, and zeolites have previously been reported from the deposit.

This deposit was discovered in about 1876 when a young girl drew the attention of her father, Mr. Henry Robillard, to some corundum crystals in an outcrop on the hill on her father's property. To her the crystals resembled cruet-bottle stoppers. The crystals were compared to the Lake Clear

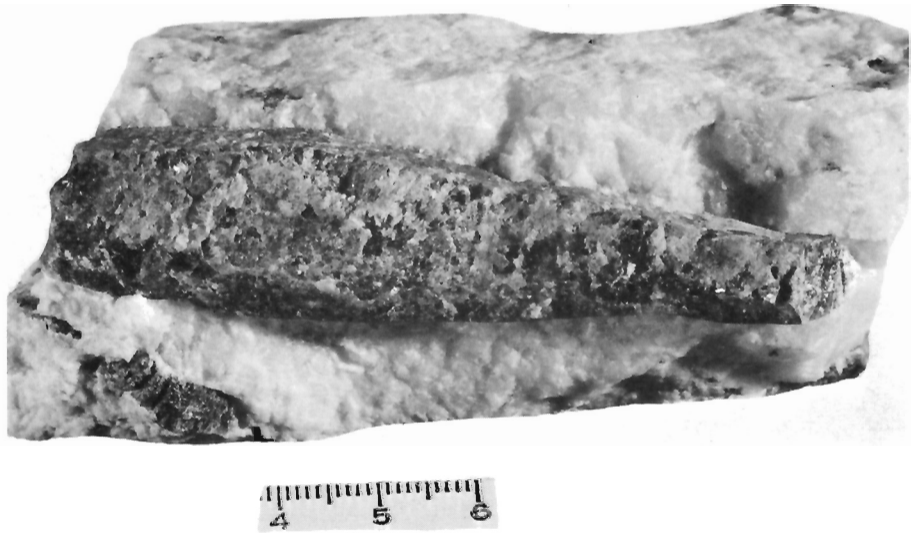


Plate IX. Corundum crystal in nepheline syenite, Craigmont Mine. (GSC photo 201420-D, scale in mm)

Plate X. Craigmont Mine on Robillard Mountain (GSC photo 153190).

apatite crystals, were mistaken for that mineral, and plans were made to mine phosphate. It was not until 10 years later that the mineral was identified as corundum by a geologist, Mr. Hubert Ross Wood. A few years later federal and provincial geologists surveyed the corundum-bearing rocks in the area and within a few years, mining operations commenced.

This mine was the province's first producer of corundum. Mining operations were conducted on the south and west slopes of Robillard Mountain by the Canada Corundum Company (1900-1908) and by the Manufacturers Corundum Company (1909-1913). At that time the deposit was regarded as the largest corundum deposit in the world. A mill was located near the south workings. Corundum was produced from the dumps in 1920-21 and from 1944 until 1946. The total production from the deposit amounted to 20,758 tons which was 84 per cent of Canada's total production of corundum. There are over twenty open-cuts (largest is 500 feet by 10 feet) and an adit on the south slope, and 11 open-cuts (largest is 320 feet by 100 feet) on the west slope; the distance between the two is approximately 1,200 yards. The workings on the south slope are the more accessible and are visible from the road. There are extensive dumps along the slope.

Road log from Mile 43.1 of side trip to the Eganville-Quadeville-Craigmont area (see page 32):

Mile	0.0	Junction Highways 62 and 515; proceed west along Highway 62 toward Combermere.
	0.3	Combermere, at junction Highway 517; turn left onto Highway 517.
	1.4	Junction Craigmont Road; continue along highway.
	5.8	Junction single lane road; turn left.
	6.2	The western pits are located on the hill on left.
	6.4	Fork; bear left.
	7.1	The dumps on the south slope of Robillard Mountain are visible on left.
	7.25	Remnants of old mill on both sides of road. A trail on the left leads to the open-cuts beginning 300 yards from the mill-site.

Refs.: 3 pp. 16-27; 5 pp. 102-116; 7 pp. 15-16; 9 pp. 230-231; 21 pp. 56-60; 53 pp. 11, 32-33.

Maps (T): 31 F/5 E Barrys Bay.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew (Ont. Dept. Mines).
53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Burgess Mine

CORUNDUM, SCAPOLITE, HORNBLENDE, MAGNETITE, MUSCOVITE, BIOTITE, TITANITE, PYRITE, EPIDOTE, CHLORITE, ZIRCON, RUTILE

In syenite and pegmatite

Corundum occurs as pinkish brown to grey crystals and as irregular masses. It is associated with feldspar, light green granular scapolite, hornblende, magnetite, muscovite, and biotite. Occurring less abundantly are titanite, pyrite, epidote, chlorite, zircon (tiny pink prisms), and rutile (tan-coloured). Radioactive minerals have been reported from the deposit.

This corundum deposit was discovered in 1896 by W. F. Ferrier of the Geological Survey of Canada who investigated the occurrence after identifying some corundum specimens from the area sold to him mistakenly as pyroxene crystals. Mining operations commenced in 1902 by the Ontario Corundum Company. An opening was made into the side of a cliff, a mill was installed, and the location was known as Burgess Mines. During the next ten years various companies worked the deposit including Manufacturers Corundum Company, the last operator which at the same time operated the Craigmont Mine. The openings include two main cuts into the cliff (100 feet and 75 feet long) and several small cuts in the hill to the northeast.

Road log from Mile 43.1 of side trip to the Eganville-Quadeville-Craigmont area (see page 32):

Mile	0.0	Junction Highways 62 and 515; proceed west along Highway 62 towards Combermere.
	0.3	Combermere at junction Highway 517; proceed onto Highway 517 towards Craigmont Mine.
	5.8	Turn-off to Craigmont Mine; continue straight ahead.
	9.9	Junction Boulter-New Carlow Road; turn right.
	11.1	Junction single lane road; turn right.
	11.3	Fork; bear right.
	11.7	Burgess Mine on right.

Refs.: 3 pp. 18-19, 28-30; 7 pp. 14-15; 9 p. 231; 22 p. 32.

Maps (T): 31 F/5 E Barrys Bay.
(G): 1954-3 Monteagle and Carlow Townships, Ontario (Ont. Dept. Mines, 1 inch to 1/2 mile).

This is the last occurrence described for the side trip to the Eganville-Quadeville-Combermere area; the main road log along Highway 17 is resumed.

Plate XI. Berger amazonite occurrence (GSC 153182).

Mile 61.4 Junction Highways 60 and 17.

Berger Amazonite Occurrence

AMAZONITE, PERISTERITE, QUARTZ, MICA, GRAPHIC GRANITE, TOURMALINE, ACTINOLITE, CHLORITE, PYRITE, JAROSITE, GOETHITE

In pegmatite dyke cutting biotite gneiss

Apple-green amazonite, white plagioclase, pink microcline and colourless to smoky quartz are the principal constituents of the pegmatite. White peristerite, pink perthite, and pink and light green graphic granite are also present. The amazonite, peristerite and graphic granite are suitable for lapidary purposes. Minerals occurring less commonly in the pegmatite are biotite, black tourmaline, actinolite, dark green massive chlorite, pyrite (coated with jarosite), and goethite.

The deposit has been exposed by a pit in a pasture on the Albert Berger farm.

Road log from Highway 17 at Mile 61.4:

Mile 0.0 Junction Highways 17 and 60; proceed along Highway 60.

20.8 Junction Highways 41 and 60 (north of Eganville); proceed onto Highway 41.

20.85 Junction Germanicus Road; turn left.

22.95 Turn left onto farm lane to the Albert Berger farm.

23.1 Farmhouse; obtain permission to visit the occurrence. The pit is in the pasture approximately 300 yards west of the house.

Ref.: 50 p. 93

Maps (T): 31 F/11 E Golden Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Biederman Quarry

GRAPHITE, MICA, TREMOLITE, TOURMALINE, SERPENTINE, APATITE, CALCITE, QUARTZ

In crystalline limestone

The limestone is greyish white and contains disseminated amber mica, graphite, light green and tan-coloured tremolite, orange tourmaline, green serpentine, and light blue apatite (uncommon). Crystals of amber mica measuring an inch in diameter are common. Massive white calcite and colourless quartz are also present.

The quarry was worked in the 1930s for the production of lime for local use. A wood-burning kiln was operated at the quarry site. The quarry, now partly overgrown, is located near the top on the south slope of a ridge.

Road log from Highway 17 at Mile 61.4:

Mile 0.0 Junction Highways 17 and 60; proceed west along Highway 60.

18.3 Eganville, at junction Highway 41; proceed along Highway 60/41.

20.8 Junction; proceed along Highway 60.

27.1 Golden Lake; turn right onto Lake Dore Road (Renfrew County Road 30).

33.5 Junction single lane gravel road; turn left. (This junction is 4.2 miles west of the junction of Highway 41 and Renfrew County Road 30).

Mile 34.2 Gate. The quarry is to the right (east) of the gate and south of the farm buildings.

Refs.: 14 pp. 164-165; 53 pp. 109-110.

Maps (T): 31 F/11 E Golden Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Madawaska Feldspar Quarries

The description of these quarries is given following the road log.

Road log to Madawaska feldspar quarries:

Mile 0.0 Junction Highways 17 and 60; proceed west along Highway 60.

18.3 Eganville, at junction Highway 41; continue along Highway 60.

27.1 Golden Lake, at junction Lake Dore Road; continue along highway.

28.5 Road-cut on left exposes crystalline limestone and pegmatite. Massive grey scapolite, hornblende and calcite, and grains of pyroxene, titanite, amber mica, pyrite, orange chondrodite, brown serpentine, light blue apatite (uncommon), and yellow amphibole occur in the crystalline limestone. Aggregates of white flaky talc were noted in the limestone. Red earthy hematite occurs between flakes of mica. Titanite, pyrite and chlorite occur in the pegmatite.

29.4 Road-cut on right exposes pink pegmatite containing titanite crystals (measuring up to 1 inch long), massive magnetite, and dull greyish green to tan-coloured bastnaesite.

38.8 Junction Highways 512/62.

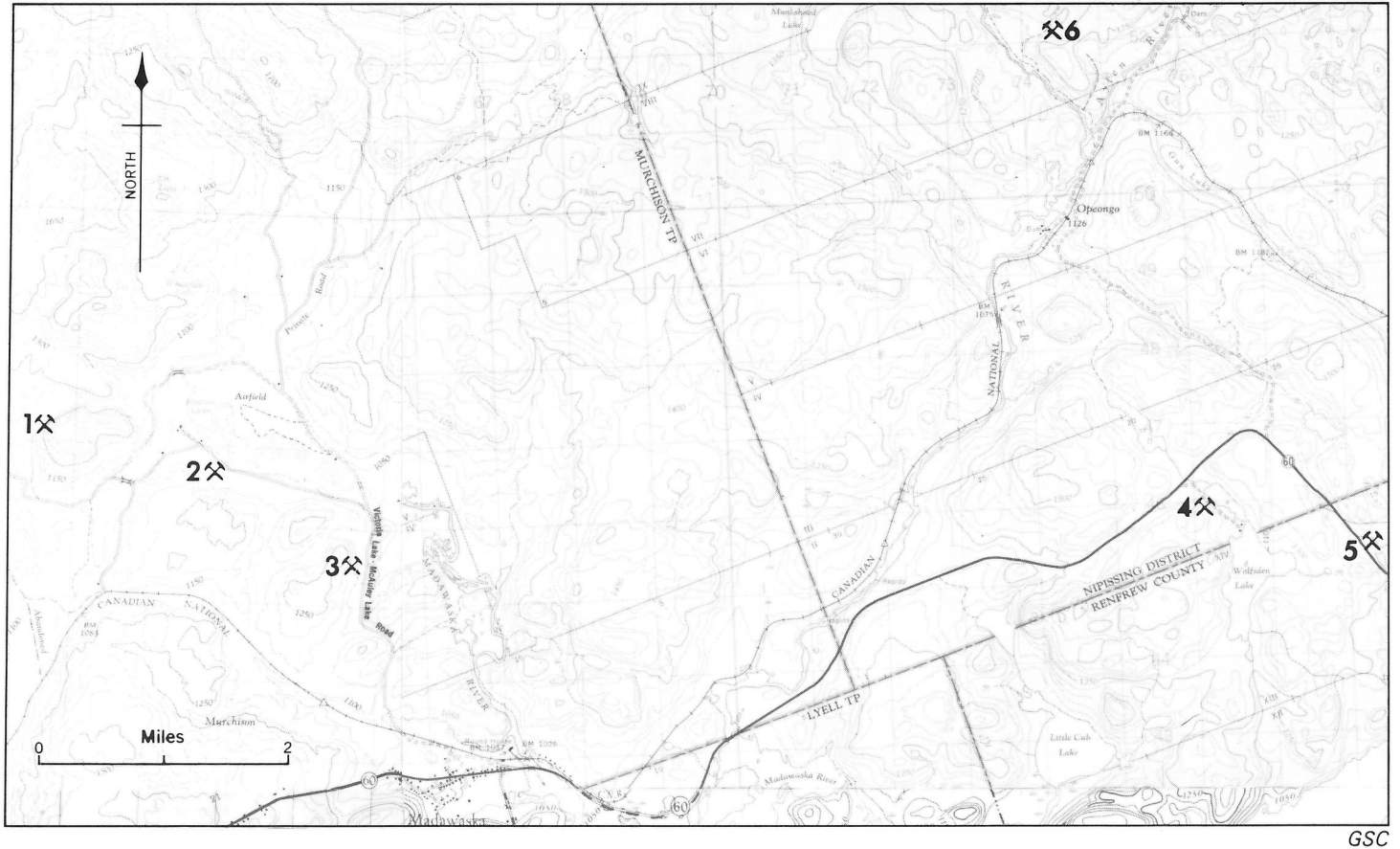
Road-cuts

TREMOLITE, GRAPHITE, PYRITE, HORNBLENDE, MICA, TITANITE, ZIRCON, ANATASE, BASTNAESITE, GRAPHIC GRANITE, APATITE, SCAPOLITE, TOURMALINE, PYROXENE

In pegmatite and crystalline limestone

Light green radiating tremolite is abundant in a pegmatite exposed on both sides of Highway 512 at a point 7.8 miles south of its junction with Highway 60. Associated with it are graphite, pyrite, massive hornblende, mica, dark brown titanite, pink zircon (tiny prisms), dark brown anatase (loose, granular

Parts of 31 E/8 E, 31 E/9 E, 31 F/5 W and 31 F/12 W



GSC

1. Cameron quarry.
2. Cameron and Aleck quarry.
3. J.G. Gole quarry.
4. Lake quarry.
5. Deady quarry.
6. Five Mile quarry.

Map 5. Madawaska area.

aggregates), and bastnaesite (dull greyish green to greyish brown laths). Pink and greyish white medium textured graphic granite also occurs in the pegmatite.

A road-cut on the Brudenell-Rockingham Road exposes crystalline limestone and white pegmatite. Tremolite, graphite, mica and light blue apatite (uncommon) occur in the limestone, and tremolite, yellow granular scapolite, black tourmaline, pyroxene, and titanite occur in the pegmatite.

Road log from Highway 60:

Mile 0.0 Junction Highways 512/62 and 60; proceed south along Highway 512 through Killaloe.

7.8 First road-cut (both sides of highway).

9.4 Brudenell, at junction Rockingham Road; turn right.

9.8 Second road-cut (on right).

Maps (T): 31 F/6 W Brudenell.
(G): 1953-2 Brudenell-Raglan area, County of Renfrew, Ontario (Ont. Dept. Mines).

The road log along Highway 60 to the Madawaska feldspar quarries is resumed.

Mile 48.9 Road-cut on left exposes pink pegmatite containing massive magnetite.

50.0 Road-cut on left exposes biotite gneiss containing massive magnetite and taffy-brown allanite.

53.5 Barry's Bay, at junction Highway 62.

Road log to Combermere-Quadeville-Eganville collecting area:

Mile 0.0 Barry's Bay, junction Highways 60 and 62; proceed south along Highway 62.

2.4 to 4.9 Road-cuts expose biotite-hornblende gneiss containing garnet (1/4 inch in diameter), titanite, and pyrite.

6.9 Junction Chippewa Road.

8.5 Road-cuts expose biotite gneiss containing red garnet crystals and aggregates measuring up to 1 inch in diameter.

10.7 Junction Highway 515. To reach the Craigmont and Burgess Mines, turn right (see page 46); turn left to reach the Quadeville-Eganville area (see page 32).

The road log along Highway 60 to the Madawaska feldspar quarries is resumed:

Mile 53.5 Barry's Bay at junction Highways 60 and 62; continue west along Highway 60.

57.1 Entrance to Carson Lake Provincial Park.

62.4 Deady quarry at west end of small lake on right.

62.6 Junction single lane road on right.

63.7 Junction Aylen Lake Road to Five Mile quarry.

64.6 Junction Spectacle Lakes Road to Lake quarry.

71.3 Madawaska, at junction Highway 523; continue straight ahead.

71.7 Madawaska, at junction Victoria Lake, McAuley Lake Road to J.G. Gole, Cameron and Aleck, and Cameron quarries.

Deady Quarry

QUARTZ CRYSTALS, GRAPHIC GRANITE

In pegmatite

Quartz crystals measuring up to 1 inch in diameter occur in cavities in massive quartz and feldspar. The pegmatite is composed of microcline, quartz, plagioclase, chlorite, and mica. Medium-textured pink graphic granite is also present.

The quarry was operated in 1942 by Keystone Contractors, Limited. Small amounts of feldspar and quartz were recovered. The quarry is located at the west end of a small lake at Mile 62.4 and is visible from the highway. Access to it is by the single lane road at Mile 62.6.

Ref.: 53 p. 39.

Maps (T): 31 F/12 W Round Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1inch to 2 miles).

Five Mile Quarry

ALLANITE, GARNET, CHLORITE, BIOTITE, FELDSPAR, QUARTZ, GRAPHIC GRANITE, PYROXENE, TITANITE

In pegmatite

Allanite occurs as dull brown laths in white plagioclase feldspar. Associated with it are pink garnet and chlorite. The pegmatite is composed of plagioclase, microcline, quartz, and biotite. White graphic granite is also present. Excellent crystals of pyroxene (augite) and titanite occur in the pegmatite.

The quarry now partly overgrown, was operated for feldspar by Keystone Contractors Limited in 1947-48. Some 5,000 tons of feldspar were removed.

Road log from Highway 60 at Mile 63.7:

Mile 0.0 Turn right onto the Aylen Lake Road.

3.7 Junction single lane road at gravel pits; turn left.

3.8 Aylen River. Walk across the river and continue along the road for 3/4 mile to a fork, follow the right fork for about 1/2 mile to the quarry on the west side of the ridge.

Ref.: 19 p. 12.

Map (T): 31 F/12 W Round Lake.

Lake Quarry

FELDSPAR, QUARTZ, GRAPHIC GRANITE, BIOTITE, CHLORITE

In pegmatite

Pink microcline, greyish white plagioclase, and colourless, smoky to white quartz are the chief constituents of the pegmatite. Pink and white, fine- to medium-textured graphic granite, biotite, and massive dull green chlorite also occur in the dyke.

The quarry is located on the east side of a ridge overlooking Spectacle (Wolfsden) Lake. It was operated by W.B. Cameron.

Road log from Highway 60 at Mile 64.6:

Mile 0.0 Turn left (south) onto the Spectacle Lakes Road.

0.4 Quarry and dump on right.

Ref.: 19 p. 12.

Maps (T): 31 F/12 W Round Lake.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Plate XII. Muscovite crystal in pegmatite, J.G. Gole quarry.
(GSC photo 201420-G, scale in mm)

J.G. Gole Quarry

PERISTERITE, SUNSTONE, FELDSPAR, QUARTZ, BIOTITE, GRAPHIC GRANITE, CHLORITE, FERGUSONITE, MAGNETITE

In pegmatite

Pink peristerite and greyish pink sunstone suitable for lapidary purposes occur in this quarry. The sunstone (orthoclase) has attractive reddish gold flecks in it. The pegmatite consists of pink microcline, white to grey plagioclase, white to smoky quartz, biotite, and graphic granite. The plagioclase exhibits good twinning striations. Accessory minerals in the pegmatite include chlorite, allanite, magnetite, and dark brown fergusonite crystals. During mining operations large crystals of feldspar, including one which produced 300 tons of feldspar, were encountered.

This was the largest feldspar mine in the Madawaska district with a production of close to 10,000 tons of feldspar. Quartz was also mined. The mine consists of two open-cuts (500 feet and 70 feet long) into the southeast side of a hill. It was operated from 1937 until 1944 by J.G. Gole and D.L. Ross.

Road log from Highway 60 at Mile 71.7:

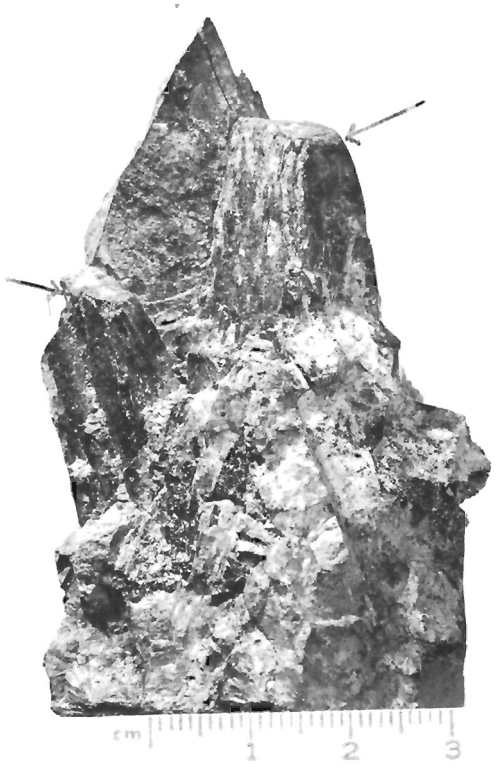


Plate XIII.
Fergusonite crystals in feldspar, J.G. Gole quarry. (GSC photo 201420-W, scale in mm)

Mile 0.0 Turn right onto Victoria Lake, McAuley Lake Road.

2.0 Junction; turn left onto single lane road.

2.2 Quarry.

Refs.: 19 p. 12; 53 p. 120.

Map (T): 31 E/9 E Opeongo Lake.

Cameron and Aleck Quarry

PERISTERITE, OLIGOCLASE, MICROCLINE, ALBITE, HORNBLENDE, BIOTITE, QUARTZ CRYSTALS, MUSCOVITE, TOURMALINE, ALLANITE, TITANITE, ANATASE, FERGUSONITE, ZIRCON, PYRITE, SERPENTINE, CHLORITE, URANINITE, APATITE, URANOPHANE, GRAPHIC GRANITE

In pegmatite

The pegmatite is composed principally of albite, oligoclase, microcline and quartz. The plagioclase feldspars exhibit good twinning striations. Peristerite and sunstone are also present but are of fair to poor quality for gem purposes; the sunstone is less common than the peristerite. Crystal aggregates of lustrous black hornblende and large books of biotite are the most

abundant accessory minerals. Cavities in massive quartz are lined with small crystals of quartz and of muscovite. Minerals occurring less abundantly in the pegmatite are: tourmaline, as black massive patches, allanite, as dull black laths; titanite, as dark brown crystals; anatase, as cream-white compact masses in hornblende; fergusonite, as lustrous dark brown crystals; zircon, as brownish pink turbid crystals measuring less than 1/2 inch long; pyrite; serpentine, as dull greenish black laths (alteration of pyroxene); chlorite, as greasy black flaky masses; uraninite, as small black masses in quartz and as microscopic grains and crystals in hornblende and in quartz; and apatite as amber coloured patches in hornblende. The secondary uranium mineral, uranophane, occurs as a yellow waxy crust on hornblende where it is closely associated with uraninite. Pink, fine textured graphic granite also occurs in the deposit. It is suitable for lapidary purposes.

The deposit was worked for feldspar for a few years beginning in 1949. Close to 2,000 tons of feldspar were produced. The opening has been made into the north side of a wooded hill.

Road log from Highway 60 at Mile 71.7:

Mile 0.0 Madawaska; proceed north onto the Victoria Lake, McAuley Lake Road.

2.0 Turn-off to the J. G. Gole quarry on left; continue straight ahead.

3.9 Junction single lane mine road on left; turn left. Small piles of feldspar, quartz and accessory minerals from the quarry have been left in the lightly wooded area along the mine road.

4.0 Quarry.

Ref.: 19 p. 12.

Map (T): 31 E/9 E Opeongo Lake.

Cameron Quarry

ALBITE, OLIGOCLASE, MICROCLINE, QUARTZ, HORNBLENDE, PYROXENE, TITANITE, EUXENITE, ALLANITE, EPIDOTE, PYRITE, HEMATITE, GRAPHIC GRANITE

In pegmatite

The main constituents of the pegmatite are albite, oligoclase, microcline and colourless to smoky quartz. White platy albite (cleavelandite) is also present. Hornblende, pyroxene and titanite are common accessories. Other minerals occurring in the deposit are euxenite, allanite, epidote, pyrite, and hematite. Medium-textured pink graphic granite occurs in the pegmatite.

The quarry was originally operated in 1940 by Mr. W. B. Cameron. Subsequent operators were Keystone Contractors Limited and Bowser Bros. Operations were terminated in 1950 after some 6,000 tons of feldspar had

been mined. The opening was made into the southwest side of a hill and measures 200 feet by 15 feet and 15 to 25 feet deep.

Road log from Highway 60 at Mile 71.7:

Mile 0.0 Madawaska, proceed north along the Victoria Lake, McAuley Lake Road.

2.0 Turn-off to J.G. Gole quarry on left; continue straight ahead.

3.9 Turn-off to Cameron and Aleck quarry on left; continue straight ahead.

4.9 Bridge over Madawaska River.

5.7 Junction single lane road on right; turn right.

5.85 Fork; bear right. Proceed along south end of small lake then along west side of a hill to the quarry.

6.3 Quarry.

Refs.: 19 p. 12; 53 p. 121.

Map (T): 31 E/9 E Opeongo Lake.

The main road log along Highway 17 is resumed.

Mile 65.1 Haley Station, at junction Highway 653.

Road log to localities along Highway 653 (The descriptions for underlined localities follow the road log.):

Mile 0.0 Junction Highways 17 and 653; proceed along Highway 653.

0.5 Junction road to Wright quarry.

0.9 Junction road to Dominion Magnesium quarries, Foresters Falls quarry, Ross and Elliott's mines.

1.4 Road-cut on left exposes crystalline limestone containing graphite and mica flakes, and grains of yellow chondrodite, orange tourmaline, brown titanite, honey-coloured amphibole, magnetite, and pyrite.

1.9 Turn-off (left) to the Smith quarry.

4.6 Junction Renfrew-Pembroke Road; continue straight ahead.

6.4 Road-cuts expose crystalline limestone and amphibolite. Pink calcite, dark green pyroxene, serpentine, dolomite, pyrite, and pink spinel (tiny crystals) occur in the limestone. Pyrite and small grains of titanite are found in the amphibolite.

6.7 East end of bridge over Chenaux Dam. On right, along the Ottawa River and below the dam, are exposures of dolomitic crystalline limestone in which are found dark green massive pyroxene, yellowish orange granular chondrodite, tiny pink spinel crystals, smoky light brown amphibole, graphite, pyrite, magnetite, and goethite.

Mile 6.8 Road-cut on right exposes crystalline limestone containing disseminations of graphite, mica, pyrite, serpentine, and olivine (grey grains).

7.4 Portage-du-Fort, at junction road to Shawville.

12.7 Junction Highway 8.

Wright Quarry

TREMOLITE, DIOPSIDE, QUARTZ

In dolomitic crystalline limestone

Colourless, light blue and green tremolite is abundant in this quarry. It occurs as radiating bladed and acicular aggregates and as compact fibrous and columnar masses. White diopside (as flat prisms) is associated with the tremolite. Colourless massive quartz is also present in the limestone.

The deposit has been exposed by one large pit (20 by 75 feet and 8 feet deep) and three small ones in a pasture on the farm of Mr. Herb Wright. It was formerly worked for terrazzo.

Road log from Highway 653 at Mile 0.5:

Mile 0.0 Turn right (south) onto gravel road.

0.6 Herb Wright farmhouse on right. Visits to the quarry may be arranged here.

0.9 Junction road to Camp Galilee; turn left.

1.0 Quarry on low hill in pasture on left.

Ref.: 53 p. 107.

Maps (T): 31 F/10 W Cobden.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Dominion Magnesium Quarries

DOLOMITE, CALCITE, SERPENTINE, CHLORITE, TALC, TOURMALINE, TREMOLITE, RUTILE, PYRITE, HEMATITE, GRAPHITE, MARCASITE

In crystalline limestone

Magnesium is being produced from a very pure dolomitic marble at this deposit. The dolomite is white to pink, granular massive. Other minerals occurring sparsely in the marble are: white fibrous, and white, pale blue and pink crystalline calcite (the white calcite fluoresces pink when exposed to ultraviolet rays); light green and dark grey serpentine; dark green flaky chlorite; grey massive talc; light brown tourmaline, as crystalline aggregates; white bladed tremolite; black metallic rutile (grains); pyrite; hematite which in places causes a reddish colour to the marble; graphite; marcasite.

Dominion Magnesium Limited has operated the mine and processing plant since 1941. The metal is used in the aeronautics industry. Two quarries are currently in operation; permission for entry must be obtained from the office.

Road log from Highway 653 at Mile 0.9:

Plate XIV. Dominion Magnesium Limited, quarry and processing plant (GSC 153187).

Mile 0.0 Junction; turn left.

1.7 Mine office on left.

Refs.: 25 p. 75; 53 pp. 65-66.

Maps (T): 31 F/10 W Cobden.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Foresters Falls Quarry

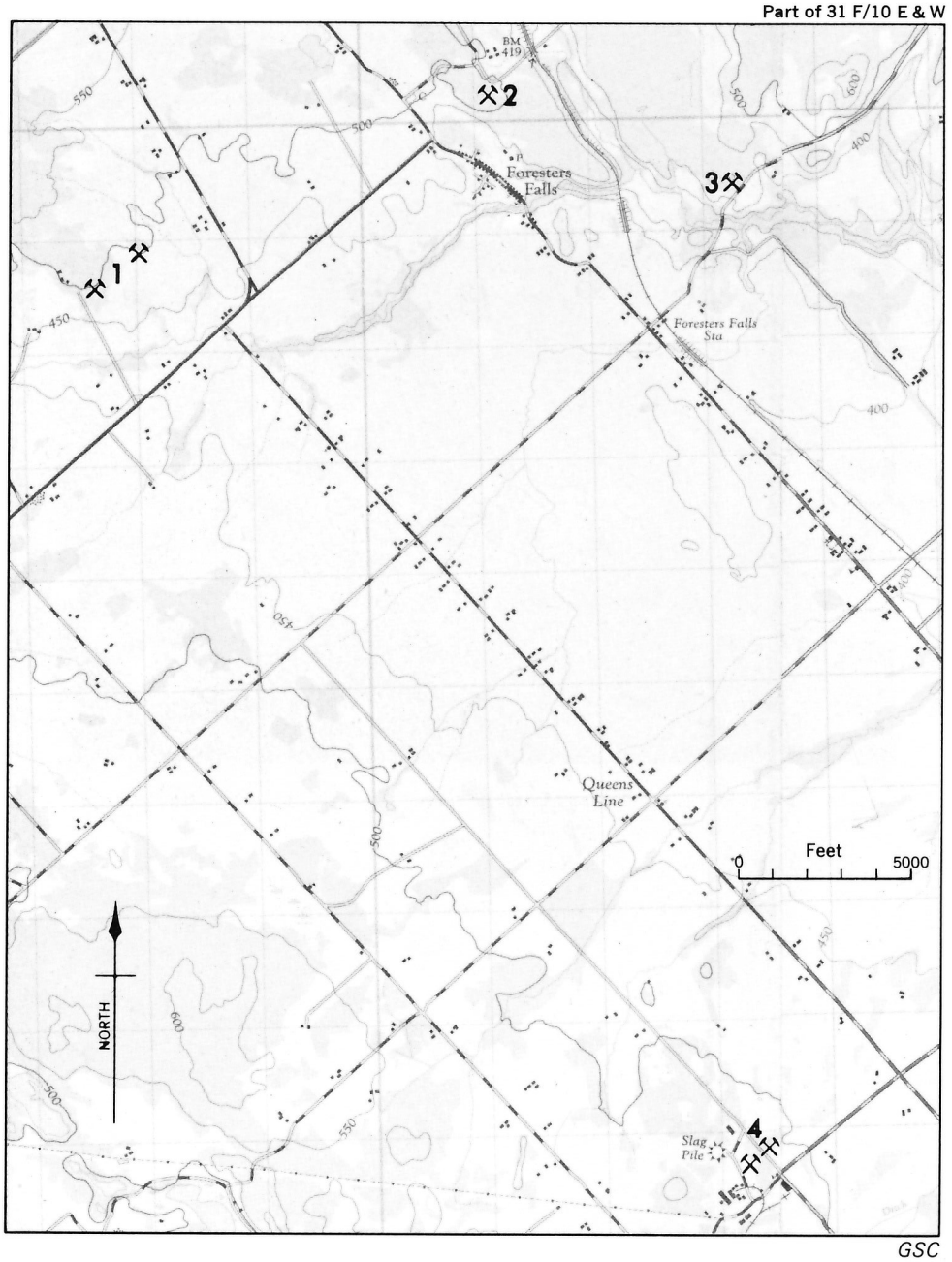
TREMOLITE, PYROXENE, GRAPHITE, PYRITE

In crystalline limestone

The crystalline limestone is white to grey and contains small amounts of grey to honey-yellow tremolite, dark green pyroxene, graphite, and pyrite.

The deposit was opened by three quarries that are now overgrown. Specimens are available from the walls of the quarry. The quarries and lime-burning kiln were operated many years ago by J. M. Jamieson.

Part of 31 F/10 E & W



GSC

Road log from Highway 653 at Mile 0.9:

Mile	0.0	Junction; turn left.
	1.7	Turn-off (left) to Dominion Magnesium Limited; continue straight ahead.
	2.1, 2.3	Road-cuts. Crystalline dolomitic limestone similar to the Dominion Magnesium deposit is exposed by these cuts.
	3.0	Junction Queens Line Road; turn left.
	3.8	Road-cuts expose crystalline limestone containing colourless to light green tremolite, serpentine, fibrous calcite, and pyrite.
	7.0	Junction; turn right.
	8.7	Junction; continue straight ahead.
	9.2	Fork; bear left.
	9.6	Quarries on left.

Refs.: 14 pp. 167-168; 53 p. 108.

Maps (T): 31 F/10 W Cobden.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Ross Mine

APATITE, TITANITE, PYROXENE, ZIRCON, CALCITE

In hornblende pegmatite

Light green and maroon-red apatite crystals occur with brown titanite, dark green pyroxene, and tiny pink zircon crystals in white to pink calcite. Small brown zircon crystals have been reported to occur in the hornblende.

The deposit has been exposed by two small pits on the farm of Mr. Fred Ross, 1/2 and 3/4 mile west of the farmhouse. The openings and dumps are now overgrown.

Road log from Highway 653 at Mile 0.9:

Mile	0.0	Junction; turn left and proceed toward the Foresters Falls quarry.
	7.0	Junction; continue straight ahead.
	8.6	Junction; turn right.
	8.8	Junction; turn left.
	9.4	Turn-off (left) to the Ross farmhouse. Obtain permission here to visit the property.

Ref.: 53 p. 17.

Maps (T): 31 F/10 W Cobden.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Elliott's Mine

APATITE, HORNBLENDE, PYROXENE, SCAPOLITE, TITANITE, FLUORITE, ORTHOCLASE, CALCITE, SPINEL, MOLYBDENITE

In crystalline limestone

Crystals of red apatite, black hornblende, dark green pyroxene, bluish grey to grey scapolite, colourless to purple fluorite, and white orthoclase occur in white to pale pink calcite. The scapolite fluoresces pink when exposed to 'short' ultraviolet rays. Spinel and molybdenite have been reported from the deposit.

The deposit has been exposed by a series of small pits, now moss-covered and overgrown. In 1883 about one ton of apatite crystals was mined.

Road log from Highway 653 at Mile 0.9:

Mile	0.0	Junction; turn left and proceed toward the Ross Mine.
	8.8	Junction; continue straight ahead toward Foresters Falls.
	10.2	Junction; turn left.
	10.5	Junction at cemetery; turn right.
	11.0	Junction; turn right.
	11.15	The road here bends sharply to the left. Park here and proceed into the woods on right. The pits are located along a slight ridge just beyond a swampy area. The distance from the road is approximately 150 yards.

Refs.: 53 pp. 17, 88; 66 pp. 5, 8.

Maps (T): 31 F/10 Cobden.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Smith Quarry

TREMOLITE, MICA, TOURMALINE, APATITE, TALC, GRAPHITE, HEMATITE, GOETHITE, QUARTZ

In dolomitic crystalline limestone

The marble is pure white with some grey and rose coloured bands. It contains abundant colourless, fibrous to columnar aggregates of tremolite and greenish yellow mica. Occurring less abundantly are deep yellow to yellowish green granular tourmaline, light blue apatite (uncommon), white talc, graphite, hematite, goethite, and quartz.

The quarry was worked for a short time by Canadian Dolomite Company for the production of marble chips. It measures approximately 30 by 20 feet and is located in a pasture on the farm of Mr. Charles Smith.

Access is by a 1/4 mile road leading north from the Smith farmhouse at Mile 1.9 on Highway 653.

Ref.: 25 p. 79.

Maps (T): 31 F/10 E Cobden.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

This is the last occurrence described along Highway 653, the main road log along Highway 17 is resumed.

Mile 65.1 Junction Highway 653.

67.6 Road-cut on left exposes pink calcite in crystalline limestone. The calcite contains black pyroxene, pale green apatite crystals (measuring up to 1 inch in diameter), and pyrite.

67.8 Junction Pinewood Park Road.

68.0 Road-cut on left exposes pink and grey coarsely crystalline calcite containing dark green massive pyroxene, dark brown massive titanite, biotite, light green and yellow apatite (massive and small crystals), black allanite crystals, magnetite, pyrite, and pyrrhotite.

69.2 Historic site on right. It was in this area that Champlain's astrolabe, lost during his first voyage up the Ottawa River (1613), was found in 1867.

71.9 Road-cut on right exposes granitic rock containing granular masses of dark green pyroxene, dark brown titanite, and yellow scapolite, and tiny grains of pink to tan-coloured zircon. Red apatite crystals (about 1/2 inch in diameter) occur in pink calcite veins cutting the granitic rock.

72.1 Cobden, at junction road to Eganville.

81.4 Road-cuts expose Ordovician limestone containing shell fossils and crinoids.

82.1 Quarry on right. Hornblende gneiss was formerly obtained from this quarry and was used for road metal.

87.9 Junction Highway 62.

88.8 Junction gravel road.

Pembroke Quarry

LIMESTONE

Brownish grey Chazy (Ordovician) limestone from this quarry was formerly used as a building stone. Examples of its use can be seen in the General Hospital, convent, and churches in Pembroke. The quarry measures 100 by 450 feet. It belongs to the Township of Pembroke.

Road log from Highway 17 at Mile 88.8:

Mile 0.0 Turn left onto gravel road.

1.1 Junction; continue straight ahead.

2.0 Junction Quarry Road; turn right.

2.1 Junction; continue straight ahead.

2.2 Gate to quarry.

Ref.: 53 pp. 106-107.

Maps (T): 31 F/14 E Pembroke.
(G): 53b Renfrew area (Ont. Dept. Mines, 1 inch to 2 miles).

Mile 89.9 Pembroke; Champlain Trail Museum on left.

91.9 Pembroke, at junction Highway 41.

Road log to localities in Eganville-Quadeville-Combermere area:

Mile 0.0 Proceed south along Highway 41.

7.8 Road-cuts expose Ordovician limestone containing brachiopods, gastropods, bryozoans, and crinoids.

12.0 Junction Green Lake Road.

14.7 Road-cuts expose pegmatite containing dull black bastnaesite, and magnetite.

14.9 Junction Renfrew County Road 30. (This road leads to the Biederman quarry. See page 48.)

21.4 Junction Highway 60; proceed toward Eganville.

23.9 Eganville, at junction Highways 41 and 60. The side trip to Quadeville and Combermere begins here. See page 32.

The main road log along Highway 17 is resumed.

Mile 109.7 Chalk River, at junction road to Atomic Energy of Canada Limited. Tours are conducted on weekdays (June to September) through the nuclear plant. Arrangements should be made 24 hours in advance.

132.0 Rolphton, at junction Highway 635.

134.0 to 135.9 Road-cuts expose biotite gneiss containing small red garnets.

137.5 Mackey, at junction Trout Lake Road.

138.7 Mackey, at junction road to Deep River Cub Camp.

Carey Quarry

PERISTERITE, SUNSTONE, GRAPHIC GRANITE, MICA, QUARTZ, GARNET, KAOLINITE, CHLORITE, MAGNETITE, HEMATITE, EUXENITE, BASTNAESITE, THORITE, ZIRCON, RUTILE, ANATASE

In pegmatite

Pink peristerite with a blue schiller is abundant at this quarry. It is suitable for use in making jewellery. Some sunstone is also present but it is relatively uncommon. Medium textured pink graphic granite, also suitable for lapidary purposes, is common. The pegmatite is composed of pink feldspar, biotite, greenish yellow mica, and colourless to smoky and white quartz. Red garnet crystals measuring up to 1 inch in diameter are common in the feldspar. Minerals occurring less commonly are kaolinite, chlorite, magnetite, hematite, euxenite (dark amber to brown glassy patches), bastnaesite (dull yellow to brownish red laths), thorite (dull brown prisms), zircon (reddish amber prisms), brown rutile, and tan-coloured anatase.

The deposit was worked for feldspar between 1924 and 1928 by Wanup Feldspar Mines Limited. An estimated 3,000 tons of feldspar and some quartz were produced. The pit measures 100 by 40 feet and is 40 feet deep.

Road log from Highway 17 at Mile 138.7:

Mile	0.0	Turn right (north) onto road to the Deep River Cub Camp.
	1.5	Junction; turn right.
	1.8	Junction; turn right.
	1.9	Cub camp; continue straight ahead.
	2.0	Quarry.

Ref.: 62 p. 49.

Map (T): 31 K/4 W Des Joachims.

Mile	139.9	Junction road to Driftwood Provincial Park.
	151.8 to 152.3	Road-cuts expose feldspar-biotite gneiss containing red garnets measuring up to 1/2 inch in diameter.
	164.3	Deux Rivieres, at bridge.
	165.6	Junction Green Lake Road to Brent.

Muskwa Lake Quarry

FELDSPAR, MICA, QUARTZ, ALLANITE, CHLORITE, MAGNETITE, SERPENTINE

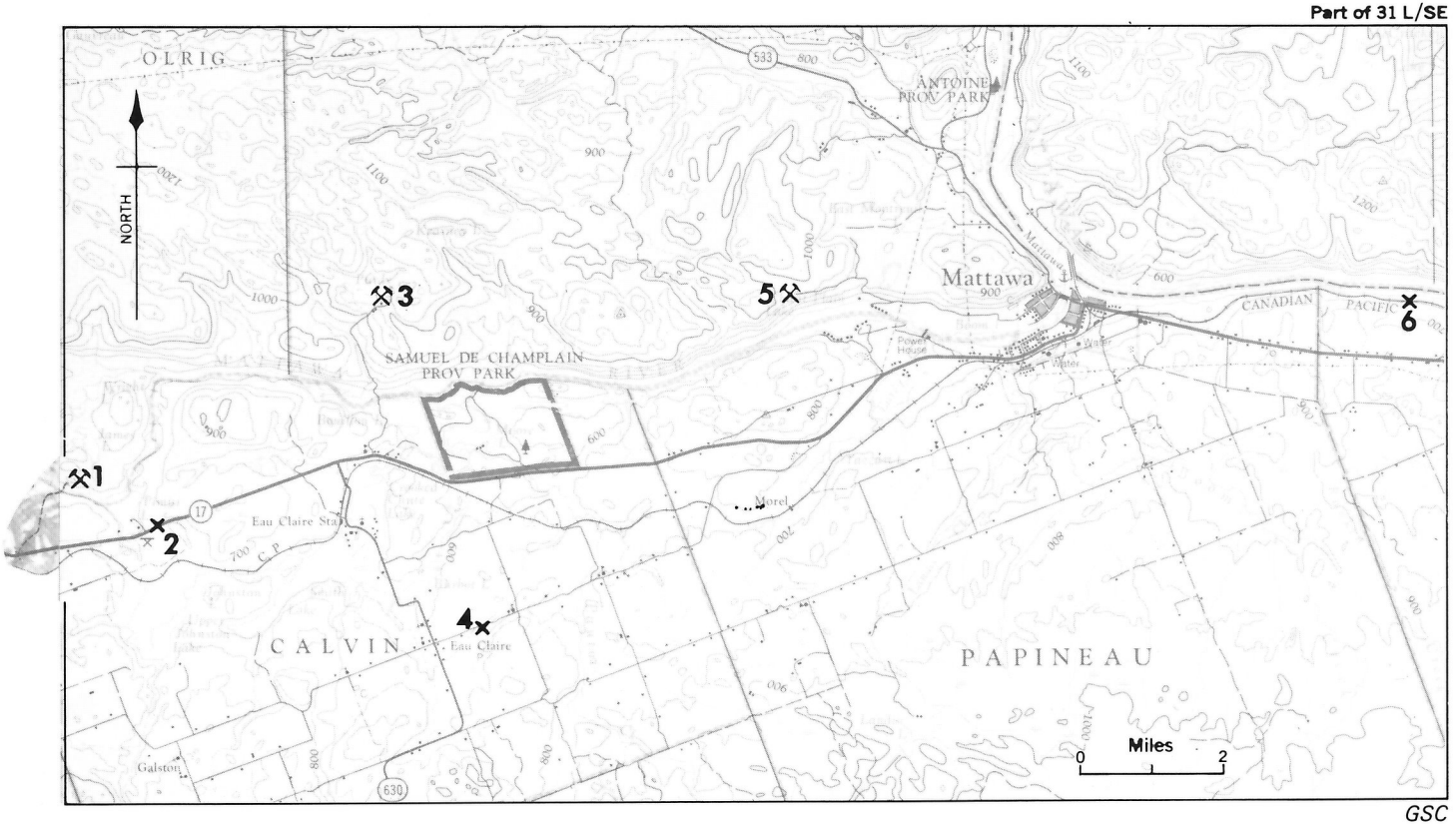
In pegmatite

The main constituents of the pegmatite are plagioclase, microcline, biotite, muscovite, and quartz. The plagioclase (oligoclase) exhibits good twinning striations. Accessory minerals include: dull greenish black allanite, chlorite, magnetite, and serpentine.

The quarry was formerly worked for feldspar. It is now partly overgrown. The deposit is located in a wooded area on the west side of Muskwa Lake.

Road log from Highway 17 at Mile 165.6:

Mile	0.0	Turn left (south) onto the Green Lake Road and follow the signs towards Brent.
	5.7	Fork; bear right.
	10.6	Fork; bear right.



1. Legendre quarry.
2. Road-cut at Mile 200.6.
3. Purdy Mine.
4. MacLaren beryl occurrence.
5. Mattawan Mine.
6. McMeekin amazonite occurrence.

Map 7. Mattawa area.

Mile 17.0 Algonquin Park boundary.

20.6 Junction road to gravel pit at Muskwa Lake. Park here and proceed up the main road for approximately 50 yards; a path on left leads 20 yards to the quarry.

Map (T): 31 L/1 W Brent.

Brent Crater

The Brent crater, a topographic feature believed to have been formed by the impact of a meteorite, is located just west of Muskwa Lake. It was discovered in 1951 from aerial photographs. The crater measures approximately 1 3/4 miles in diameter. Its western boundary follows the western shore of Gilmour Lake; the eastern boundary is just outside the east shore of Tecumseh Lake. The crater is underlain by Paleozoic limestone while the country rocks surrounding it are granite gneisses. It is densely wooded and cannot be readily recognized except from the air.

The crater-area can be seen by looking to the right (west) from the road (to Brent) at a point about 300 yards beyond the Muskwa Lake feldspar quarry.

Ref.: 35 pp. 1-8.

Map (T): 31 L/1 W Brent.

Mile 181.8 Turn-off (right) to the D. McMeekin property.

McMeekin Amazonite Occurrence

AMAZONITE

In pegmatite

Attractive apple green to emerald green amazonite occurs in a pegmatite dyke with pink feldspar and quartz. The deposit has been exposed by small pits near the railroad tracks about 3/4 mile north of the McMeekin farmhouse on the north side of Highway 17 at Mile 181.8.

Map (T): 31 L/7 E Mattawa.

Mile 186.1 Mattawa, junction Highway 533.

Mattawan Mine

FELDSPAR, QUARTZ, MICA, EUXENITE

In pegmatite dyke cutting biotite-hornblende gneiss

Pink microcline, pink plagioclase, quartz, biotite, and muscovite comprise the pegmatite. Crystals and aggregates of brilliant taffy-brown to black euxenite occur commonly in the feldspar.

The deposit was worked for feldspar in 1925 and 1926 by O'Brien and Fowler of Ottawa. It was the largest feldspar operation in the district. Production is estimated at 2,500 tons. Two pits, each measuring 125 feet by approximately 25 feet, were made into the side of a ridge. Large dumps lie adjacent to the openings.

Road log from Highway 17 at Mile 186.1:

Mile 0.0 Mattawa, at junction Highways 17 and 533; proceed onto Highway 533.

0.5 Junction; turn left onto Brydges Street to Moose Head Lodge.

2.7 Junction; continue straight ahead.

3.0 Junction single lane mine road on right. (This junction is just before a fork to the left.) Proceed on foot along the mine road which leads west along the side of a ridge. (Do not take any forks to the right off this road.)

4.7 Mine.

Refs.: 9 pp. 190-191; 18 pp. 46-47; 47 pp. 28-29; 62 p. 52.

Maps (T): 31 L/7 W Mattawa.
(G): 53d Mattawan-Olrig area, District of Nipissing (Ont. Dept. Mines).

Crocan Lake Kyanite Occurrence

KYANITE, GARNET, TOURMALINE, GRAPHITE

In biotite gneiss

Kyanite occurs as colourless, light blue and greenish blue flat bladed crystals measuring up to 3 inches long. Associated with it are abundant purplish pink garnet crystals averaging 1/4 inch in diameter. Less common are tourmaline (as dark brown grains) and graphite. The kyanite content of the rock averages from 12 to 20 per cent.

The deposit was discovered in 1951 and was exposed by trenching and stripping. The kyanite-bearing rock is located at the north east end of Crocan Lake, along the east shore of the lake, and along the lumber road from Timber Creek to Crocan Lake.

Road log from Highway 17 at Mile 186.1:

Mile 0.0 Mattawa, at junction Highways 17 and 533; proceed onto Highway 533.

0.5 Junction Brydges Street; continue along highway.

3.0 Junction Highway 656; continue along Highway 533.

22.6 Junction single lane road; turn right. (This junction is 10.5 miles from the junction of Highways 533 and 63.)

22.8 Fork; bear right onto rough dry weather road.

23.7 Stripping on right opposite northeast end of Crocan Lake.

Refs.: 20 pp. 3-4.

Map (T): 31 L/11 E Temiscaming.

Mile 189.4 Junction Lake Champlain Road.

190.2 Road-cuts expose biotite gneiss containing small red garnets.

194.5 Junction road to Samuel de Champlain Provincial Park.

196.8 Road-cuts expose garnetiferous biotite gneiss containing greyish green tremolite.

197.3 Junction single lane road on right.

Purdy Mine

MICA, FELDSPAR, CHLORITE, GARNET, EPIDOTE, HORNBLENDE, ZIRCON, FERGUSONITE, TOURMALINE, PYRITE, EUXENITE, URANINITE, BERYL, MONAZITE, ALLANITE

In pegmatite dykes cutting gneiss

This mine was the largest muscovite producer in Canada. Large crystals, including one that measured 7 feet by 9 feet and 3 feet thick, were obtained from the deposit. The muscovite is silvery green and occurs in microcline-quartz pegmatite that also contains considerable amounts of albite and biotite. Other minerals present include: chlorite, dark red garnet, light green epidote,

hornblende, orange-red zircon, amber fergusonite, black tourmaline, and pyrite. In addition, the following minerals have previously been reported: euxenite, uraninite, beryl, monazite, and allanite. Large sheets of muscovite from this deposit are on display at the Royal Ontario Museum.

The deposit was discovered in 1941 by J. Purdy and H. MacDonald of Eau Claire. The discoverers recovered about $20,000 worth of muscovite in 1941 and 1942. The deposit was later operated by Purdy Mica Mines Limited (1942-1945) and by the Northern Mica Company (1949-1953). The total production amounted to 2,942,786 pounds of mica valued at $1,577,326.00. The mica was trimmed in shops at Mattawa and North Bay. The mine was worked by open-cuts, an adit and shafts. The deepest opening is 130 feet. There are large dumps adjacent to the openings.

Road log from Highway 17 at Mile 197.3:

Mile 0.0 Turn right (north) onto single lane gravel road.

1.0 Bridge; turn right after crossing over bridge.

1.3 Junction mine road on left. This road is partly overgrown and rough. Proceed along this road.

3.0 Mine. The first opening is to the left; to reach others continue along the trail.

Refs.: 18 pp. 33-40; 23 pp. 181-185; 32 pp. 305-312.

Maps (T): 31 L/7 W Mattawa.
(G): 53d Mattawan-Olrig area, District of Nipissing (Ont. Dept. Mines).

Mile 197.6 Junction Highway 630 to Eau Claire.

MacLaren Beryl Occurrence

BERYL, TOURMALINE, GARNET, PYROCHLORE, MICA

In pegmatite cutting granite gneiss

Yellow beryl crystals occur sparingly in cleavelandite. When the deposit was first opened, crystals measuring from 1 to 3 inches in diameter were found. Black tourmaline crystals (up to 8 inches long), red granular garnet, brown pyrochlore (uncommon), and colourless to greenish yellow mica also occur in the pegmatite which is composed of pale pink microcline, white plagioclase and quartz.

The deposit has been exposed by three pits and some trenches over a distance of 200 feet. The openings are in a slightly wooded area and are now partly overgrown and/or filled. The property belongs to Mr. R. MacLaren whose farmhouse is located nearby.

Road log from Highway 17 at Mile 197.6:

Mile 0.0 Proceed south along Highway 630.

1.8 Junction; continue straight ahead.

3.4 Junction; turn left.

3.9 R. MacLaren farmhouse on right; obtain permission to visit occurrence.

4.1 Pits in outcrop on right.

Refs.: 9 pp. 188-189; 38 p. 85.

Map (T): 31 L/7 W Mattawa.

Mile 198.3 Road-cuts expose feldspar-biotite gneiss containing small red garnets, epidote, and magnetite.

200.6 Road-cuts expose crystalline limestone containing brucite, hydromagnesite (white flaky aggregates), dolomite, serpentine, mica (light green), and graphite.

200.9 Bridge over Pimisi Bay.

201.2, 201.4 Road-cuts expose light green quartzite containing aggregates of deep red garnet, amphibole, and titanite.

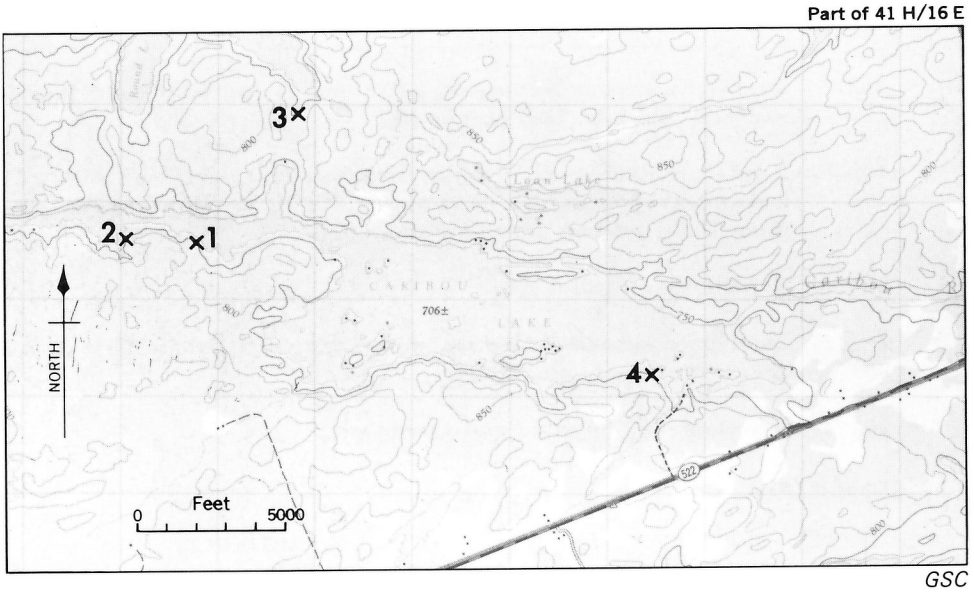
202.4 Junction road on right and gravel pit.

Legendre Quarry

PYROAURITE, BRUCITE, HYDROMAGNESITE, ARAGONITE, SERPENTINE, GRAPHITE, MAGNETITE, GOETHITE

In dolomitic crystalline limestone

Pyroaurite and brucite are common in this deposit. The pyroaurite occurs as transparent greenish blue, green, and tan-coloured (on weathered surfaces) fine flaky aggregates and as light green fibrous veinlets measuring 1/4 inch wide. On exposed surfaces, the pyroaurite is lighter in colour and has a satin lustre. In some specimens it is closely associated with magnetite. The brucite occurs as white nodules measuring up to 4 millimetres in diameter. It has a whorled structure and can be readily identified in the hand specimen by its chalk white appearance which contrasts with the translucent white of the enclosing limestone. Occurring much less abundantly are hydromagnesite, as colourless very fine platy aggregates with silky lustre, and aragonite, as tiny white fibrous globules. Other minerals in the limestone are serpentine (as white, pale green and olive green granular masses), graphite, magnetite, and goethite.



1. Peristerite occurrence. 2,3,4. Feldspar occurrences.

Map 8. Caribou Lake area.

The quarry was operated by Mr. L. P. Legendre in 1962-63 for use in pulp and paper mills. The occurrence of brucite and pyroaurite in this area was discovered in 1937 by M. F. Goudge of the federal Mines Branch. Several claims were subsequently staked in 1939 for brucite in the Pimisi Bay-Lake Talon area. A few pits and a shaft were sunk but there was no further development of the deposit. The property belongs to Mr. Russ James from whom permission to enter the quarry must be obtained (see road log below).

Road log from Highway 17 at Mile 202.4:

Mile 0.0 Turn right onto road leading to gravel pit. This road leads to the right of the pit, then to the quarry.

1.7 Quarry.

Refs.: 14 pp. 130-132; 18 pp. 25-26; 24 pp. 12-13.

Maps (T): 31 L/6 E North Bay.
(G): 53d Mattawan-Olrig area, District of Nipissing (Ont. Dept. Mines).

Mile 202.9 Turn-off (right) to the Russ James farmhouse.

203.2 Road-cut on left exposes garnetiferous quartzite.

203.6 Rutherglen, at junction Talon Lake Road.

204.7 to 207.8 Road-cuts expose garnets in light green quartzite and in feldspar rock.

208.9 Junction Highway 531.

209.8 to 213.9 Road-cuts expose red garnets (1/2 inch in diameter) in coarse biotite gneiss and in massive quartz.

217.1 Junction Highway 94 south.

217.4 to 219.9 Road-cuts expose biotite gneiss containing red garnet and light green scapolite.

220.8 Junction Trout Lake Road.

221.2 Road-cut on left exposes garnetiferous gneiss. Fractures in the gneiss are filled with white crystalline calcite that fluoresces bright pink when exposed to 'short' ultraviolet rays. Pyrite crystals and hematite occur in the calcite.

221.4 La Vase Portages Historic Site.

223.8 Junction Highway 11.

Road log for side trip along Highway 11 South (the description of the underlined localities is given in the text following the road log).

Mile 0.0 Junction Highways 11 and 17; proceed south along Highway 11.

8.5 Look-out onto Lake Nipissing.

24.7 Trout Creek, at junction Highway 522 to Caribou Lake peristerite occurrence.

33.4 to 34.1 Road-cuts expose biotite-garnet gneiss.

35.3 South River, at junction road to Rye and Magnetawan Mine; turn-off to South River quarry.

50.1 Junction Highway 124.

51.3 Road-cuts expose biotite-garnet gneiss with epidote as fracture-fillings.

52.4 Burk's Falls, at junction Highway 520 to Cecebe Lake, Cecebe, Hungry Lake quarries.

Caribou Lake Peristerite Occurrence

PERISTERITE, GARNET, ZIRCON, THORITE, XENOTIME

In pegmatite

White peristerite, suitable for lapidary purposes, occurs in a pegmatite composed of microcline, plagioclase, quartz, and mica. The peristerite is used locally for jewellery. Red garnet crystals measuring up to 1/2 inch in diameter are common in the mica and feldspar. Other minerals found in the deposit include: brownish grey massive zircon, dull black thorite (laths) and black xenotime (grains).

The deposit has been exposed along the side of a knoll on the south shore of the western narrows of Caribou Lake. Access is by boat which may be rented at the east end of the lake.

Road log from Highway 11 at Mile 24.7:

Mile 0.0 Trout Creek; proceed west onto Highway 522.

15.7 Junction Highway 524; continue along Highway 522.

36.3 Port Loring, at junction Wilson Lake Road; turn right and continue along Highway 522.

40.3 Junction; turn right onto the Caribou Lake Road.

Plate XV. Pegmatite knoll, Caribou Lake peristerite occurrence (GSC 153179).

Mile 40.8 End of road at Caribou Lake. Proceed from this point for a distance of about 2 3/4 miles to the occurrence, just beyond the opening of the narrows.

Ref.: 52 pp. 58-59.

Maps (T): 41 H/16 E Noganosh Lake.
(G): 51a Portions of the Districts of Parry Sound and Muskoka, Province of Ontario (Ont. Dept. Mines, 2 miles to 1 inch).

Magnetawan Mine

MAGNETITE, HORNBLENDE, GARNET, PLAGIOCLASE, GOETHITE

In amphibolite

Massive magnetite was formerly mined from this deposit. Associated with it are hornblende, granular garnet, and plagioclase feldspar. Goethite occurs as a rusty yellow powder on ore specimens.

The deposit was worked by an open pit (50 by 10 feet and 12 to 22 feet deep) and by a side hill cut (15 by 100 feet). Operations were conducted from 1910 until 1912 by Cramp Steel Company Limited. Total production amounted to 6,000 tons. The openings and dumps are now partly overgrown.

Road log from Highway 11 at Mile 35.3:

Mile 0.0 South River; turn right (west) onto road to Rye.

8.7 Junction; continue straight ahead.

13.2 Junction; continue straight ahead.

14.8 Junction; turn left onto road to Magnetowan.

19.1 Junction; turn right.

20.9 Junction at school; turn right.

22.6 Junction; turn right.

24.0 Junction; continue straight ahead.

24.3 Mine on right (50 feet from road) opposite turn-off to a farm.

Refs.: 54 p. 32; 58 p. 283.

Maps (T): 31 E/13 E Golden Valley.
(G): 1955-4 Township of Lount, District of Parry Sound (Ont. Dept. Mines, 1 inch to 1/2 mile).

South River Quarry

PYROCHLORE, GARNET

In granite

Small grains of brown pyrochlore and brownish red garnet occur in pink granite.

The granite was formerly quarried as a building stone. It is located north of South River village.

Road log from Highway 11 at Mile 35.3:

Mile 0.0 South River, at junction road to Rye; turn left toward South River village.

0.15 Intersection; turn left.

0.85 Entrance to quarry on right.

Maps (T): 31 E/14 W South River.
(G): 51a Portions of the Districts of Parry Sound and Muskoka, Province of Ontario (Ont. Dept. Mines, 2 miles to 1 inch).

Cecebe Lake Mine

FELDSPAR, MUSCOVITE, BIOTITE, GARNET

In pegmatite dyke cutting biotite schist

This mine was formerly worked for muscovite (1937-38) and for feldspar (1941). Both plagioclase and microcline are present. Large books of muscovite measuring up to 1 foot in diameter occur in the dyke. Less common in the deposit are biotite, and deep red garnet crystals averaging 1/2 inch in diameter. The pegmatite outcrops at the top of a steep wooded ridge on the north shore of the eastern end of Cecebe Lake.

Road log from Highway 11 at Mile 52.4:

Mile	0.0	Burk's Falls; turn right (west) onto Highway 520.
	7.5	Junction single lane road on left; turn left.
	7.9	Junction; turn right.
	8.5	Clearing on left. The old mine road begins in the clearing and leads south. Proceed on foot along this road.
	9.0	Mine.

Ref.: 52 pp. 60-61.

Maps (T): 31 E/12 E Magnetawan.
(G): 51a Portions of the Districts of Parry Sound and Muskoka, Province of Ontario (Ont. Dept. Mines, 2 miles to 1 inch).

Cecebe Quarry

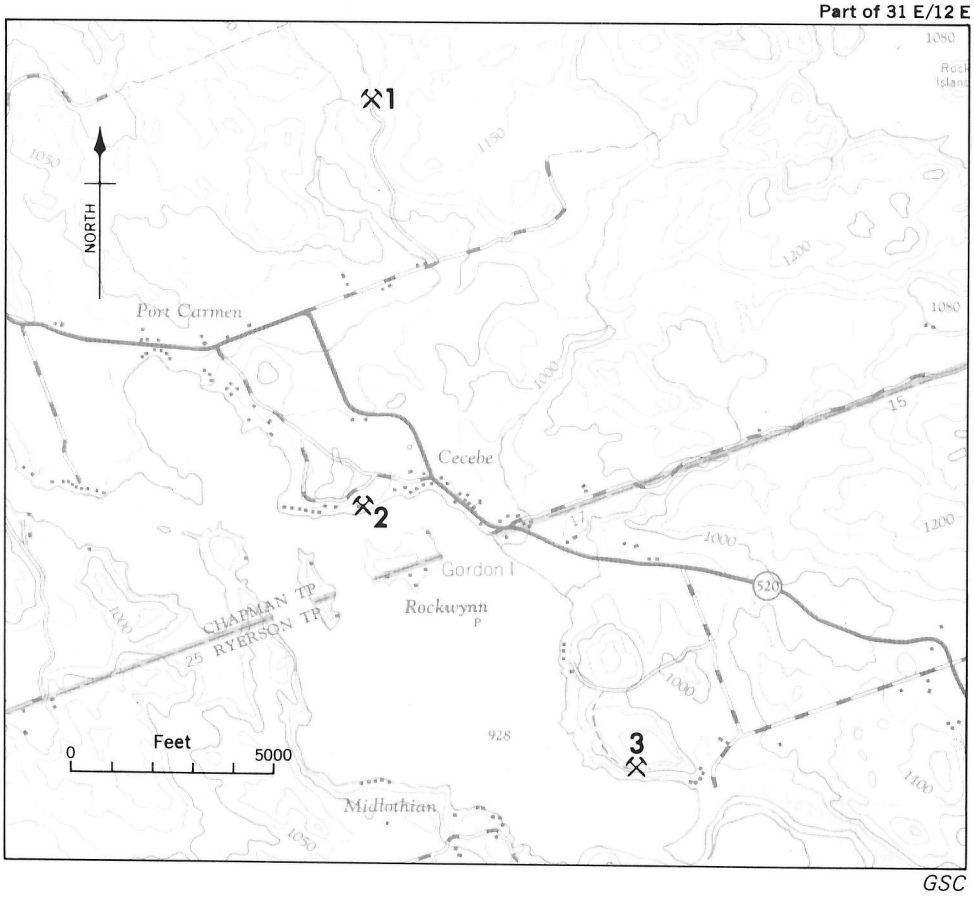
FELDSPAR, GRAPHIC GRANITE, CHLORITE, MAGNETITE, HEMATITE, GARNET, BASTNAESITE, EUXENITE

In pegmatite

Pink, fine- to medium-textured graphic granite suitable for lapidary purposes is abundant at this former feldspar mine. It occurs in a pegmatite composed of pink microcline, colourless to smoky quartz and biotite. Accessory minerals include chlorite, magnetite, hematite, garnet (tiny pink crystals), bastnaesite (dull black laths), euxenite (dark reddish brown glassy grains), and zircon (tiny brown tetragonal prisms).

The deposit was worked for a brief time in 1948 by Burks Falls Feldspar Syndicate Limited. It is located in Cecebe Village near the top of a steep ridge on the north side of Cecebe Lake.

Road log from Highway 11 at Mile 52.4:



1. Hungry Lake quarry. 2. Cecebe quarry. 3. Cecebe Lake Mine.

Map 9. Cecebe Lake area.

Mile 0.0 Burk's Falls; turn right onto Highway 520.

7.5 Junction road to Cecebe Lake Mine; continue along highway.

8.8 Cecebe village, at junction Chapman Drive Road; turn left.

9.1 Fork; bear left.

9.2 Trail on left leads through clearing then through wooded area to quarry, a distance of approximately 100 yards.

Ref.: 19 p. 12.

Maps (T): 31 E/12 E Magnetawan.
(G): 51a Portions of the Districts of Parry Sound and Muskoka, Province of Ontario (Ont. Dept. Mines, 2 miles to 1 inch).

Hungry Lake Quarry

FELDSPAR, QUARTZ, BIOTITE, GARNET, ZIRCON, GRAPHIC GRANITE

In pegmatite dyke cutting biotite gneiss

The pegmatite consists of pink to almost white microcline, colourless to smoky quartz, and biotite. Accessory minerals include red garnet (crystals averaging 1/4 inch in diameter) and pink zircon (crystals about 2 millimetres long). Some pale pink graphic granite occurs in the deposit.

The quarry has been opened into the side of a hill at the south end of Hungry (Carmen) Lake. It was operated in 1941 by T.B. Tough. The property belongs to Mr. Malcolm Applegate of Kingston.

Road log from Highway 11 at Mile 52.4:

Mile 0.0 Burk's Falls; turn right (west) onto Highway 520.

7.5 Junction road to Cecebe Lake Mine; continue along highway.

8.8 Junction Chapman Drive Road; continue along highway.

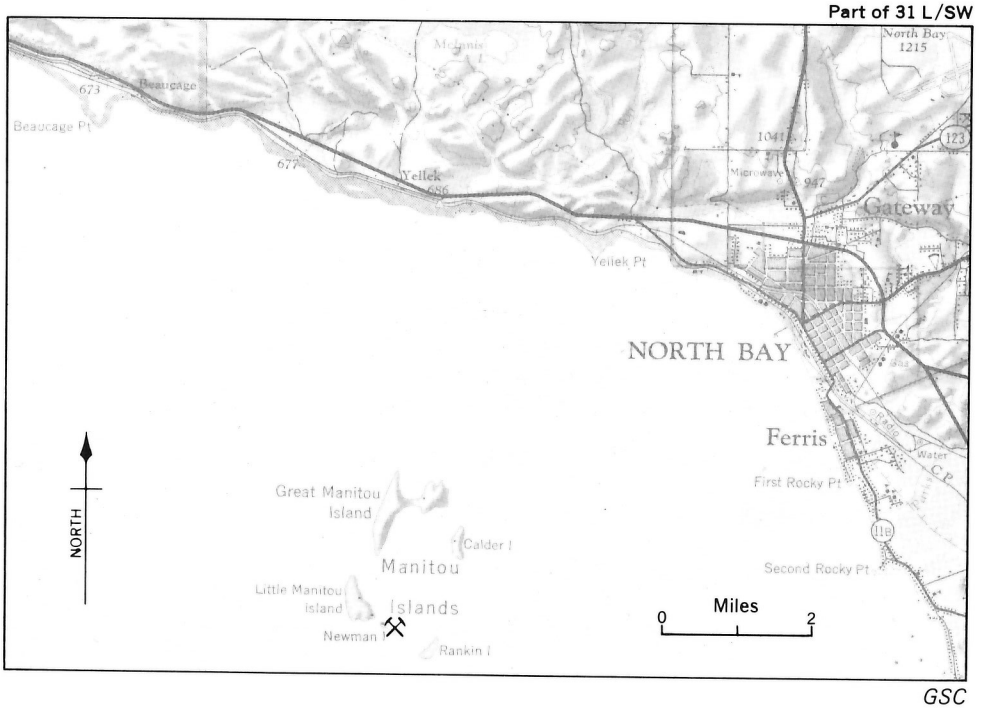
9.9 Junction gravel road; turn right.

10.6 Junction farm lane on left; turn left.

10.8 Gate.

11.5 Quarry.

Ref.: 52 p. 56.



Map 10. Nova Beaucage Mine.

Maps (T): 31 E/12 E Magnetawan.
(G): 51a Portions of the Districts of Parry Sound and Muskoka, Province of Ontario (Ont. Dept. Mines, 2 miles to 1 inch).

This is the last occurrence along the Highway 11 side trip; the main road log along Highway 17 is resumed.

Mile 225.0 North Bay, at junction Highway 63.

Niemetz and Ross Quarries

GNEISS

Light green muscovite gneiss was formerly quarried on both sides of Highway 63 for use as a building stone.

The quarries are located on either side of Highway 63 near the bridge over the Jocko River, 29.8 miles from the junction of Highways 17 and 63. The quarry operated by H. Niemetz is on the east side of the highway; the one operated by L. Ross is on the west side.

Maps (T): 31 L/11 E Temiskaming.
(G): 394 Tomiko Sheet, District of Nipissing (Ont. Dept. Mines, 2 miles to 1 inch).

Twenty Minute Lake Occurrence

AMETHYST

In quartz

Amethyst crystals ranging in colour from very pale to medium dark purple occur in massive quartz cutting diabase. The amethyst is used locally by lapidarists for jewellery.

The deposit has been exposed by a pit along the side of a ridge. Access to it is most practical in the autumn when the near-by swampy area is more accessible.

Road log from Highway 17 at Mile 225:

Mile 0.0 Proceed north onto Highway 63.

18.4 Junction road to Fish Hatchery; continue along highway. The hatchery is operated by the Ontario Department of Lands and Forests and is open to visitors at specified hours; it is located 0.15 mile from the highway.

19.8 Junction single lane road to Twenty Minute Lake; turn right.

19.9 Junction; bear right.

20.0 Junction; continue straight ahead.

20.2 Junction; continue straight ahead.

21.0 Road widens at this point; park vehicle and follow trail on left. The trail leads through the woods, through a swampy area, and around a small lake to a ridge.

21.6 Amethyst occurrence at side of ridge.

Maps (T): 31 L/6 E North Bay.

Maps (G): P381 North Bay Sheet, Districts of Nipissing and Parry Sound (Ont. Dept. Mines, 1 inch to 2 miles).

Narco Kyanite Mine

KYANITE, GARNET, GRAPHITE, APATITE, TOURMALINE

In biotite gneiss

Bladed aggregates of colourless to ink-blue kyanite occur with pink garnet crystals (less than 1/2 inch in diameter) at this mine. Individual crystals of kyanite measure up to 5 inches long. Graphite, as small flakes and aggregates, is common. Minerals occurring less abundantly are black tourmaline, amber to reddish orange and yellow apatite, and pyrite; these minerals occur as small grains in the gneiss. The kyanite from this locality is not sufficiently uniform in colour for use as a gemstone; its principal value is in specimen material. Particularly attractive are specimens consisting of blue kyanite crystals and aggregates in the quartz-rich layers of the gneiss.

The deposit was opened for kyanite by an open-cut in 1969 by Narco Mines Limited; a test mill was installed to determine its potential use in the manufacture of refractories. There are no records of production and the mine is no longer in operation.

Road log from Highway 17 at Mile 225:

Mile	0.0	North Bay, at junction Highways 17 and 63; proceed along Highway 63.
	19.8	Junction road to Twenty Minute Lake; continue straight ahead.
	21.7 to 22.5	Road-cuts expose muscovite gneiss containing magnetite, garnet and pyrite.
	24.6	Junction Highway 533; continue straight ahead. (The turn-off from Highway 533 to the Crocan Lake kyanite occurrence is located 10.5 miles east of this junction.)
	29.8	Niemetz quarry on right and Ross quarry on left. The road-cut on right exposes muscovite gneiss similar to the rock found at these quarries.
	40.4	Temiskaming, at junction Highway 46 and Byrne Road; turn right onto Byrne Road.
	40.5	Junction; turn right onto Murer Avenue.
	40.6	Junction; turn left onto road to Golf Club.
	48.0	Junction; bear left.
	48.3	Junction; bear right.
	48.7	Junction at railway; turn right.
	52.4	Narco Mine.

Map (T): 31 L/10 W Lac Beauchêne.

Mile 226.5 North Bay at junction Highway 11 North and Algonquin Avenue.

Nova Beaucage Mine

PYROCHLORE, ACMITE, FLUORITE, APATITE, CHLORITE, MONAZITE, HORNBLENDE, HEMATITE, MAGNETITE, PYRITE

In alkali rock and carbonatite

Uranium-bearing pyrochlore was formerly mined from this deposit. It occurs as chocolate-brown crystals less than 1/8 inch in diameter, and as crystalline aggregates. Associated with it are acmite, purple fluorite, light green apatite, chlorite, monazite, hornblende, hematite, magnetite, and pyrite. These minerals occur as aggregates of small crystals and/or grains. The pyrochlore contains approximately 10 per cent uranium oxide.

The deposit was discovered in 1952 by Mr. James Strohl of Tunkhannock, Pennsylvania, while prospecting outcrops on the Manitou Islands with a geiger counter. In 1953 Beaucage Mines Limited was formed to take over the property. The deposit was found to extend from the east end of Newman Island eastward below the lake and much of the diamond drilling was done from ice on the lake. A four-compartment shaft was sunk to a depth of 442 feet with levels at 275 and 400 feet. The underground workings extend eastward from the shaft on Newman Island and below the lake. A pilot plant was constructed on the site in 1955. The mine has been idle since 1956.

The mine is located on the east end of Newman Island, one of the Manitou Islands, 6 1/2 miles southwest of the wharf at North Bay. Boat rental arrangements may be made at the wharf in North Bay or at Sturgeon Falls.

Ref.: 49 pp. 45-62.

Maps (T): 31 L/5 E Sturgeon Falls.
(G): P381 North Bay Sheet (Ont. Dept. Mines, 2 miles to 1 inch).

River Valley Garnet Occurrence

GARNET, CHLORITE

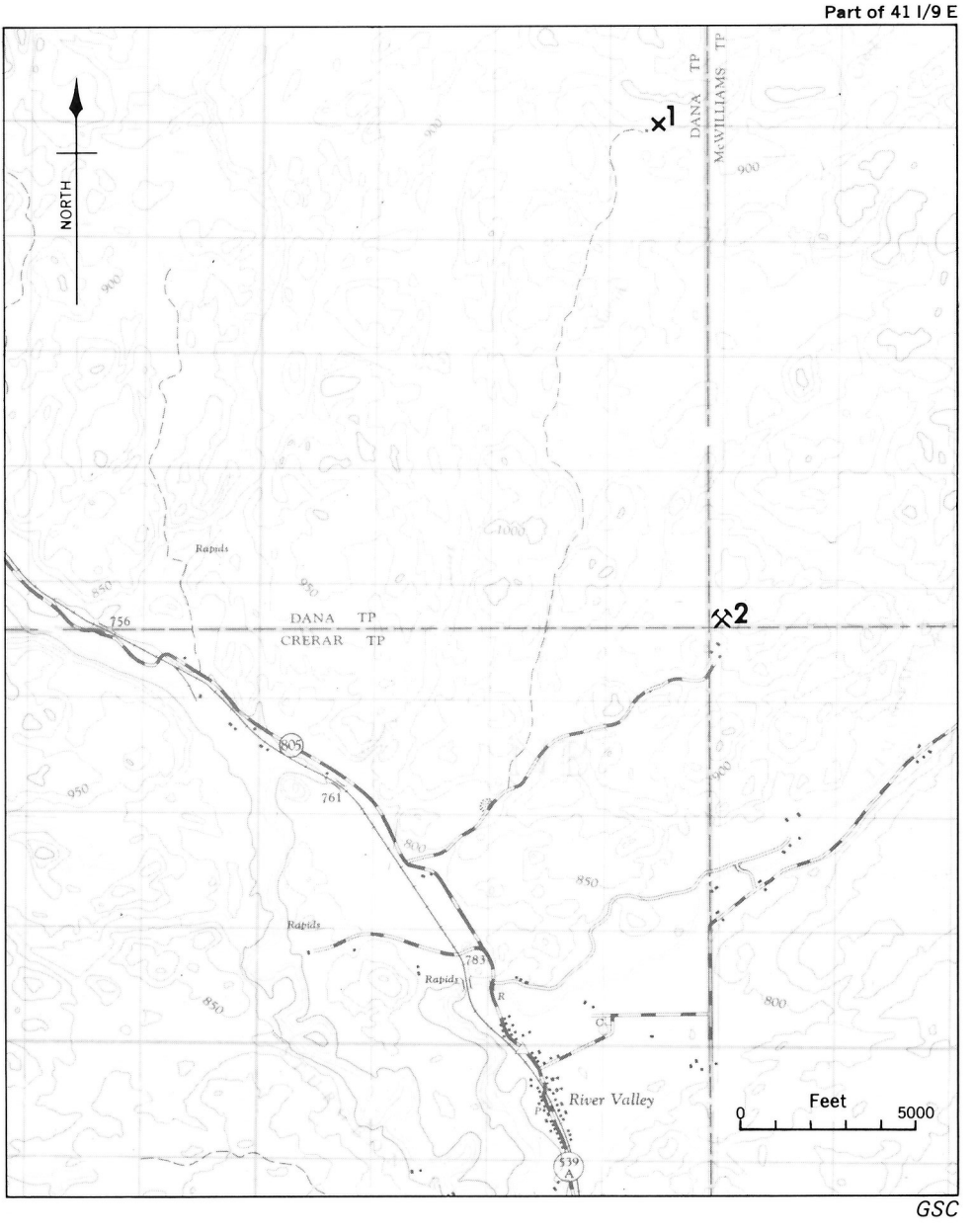
In biotite schist and biotite gneiss

Purplish pink to red garnet crystals averaging an inch in diameter are enclosed in biotite. The garnet is of the almandine variety and crystals measuring up to 7 inches in diameter have been found. The crystals are not generally of gem quality. Some of the biotite has altered to green chlorite.

The deposit occurs on a ridge 5 miles north of River Valley. It has been exposed by a few pits and strippings. The Niagara Garnet Company operated the deposit from 1943 until 1949. The company's mill was located in Sturgeon Falls. Later, the deposit was operated by the Industrial Garnet Company. In 1969, the Rivale Mining Company was in the process of preparing the site for mining operations.

Road log from North Bay at Mile 226.5:

Mile	0.0	Junction Highways 17 and 11 North; proceed west along Highway 17.
	3.8, 4.5	Road-cuts expose hornblende-biotite gneiss containing magnetite and titanite.
	5.4	Junction Nova Beaucage Road. This road leads to the Lake Nipissing shore. During mining operations at the Nova



1. River Valley garnet occurrence. 2. Nipissing Black Granite quarry.

Map 11. River Valley area.

Mile 5.4 Beaucage Mine, boat transportation to the mine was conducted from this point. The distance to the mine is approximately 7 1/2 miles.

8.1 to 10.2 Road-cuts expose magnetite-bearing biotite-hornblende gneiss.

11.0 Lake Nipissing Scenic Lookout on right.

23.6 Sturgeon Falls, at junction Highway 64; turn right onto Highway 64.

37.9 Field, at junction Highway 539; turn left onto Highway 539.

47.2 Junction; proceed right onto Highway 539A.

47.8 River Valley, at railway crossing.

48.5 Bridge over Timagami River.

48.7 Junction; continue straight ahead on Highway 805.

49.4 Junction; turn right onto gravel road.

50.2 Fork; bear left.

50.8 Fork; bear right.

54.3 Mine.

Ref.: 48 pp. 4-7.

Map (T): 41 I/9 E Glen Afton.

Nipissing Black Granite Quarry

ANORTHOSITE, NATROLITE, ANALCIME

Anorthosite, a medium-textured black rock that takes an excellent polish, has been quarried at this locality for use as a building and monumental stone. It makes an attractive ornamental stone and is commercially known as black granite. Joints in the rock are lined with a thin layer of white radiating platy aggregates of natrolite. Patches of olive green analcime occur on the natrolite.

The deposit has been quarried into the side of a hill. It was opened in 1949 by Nipissing Black Granite Company Limited. It is currently operated by Mr. E. Blanchard of Sudbury.

Road log from Highway 17 at Mile 226.5:

Mile 0.0 Junction Highways 17 and 11 North at North Bay; proceed west along Highway 17 and follow road log toward River Valley garnet occurrence.

49.4 Junction Highway 805 and gravel road; turn right onto gravel road.

50.2 Junction road to River Valley garnet occurrence; bear right.

50.7 Junction; continue straight ahead.

51.7 Quarry.

Ref.: 50 pp. 49-50.

Map (T): 41 I/9 E Glen Afton.

New Golden Rose (Afton) Mine

JASPILITE, GOLD, PYRITE, DOLOMITE, GOETHITE, CHALCOPYRITE

In iron-formation

Jaspilite, a very attractive ornamental rock, occurs at this former gold mine. It consists of alternating bands of deep red siliceous hematite and bluish black siliceous magnetite speckled with tiny grains and streaks of pyrite. It takes an excellent polish and makes attractive ornamental objects such as paper-weights, pen-stands, etc. Tiny fragments of native gold are associated with pyrite which occurs as crystals measuring up to 1 inch in diameter. The pyrite occurs in the iron-formation and in quartz and dolomite. Small amounts of goethite and chalcopyrite are associated with pyrite.

Gold was discovered over 70 years ago in loose sand along the shore of Emerald Lake near the present mine-site. The deposit was first worked in 1915-16 by Golden Rose Mining Company which sank a 30-foot shaft. In 1927 Afton Mines Limited deepened the shaft to 100 feet, and in 1934 the property was acquired by New Golden Rose Mines Limited which was partly owned by Consolidated Mining and Smelting Company. The latter company operated the mine from 1935 until it was closed in 1941. The workings consist of a 3-compartment 749-foot shaft with drifts and cross-cuts at several levels, and a 240-foot adit near the water's edge. A mill, power house, and residential buildings has been erected near the mine. None of these buildings remain at present. There is a large dump near the shaft.

Road log from Highway 17 at Mile 226.5:

Mile	0.0	North Bay, at junction Highways 17 and 11 North; proceed west along Highway 17 and follow road log toward River Valley garnet occurrence and Nipissing Black Granite quarry.
	49.4	Turn-off to River Valley garnet occurrence; continue straight ahead along Highway 805.
	63.5	Fork; bear right.
	80.0	Junction; turn left onto single lane road to Camp Louise.
	80.4	Fork; bear right.
	80.9	Mine.

Refs.: 27 pp. 93-94; 36 pp. 38-39, 46-48.

Map (T): 41 I/16 W Lake Timagami.

SECTION 2

HULL - WALTHAM

Mile 0.0 Hull, at junction Highway 8 (rue Principale) and Highway 11 (rue Montcalm); proceed west along Highway 8.

1.0 Junction Gatineau Parkway; mineral occurrences along the Parkway are described in Geological Survey of Canada Paper 69-50.

2.3 Road, on left, to Champlain Bridge; continue straight ahead.

4.6 Junction Vanier Road.

Lavigne Quarries

CALCITE, FOSSILS

In Ordovician limestone

Plate XVI. Deschênes limestone quarry (GSC 153200).

Colourless to white calcite crystals occur along fractures in the limestone. Fossils including corals, crinoids, brachiopods and gastropods are common; in places they form a coquina limestone.

The quarries were formerly worked to supply material for road-building. They are on the property of Mr. L. A. Lavigne.

Road log from Highway 8 at Mile 4.6:

Mile 0.0 Turn right (north) onto Vanier Road.

2.4, 2.6 Abandoned quarries on left. The limestone at these quarries is similar to that at the Levine quarry but is less rich in fossils.

3.0 Junction Pink Road; continue straight ahead.

4.0 Junction Cook Road; turn left.

5.0 Quarries on left, just west and south of the Lavigne house.

Refs.: 13 p. 60; 68 pp. 21-26.

Maps (T): 31 G/5 W Ottawa.
(G): 414A Ottawa Sheet (west half), Carleton and Hull Counties, Ontario and Quebec (G.S.C.).
7-1970 Gatineau Park, Quebec (G.S.C., 1 inch to 1,500 feet).

Deschênes Quarry

FOSSILS, BARITE, CALCITE

In limestone

Ordovician fossils including corals, crinoids, brachiopods, trilobites and gastropods are common in the limestone. The rock is medium grained, light grey, and is known as Black River limestone. Calcite occurs as crystals and in massive form; the crystals are coated with white platy barite.

The quarry and crushing plant are operated by Deschênes Construction Limited for road metal.

Road log from Highway 8 at Mile 4.6:

Mile 0.0 Turn right (north) onto Vanier Road and follow the road log towards the Lavigne quarry.

3.0 Junction; turn left onto Pink Road.

4.6 Quarry entrance on left just in front of the junction of the Klock Road.

Refs.: 13 p. 60; 68 pp. 21-26.

Maps (T): 31 G/5 W Ottawa.
(G): 414A Ottawa Sheet (west half), Carleton and Hull Counties, Ontario and Quebec (G.S.C.).

Mile 6.5 Aylmer at traffic light.

30.4 Junction Hammond Road.

Godwin Mine

MICA, PYROXENE, CALCITE, SCAPOLITE, HORNBLENDE, PYRITE

In pyroxenite

Amber mica was formerly mined from this deposit. Crystals measuring up to 1 foot in diameter were obtained during mining operations. The crystals are amber and much darker along the edges. Massive pyroxene and pyroxene crystals occur with the mica in pink to orange calcite. Other minerals associated with the deposit are light greyish green scapolite, hornblende, and pyrite. The mica-bearing pyroxenite dyke cuts syenite.

The deposit was first worked in 1900 by Mr. J. J. Godwin. It was operated again briefly in 1906. The pit measures 85 by 10 feet and 30 feet deep. There is a small dump near the pit; both are now partly overgrown. The property belongs to Mr. Paul J. Bourque of Ottawa.

Road log from Highway 8 at Mile 30.4:

Mile 0.0 Turn right (north) onto Hammond Road.

3.1 Junction. The road to the mine begins at the gate opposite this junction and leads north.

4.0 Trail on left leading 30 yards to the pit.

Refs.: 55 pp. 135-136; 70 pp. 116-117.

Maps (T): 31 F/9 E Quyon.
(G): 1739 Portions of Bristol, Onslow, McNab, Fitzroy and Torbolton Townships, Quebec and Ontario (G.S.C.).
1034 Onslow-Masham area, Pontiac and Gatineau Counties (Que. Dept. Natural Resources).

Mile 32.9 Quyon, at junction Egan Street.

Moss Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, FLUORITE, MAGNETITE, CHLORITE, TITANITE, HEMATITE, PYROXENE, BIOTITE

In syenite

Molybdenite occurs as flakes (averaging 1/2 inch in diameter) and as flaky aggregates in the syenite. It is associated with aggregates of pyrite, pyrrhotite, purple fluorite, magnetite, chlorite, titanite, hematite, pyroxene, and biotite. Pyroxene crystals occur in the deposit but are uncommon.

The molybdenite deposit, on the farm of Mr. Robert Steel, was discovered several years before it was first exploited in 1915. During World War I it was the world's leading producer of molybdenum and accounted for 80 per cent of the Canadian output. Operators included the Canadian Wood Molybdenite Company (1915-1916), Dominion Molybdenite Company (1917-1919), and Quyon Molybdenite Company (1938-1944). The workings consist of 3 pits and 2 shafts near the mill-site, and a pit and shaft 500 yards to the northwest. The largest pit measures 120 by 50 feet and is up to 30 feet deep. All mine buildings have been dismantled, the pits are water-filled, and there are only small dumps near the openings. Total production amounted to 550 tons of molybdenite.

Road log from Highway 8 at Mile 32.9:

Mile 0.0 Quyon, turn right (north) onto Egan Street.

2.9 Junction; continue straight ahead. (The Godwin Mine may be reached from this junction by proceeding east 2.8 miles to the gate and turn-off to mine.)

3.2 Junction mine road; turn right.

3.3 Fork; bear left. (The mill is on left.)

3.4 Pits.

Refs.: 6 pp. 150-155; 51 p. 6; 64 pp. 186-194; 70 pp. 64-77.

Maps (T): 31 F/9 E Quyon.
(G): 1739 Portions of Bristol, Onslow, McNab, Fitzroy and Torbolton Townships, Quebec and Ontario (G.S.C.).
1034 Onslow-Masham area, Pontiac and Gatineau Counties (Que. Dept. Natural Resources).

Plate XVII. Open pit, Hilton Mine (GSC 153194).

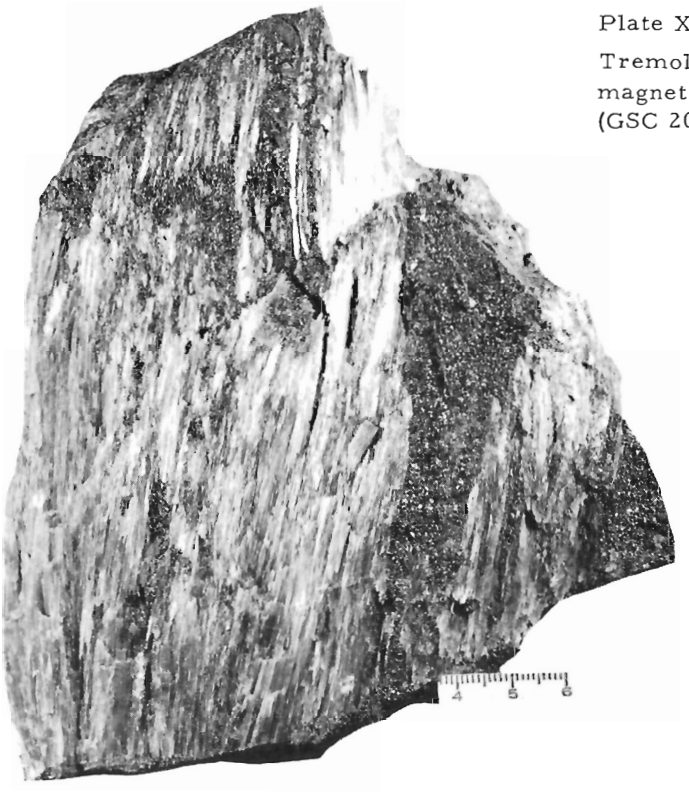


Plate XVIII.

Tremolite partly replaced by magnetite, Hilton Mine. (GSC 201420-N, scale in mm)

Mile 40.4 Junction road to Bristol Mines.

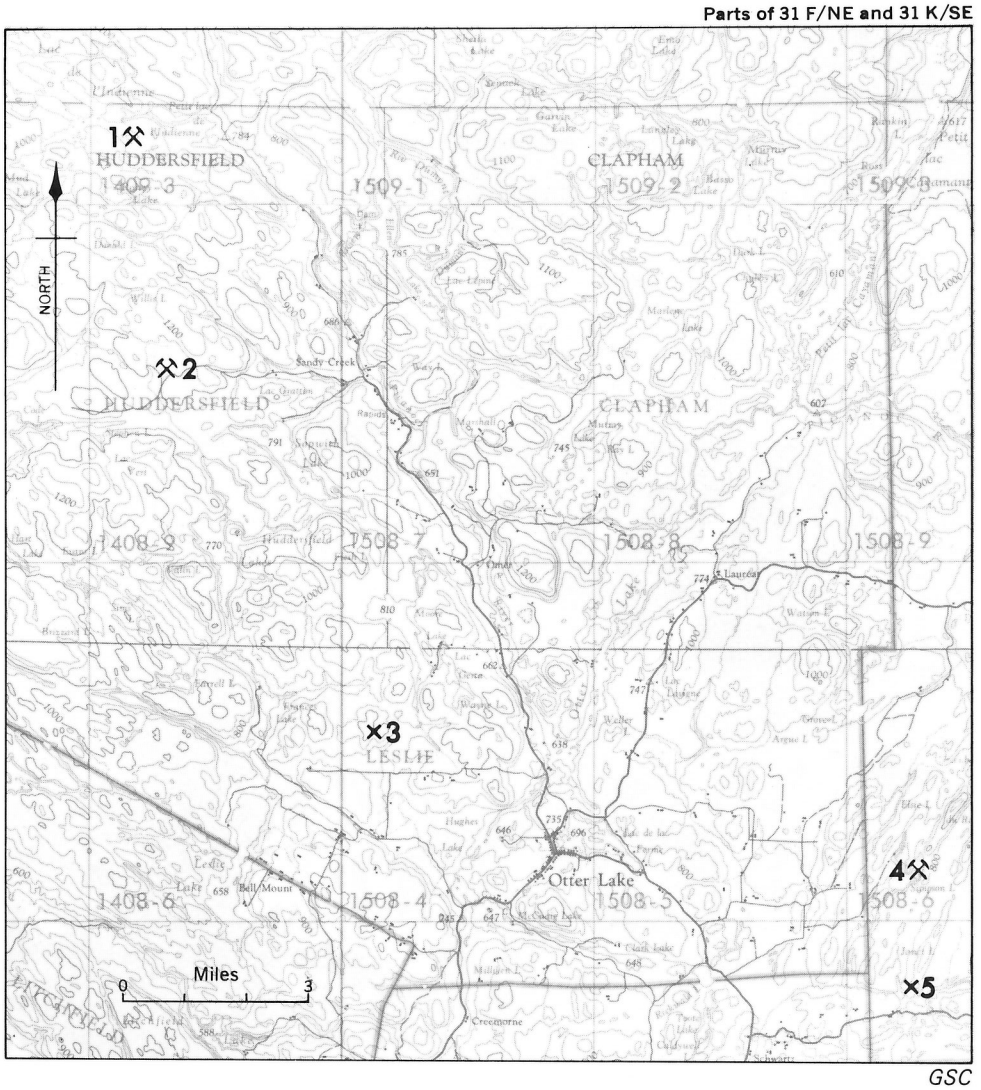
Hilton (Bristol) Mine

MAGNETITE, HORNBLENDE, TALC, TREMOLITE, PYRITE, HEMATITE, CHALCOPYRITE, CHLORITE, SERPENTINE, FELDSPAR, EPIDOTE, GARNET, SCAPOLITE, MARTITE

In amphibolite near its contact with crystalline limestone

Magnetite, the ore mineral, occurs as finely granular masses. Hornblende, grey massive talc, and light green fibrous tremolite occur commonly in the orebody. In places the fibrous tremolite is replaced by magnetite and/or pyrite which retain the fibrous structure. Grains and veinlets of pyrite and less commonly chalcopyrite, are found in the magnetite. Other minerals associated with the deposit include: chlorite, serpentine, brick red feldspar cut by epidote veinlets, orange-red garnet (grains associated with epidote), and greenish grey scapolite. Martite has also been reported from the deposit.

The deposit was discovered in about 1870 by Mr. Thomas Moore. The first period of mining activity was from 1872 until 1894 when more than 16,000 tons of iron ore were mined. Operations were conducted from a 100- and a 200-foot shaft and from several open pits. Two roasting furnaces were used. In 1958 Hilton Mines Limited, the present operator, resumed operations from an open pit. The company installed concentrating and pelletizing plants at the mine site.



1. Squaw Lake Mine.
2. Yates uranium mine.
3. Richard cordierite occurrence.
4. Zimmerling Mine.
5. Milkie asbestos occurrence.

Map 12. Otter Lake area.

Access to the mine is via a 4.3 mile road leading south from Highway 8 at Mile 40.4. A limited number of groups are admitted to the mine; application should be made one week prior to the proposed visit.

Refs.: 17 pp. 77-80; 46 pp. 27-29; 70 pp. 107-112.

Maps (T): 31 F/9 W Quyon.
(G): 1739 Portions of Bristol, Onslow, McNab, Fitzroy and Torbolton Townships, Quebec and Ontario.

Mile 48.0 Shawville, at junction to Otter Lake.

Road log for side trip to Otter Lake area (underlined localities are described in text following log):

Mile	0.0	Highway 8 at junction to Otter Lake; turn right (north) toward Shawville.
	7.7	Junction Clarendon Road 13 to Kirkham Mine.
	13.9	Ladysmith, at junction Wolfe Lake Road; continue straight ahead.
	17.6	Junction at church; road on right leads to Milkie asbestos occurrence.
	18.8	Junction gravel road on right to Zimmerling Mine.
	22.6	Otter Lake, at junction Campbell's Bay-Kazabazua road; turn right (north).
	22.7	Junction; turn left onto the Picanoc Road.
	29.8	Road-cuts on left expose granite pegmatite containing dull brown to black allanite. Epidote, titanite, pyroxene and tremolite occur with quartz.
	31.7	Sandy Creek; at junction road to Yates uranium mine.
	36.7	Junction Squaw Lake Lodge Road to Squaw Lake Mine

Kirkham Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, CHALCOPYRITE, URANINITE, TITANITE, DIOPSIDE, SCAPOLITE, MAGNETITE, ZIRCON, ALLANITE, URANOTHORITE

In pyroxenite at contact crystalline limestone and gneiss

Molybdenite flakes measuring up to 3 inches in diameter occur with pyrite, pyrrhotite and chalcopyrite in light green pyroxenite. Grains of uraninite are associated with calcite, tremolite, titanite, diopside, and scapolite. In a pegmatite dyke associated with the pyroxenite, the following minerals have been reported: pyroxene, magnetite, titanite, zircon, allanite, uranothorite, pyrite, and pyrrhotite.

The deposit was discovered in 1951 and between 1952 and 1957, was developed by stripping, pits, trenches and two adits. The work was done by Quebec Metallurgical Industries Limited (now QMI Minerals Limited). Most of the openings are now partly overgrown and difficult to find without a local guide.

Road log from Mile 7.7 of side trip to Otter Lake area:

Mile 0.0 Turn right (east) onto Clarendon 13th Line Road.

1.4 End of motor road; continue on foot along the trail.

1.6 Mine on right. One of the adits is a few yards from the trail on the left side of the valley. To reach the main adit zone continue along the valley for approximately 300 yards to the openings on the right side of the ridge. There is a stripping 400 yards southeast of the main working.

Refs.: 6 pp. 143-144; 64 pp. 173-179.

Map (T): 31 F/9 W Quyon.

Milkie Asbestos Occurrence

CHRYSOTILE, SERPENTINE, PYROAURITE, CHLORITE, MICA, HEMATITE, PYRITE, MAGNETITE

In crystalline limestone

White chrysotile asbestos occurs as thin veinlets (less than 1/2 inch wide) in yellow, light green and greenish blue massive serpentine. Some of the serpentine is translucent and could be used for sculpting or cutting into small objects. Snow-white silky pyroaurite nodules (about a millimetre in diameter) are found sparingly in the limestone. Flaky aggregates of light blue chlorite and colourless mica are relatively common. Other minerals found in the limestone are hematite, pyrite, and magnetite (as tiny crystals).

The deposit was opened by a small pit in 1955. It is located on the north side of a ridge overlooking the Kazabazua River, on the property of Mr. Fred Milkie.

Road log from Mile 17.6 of side trip to Otter Lake area:

Mile 0.0 Turn right (east) onto gravel road.

2.1 Turn-off (left) to the Fred Milkie farmhouse. Obtain permission to visit deposit. To reach the deposit continue straight ahead.

2.7 Turn-off to red farmhouse on left. From this point a tractor road leads north to the mine. Proceed along this road.

3.0 Fork; bear right (east) and proceed along the north bank of the Kazabazua River for a distance of 400 yards to a fork at a fallen shack on left; continue straight ahead for about 350 yards to the occurrence.

Ref.: 30 p. 5.

Maps (T): 31 F/16 W Kazabazua.
(G): 1173 Thorne-Leslie-Clapham area (Que. Dept. Natural Resources).

Zimmerling Mine

MICA, PYROXENE, CALCITE, APATITE, TITANITE, TOURMALINE, PYRITE

In pyroxenite dyke cutting crystalline limestone

Books of deep amber mica (phlogopite) occur with greyish green pyroxene crystals in pale salmon-pink calcite. The pyroxene crystals measure up to

3/4 inch in diameter. Pale blue apatite grains, pyrite, and brown tourmaline are found in crystalline limestone. Mica, titanite, pyrite, and greyish to light greenish yellow tremolite are associated with quartz and feldspar in crystalline limestone.

The deposit has been exposed by a pit at the side of a hill. It is being worked by Mr. Adolph Zimmerling of Otter Lake.

Road log from Mile 18.8 of side trip to Otter Lake area:

Mile 0.0 Turn right (east) onto gravel road.

1.6 Junction; turn right onto single lane road.

3.7 Fork; bear left.

4.9 Mine.

Ref.: 30 p. 5.

Maps (T): 31 F/16 W Kazabazua.
(G): 1173 Thorne-Leslie-Clapham area (Que. Dept. Natural Resources).

Richard Cordierite Occurrence

CORDIERITE, PYROXENE, SCAPOLITE, ALLANITE, TITANITE, GARNET, MICA, APATITE, PYRITE

In gneiss and pyroxenite

Blue cordierite suitable for lapidary purposes is found in gneiss. It is associated with deep red granular garnet. Well-formed crystals of pyroxene occur in coarsely crystalline pink calcite. Dark brown titanite crystals are found with white scapolite crystals in calcite and in feldspar. Crystals of allanite (platy), mica and apatite, and pyrite also occur in the deposit.

The deposit has been exposed by a pit on the property of Mr. Albert Richard of Otter Lake village. Visits to the occurrence may be arranged with Mr. Richard or Mr. Roy Hansen also of Otter Lake.

Ref.: 30 p. 6.

Maps (T): 31 F/16 W Kazabazua.
(G): 1173 Thorne-Leslie-Clapham area (Que. Dept. Natural Resources).

Yates Uranium Mine

URANOTHORITE, THORIANITE, THORITE, URANOPHANE, ALLANITE, APATITE, PYROXENE, SCAPOLITE, MICROCLINE, FLUORITE, MICA, CALCITE, STILBITE, HEULANDITE, TREMOLITE, TITANITE, CERITE

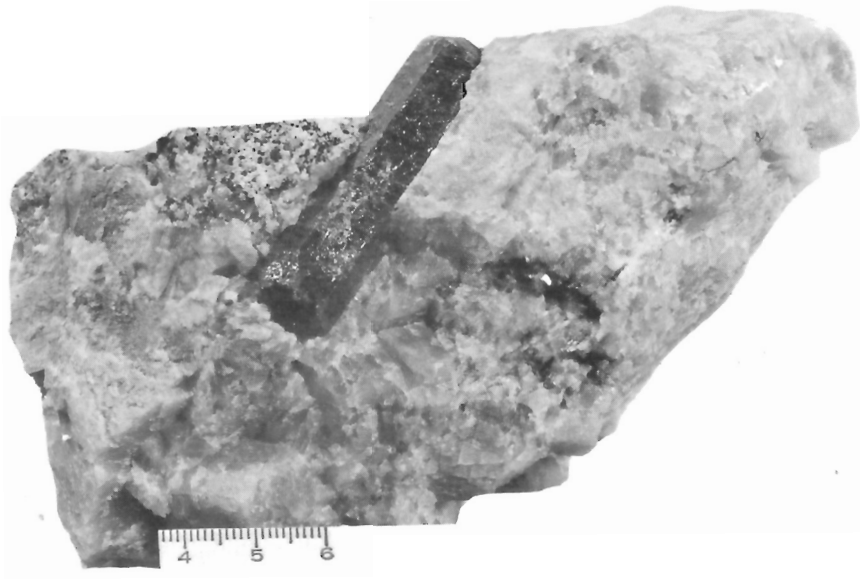


Plate XIX. Apatite crystal in calcite, Yates uranium mine. (GSC 201420-M, scale in mm)

In skarn zone

A variety of radioactive minerals have been reported from this deposit: uranothorite as red, greyish black prisms and masses; thorianite, as black grains; thorite, as reddish brown laths; uranophane, as yellow coating; and allanite, as black platy aggregates. Good crystals of the following minerals may be found: clear green and, less commonly, red apatite (up to 6 inches long), dark green to almost black pyroxene (square prisms up to 2 inches long), white scapolite (several inches in diameter), and white microcline (up to 2 inches long). Coarse aggregates of deep purple fluorite are associated with the apatite and with phlogopite in salmon-pink calcite. Cavities in the calcite are lined with white sheaf-like aggregates of stilbite and colourless to peach-coloured square crystals of heulandite. Deep pink microscopic grains of cerite occur in stilbite and in calcite at the edge of the stilbite-heulandite-lined vugs. Clear calcite crystals (Iceland spar) and fluorescent calcite (bright pink under 'short' ultraviolet rays) are also present. The skarn zone containing the mineralization consists of pyroxenite and a diopside-scapolite rock.

The deposit was originally worked for phlogopite and fluorite in 1906, 1907 by the Calumet Mica Company and later by Mr. A.G. Martin of Ottawa. The workings consisted of a few pits, the deepest measuring 20 feet. In 1943-44, Twin Valley Prospecting Syndicate mined 18 tons of fluorite from the deposit. About 20 years ago Mr. J.M. Yates discovered the presence of a radioactive

Plate XX. Scapolite crystal, Yates uranium mine.
(GSC 201420-C, scale in mm)

mineral, uranothorite, and Yates Uranium Mines Incorporated was formed to develop the property. Development between 1953 and 1956 consisted of a 300-foot adit, 2 open cuts, and diamond drilling. A mining camp was built on the site.

Road log from Mile 31.7 of side trip to Otter Lake area:

Mile	0.0	Junction at Sandy Creek; turn left (west). The key to the gate at the entrance to the deposit may be obtained from Mr. N. Roussos, proprietor of the store at this junction.
	0.2	Junction; continue straight ahead.
	1.9	Junction; bear right.
	2.7	Fork; the right fork leads 600 yards to the apatite-fluorite-rich zone. Continue straight ahead to reach the main deposit.

Mile 3.3 Main cut. The old mica pits are located about 130 yards west of this opening.

Refs.: 29 p. 5; 50 pp. 153-154; 55 pp. 133-134; 57 pp. 39-41; 71 pp. 52-53.

Maps (T): 31 F/15 E Fort Coulonge.
(G): 1165 Litchfield-Huddersfield area (Que. Dept. Natural Resources, 1 inch to 2 miles).

Squaw Lake Mine

MOLYBDENITE, PYRITE, PYRRHOTITE, DIOPSIDE, SCAPOLITE, PHLOGOPITE, HORNBLENDE, APATITE, CALCITE, TITANITE, GRAPHITE, JAROSITE, LEONHARDTITE

In pyroxenite and syenite gneiss

Flakes and flaky aggregates of molybdenite are associated with pyrite and pyrrhotite in rusty-weathered rocks. Individual flakes measuring about an inch in diameter have been found. Other minerals found in the deposit include: green diopside (crystals averaging 1/2 inch in diameter), colourless to grey scapolite, phlogopite, hornblende, green apatite (crystals), pink to white calcite, dark brown titanite, fluorite, and graphite. Yellow jarosite and white leonhardtite occur as coatings on the specimens.

The deposit was exposed by five open-cuts and trenches in 1971 by Wood Molybdenite Company of Ottawa. The largest pit measures 80 by 25 to 40 feet and is 1 to 14 feet deep. A concentrating mill was erected at the mine site and 700 pounds of concentrates were produced in 1918. The openings are now largely overgrown; the remnants of the old mill remain.

Road log from Mile 36.7 of side trip to the Otter Lake area:

Mile 0.0 Turn left (west) onto the Squaw Lake Lodge Road.

1.3 Fork; bear right.

1.5 Junction trail on left. Proceed on foot along this trail to the pits along a slope above the eastern end of Squaw Lake. The pits are located about 250 feet southeast of the mill.

Refs.: 2 pp. 35-46; 6 pp. 145-148; 64 pp. 180-185; 70 pp. 86-92.

Maps (T): 31 K/2 E Usborne Lake.
(G): 1211 Pontefract-Gillies area (Que. Dept. Natural Resources, 1 inch to 2 miles).

This is the last occurrence described for the side trip to the Otter Lake area; the main road log along Highway 8 is resumed.

Mile 48.0 Shawville, at junction road to Otter Lake.

55.3 Junction road to Portage-du-Fort.

Portage-du-Fort Quarries

DOLOMITE, TREMOLITE, MICA, SERPENTINE

In dolomitic crystalline limestone

Veinlets of pink and beige crystalline dolomite occur in snow-white dolomitic marble. Impurities in the rock are uncommon and only the following minerals were observed: tremolite (colourless), mica, and serpentine (grey).

The quarries were operated in the 1940's by the White Grit Company and by Canadian Dolomite Company for use in the manufacture of stucco dash, terrazzo, asphalt flooring, and for poultry grit. About 60 years ago, the deposit was opened for use as a building and monument stone. It has been used in the Parliament Buildings in Ottawa. The quarries are now partly overgrown and water-filled. They are located along the road to Portage-du-Fort at a point 4.5 miles from its junction with Highway 8 at Mile 55.3. Two quarries are on the east side of the road and one is on the west side.

Refs.: 13 pp. 135-137; 42 pp. 195-197.

Map (T): 31 F/10 E Cobden.

Mile 55.8

Road-cuts on Highway 8

MAGNETITE, PYROAURITE, SZÁJBELYITE, SERPENTINE, MICA, ARAGONITE, PYRRHOTITE

In crystalline limestone

Dodecahedral crystals of magnetite measuring up to 3/4 inch in diameter occur in the limestone. Of particular interest is the occurrence of the relatively rare minerals pyroaurite and szájbelyite. The former occurs as light blue and white pearly nodules measuring up to 2 millimetres in diameter, the latter as silky white fibrous, hair-like or platy matted aggregates in cavities in the limestone and as patches on the limestone. Serpentine, as yellow, light green and amber irregular masses, and mica, as deep greenish blue flaky aggregates, are common. White aragonite occurs as coatings on pyroaurite and serpentine. Small grains of pyrrhotite were also noted.

The deposit is exposed on both sides of Highway 8 at Mile 55.8.

Map (T): 31 F/10 E Cobden.

Mile 56.3 Turn-off (left) to Bryson. This is the southern turn-off to the village.

Carswell Quarry

BRUCITE, SERPENTINE, DIOPSIDE, TREMOLITE, CHONDRODITE, MICA, PYRRHOTITE, GRAPHITE, OLIVINE, CORUNDUM

In crystalline limestone

Nodular, fibrous, foliated and platy brucite occurs at this locality. Nodules measuring up to 1/2 inch in diameter have been found, but the average size is about 2 or 3 millimetres. Minerals associated with brucite include: white to light green or yellow serpentine (orange-coloured on weathered surfaces), green diopside, light green tremolite, pale yellow granular chondrodite, colourless mica, pyrrhotite, and graphite. Olivine crystals and large crystals of corundum have previously been reported from the deposit. The limestone in which these minerals occur is white with blue and grey bands.

The deposit was originally opened in the latter part of the 19th century for use as a building stone. It was later worked for lime. Two quarries, 35 feet apart, were operated on the east side of a hill over which the road to Bryson passes. Both quarries are now mostly overgrown.

To reach the quarry leave Highway 8 at Mile 56.3 and proceed toward Bryson for a distance of 0.45 mile to the quarry gate on the right.

Refs.: 13 pp. 134-135; 15 pp. 20-23; 16 p. 65; 42 pp. 194-195; 50 pp. 152-153.

Maps (T): 31 F/10 E Cobden.
(G): 549 Calumet Island area, Pontiac County (Que. Dept. Natural Resources, 1/2 mile to 1 inch).

Bryson Exposures

GARNET, DIOPSIDE, BRUCITE, SPINEL, SERPENTINE, CHONDRODITE, APATITE, CALCITE, MICA, GRAPHITE, MAGNETITE, PYRITE, PYRRHOTITE, SPHALERITE

In crystalline limestone

An unusual occurrence at this locality is that of a light blue garnet; it is massive, transparent to translucent and is intimately associated with light green diopside. Most of the garnet occurs as small irregular masses measuring up to 3 millimetres across. Small white brucite nodules (about 2 millimetres in diameter) and microscopic mauve spinel crystals are found sparingly in the marble. Yellow, light green to olive green and dark brown serpentine occurs abundantly as irregular granules and in massive form. Other minerals found in the deposit include: yellow granular chondrodite (uncommon), light blue

apatite (uncommon), colourless calcite crystals (fluoresce bright pink under 'short' ultraviolet rays), colourless to deep greenish blue mica, graphite, magnetite, pyrite, pyrrhotite, and sphalerite.

The crystalline limestone containing these minerals is exposed as broken blocks along a short side road leading west from the turn-off to Bryson.

Road log from Highway 8 at Mile 56.3:

Mile 0.0 At junction road to Bryson and Highway 8, proceed straight ahead toward Bryson Village.

0.45 Gate to Carswell quarry on right; continue straight ahead.

0.5 Junction side road on left. The blocks are exposed along this road.

Maps (T): 31 F/10 E Cobden.
(G): 549 Calumet Island area, Pontiac County (Que. Dept. Natural Resources, 1/2 mile to 1 inch).

Mile 57.5 Junction road to Bryson and Grand Calumet.

Bryson Road-cut

MAGNETITE, SERPENTINE, CALCITE, PYROXENE, PYROAURITE, HYDROTALCITE, SPINEL, CHONDRODITE, DOLOMITE, HEMATITE, PYRITE, GRAPHITE

In crystalline limestone

Magnetite and serpentine are the most abundant minerals in this deposit. Magnetite occurs in massive form and as well-formed octahedral crystals; the best crystals being the microscopic ones occurring with calcite crystals in tiny cavities in the limestone. The serpentine occurs as grey, light green to olive green and dark brown nodules and irregular masses. Coarsely crystalline blue calcite is closely associated with some of the serpentine. Minerals occurring less commonly in the marble include: light green pyroxene, light blue pyroaurite (tiny nodules), light brown hydrotalcite (grains), purplish pink and deep green spinel (microscopic crystals), pale yellow chondrodite (grains), dolomite (nodules), deep red hematite, pyrite and graphite.

The deposit has been exposed by a road-cut on the Bryson-Grand Calumet road (just south of the Bryson bridge) at a point 0.5 mile from Mile 57.5 on Highway 8.

Maps (T): 31 F/10 E Cobden.
(G): 549 Calumet Island area, Pontiac County (Que. Dept. Natural Resources, 1/2 mile to 1 inch).

Road-cut on Campbells Bay Road

BRUCITE, PYROAURITE, SERPENTINE, SPINEL, CLINOHUMITE, OLIVINE, DOLOMITE, MAGNETITE, GRAPHITE, PYRRHOTITE

In crystalline limestone

White brucite nodules measuring 1/4 inch in diameter are abundant; on exposed surfaces the brucite is cream-white to yellowish. Nodules of light blue pyroaurite measuring up to 3 millimetres in diameter are fairly common. Serpentine occurs as pale yellow, white, greenish blue and brown nodules and small irregular masses. Less common in this deposit are: spinel, as tiny mauve crystals and grains; clinohumite, as yellow transparent grains; olivine, as colourless and pink transparent grains; and white platy dolomite. Also present are crystals (octahedrons and dodecahedrons) and irregular masses of magnetite and disseminations of graphite and pyrrhotite.

Road log from Highway 8 at Mile 57.5:

Mile 0.0 Turn left onto the road to Bryson and Grand Calumet.

0.5 Bryson road-cut on right (see preceding description).

0.55 Junction, on right, road to Campbells Bay; turn right.

0.6 Road-cut on right.

Maps (T): 31 F/10 E Cobden.
(G): 549 Calumet Island area, Pontiac County (Que. Dept. Natural Resources, 1/2 mile to 1 inch).

New Calumet Mine

GALENA, SPHALERITE, PYRITE, CHALCOPYRITE, PYRRHOTITE, MARCASITE, ARSENOPYRITE, TETRAHEDRITE-TENNANTITE, TITANITE, GARNET, TREMOLITE, SCAPOLITE, ZIRCON, WILSONITE, CORDIERITE, TALC, CHLORITE, BARITE, SILLIMANITE, APATITE, SPINEL, CLINOZOISITE, GRAPHITE, GYPSUM, ANHYDRITE, EPIDOTE

In biotite gneiss, amphibolite and crystalline limestone

The orebody consists of a medium-grained aggregate of galena, sphalerite, pyrite, chalcopyrite, pyrrhotite, marcasite, arsenopyrite and tetrahedrite-tennantite. Crystals of galena, pyrite and chalcopyrite have been found. The sphalerite is dark brown in colour. Dark brown titanite, red garnet and colourless tremolite occur in gneiss. Other minerals reported from the deposit include: scapolite, zircon, wilsonite, cordierite (rare), talc, chlorite, barite, sillimanite, apatite, spinel, clinozoisite, graphite, gypsum, anhydrite, and epidote.

This mine is a former producer of lead zinc, silver and gold. It was originally worked in 1893 by James and Calvin Russell. From then until 1942 various companies carried out short and intermittent operations. New Calumet Mines Limited operated the deposit from 1942 until 1968. The workings consist of 3 shafts from the surface and 2 internal shafts. A concentrating mill was in operation from 1943 until 1968. In the summer of 1969 the mine buildings were being dismantled. There are a few very small dumps on the property.

Road log from Highway 8 at Mile 57.5:

Mile 0.0 Turn left onto road to Bryson, Grand Calumet.

0.5 Road-cut on right. For description see page 101.

0.55 Junction Campbell's Bay Road.

0.6 Bridge over Ottawa River.

0.65 Junction; continue straight ahead. (Along the road on left, at a point 1.6 miles from the junction, crystalline limestone containing disseminations of pink spinel, yellow clinohumite, mica, and serpentine is exposed.)

0.7 Road-cuts expose crystalline limestone containing serpentine, phlogopite, chlorite, magnetite, pyrite, and tremolite. Green apatite crystals (1/4 inch in diameter), dark green pyroxene, and brown titanite grains occur in pink calcite masses enclosed by the limestone.

1.4 Junction; turn left.

2.5 Junction; turn left.

3.6 Junction; turn right.

4.3 Junction mine road; turn left.

4.6 Mine.

Refs.: 1 pp. 121-126; 12 pp. 116-122; 39 pp. 12-25; 72 p. 245.

Maps (T): 31 F/10 E Cobden.
(G): 549 Calumet Island area, Pontiac County (Que. Dept. Natural Resources, 1/2 mile to 1 inch).

Calumet Uranium Occurrence

URANOTHORITE, FLUORITE, PYROXENE, SCAPOLITE, HORNBLENDE, CALCITE, MICA, APATITE, ALLANITE, CHONDRODITE, THORIANITE

In skarn zone in pegmatite

Dark brown prisms of uranothorite occur in massive deep purple fluorite. Minerals associated with this radioactive zone include: dark green pyroxene crystals measuring 1/2 inch in diameter, light green scapolite crystals, black hornblende crystals, allanite crystals, pink calcite, dark amber mica, and light green apatite. Chondrodite and black uranoanthorianite cubes occur in pink calcite in crystalline limestone.

The deposit has been exposed by strippings and trenches. The exploration was conducted by Calumet Uranium Mines Limited between 1953 and 1955. The openings are now moss-covered and partly overgrown.

Road log from Highway 8 at Mile 57.5:

Mile 0.0 Turn left onto the road to Bryson and Grand Calumet, and proceed towards the New Calumet Mine.

2.5 Junction; turn right. (The road on left goes to the New Calumet Mine.)

7.7 Junction; turn right.

8.5 Gate on left diagonally across the road from a farmhouse. A road leads southwest about 500 yards from the gate to a trench in an outcrop area at the edge of the woods. There are a few more openings further into the wooded area.

Ref.: 57 pp. 30-32.

Map (T): 31 F/15 E Fort Coulonge.

Mile 61.7 Campbell's Bay, junction road to Otter Lake.

Road-cut, Otter Lake Road

ALLANITE, HORNBLENDE, TITANITE, TOURMALINE, PYRITE, SCAPOLITE, EPIDOTE, FLUORITE, TREMOLITE, MICA, CALCITE

In pegmatite

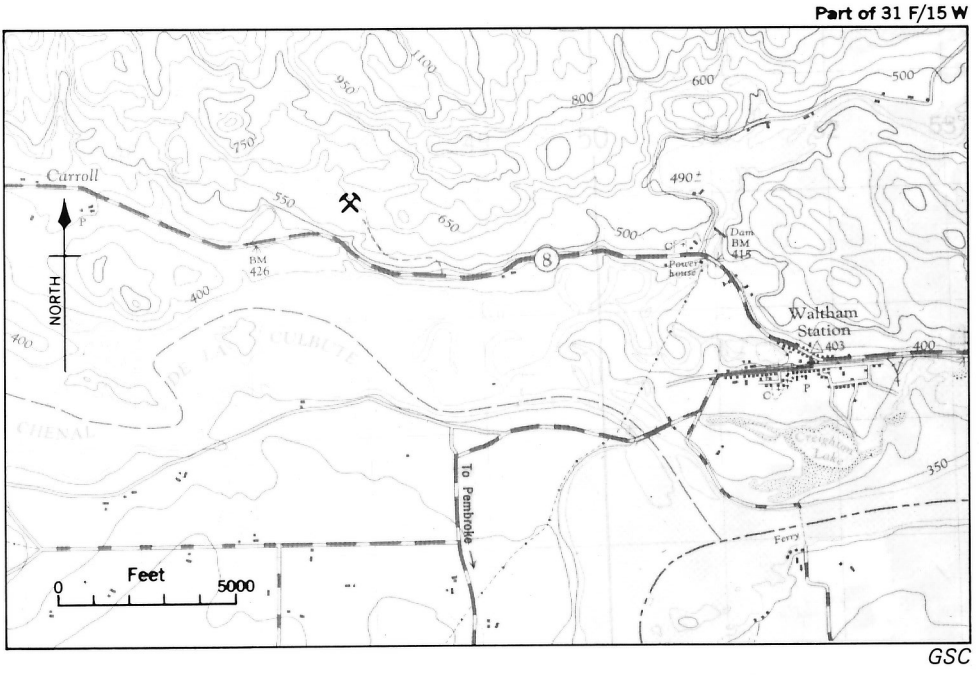
Allanite crystals occur in grey pegmatite. Associated minerals include hornblende, titanite, tourmaline, and pyrite. Crystal aggregates of green tremolite are common. White scapolite (fluoresces reddish pink under 'short' ultraviolet rays), epidote (granular aggregates and prismatic crystals), purple fluorite, mica (crystals measuring 4 inches across), and pink calcite occur with the tremolite.

The road-cut is located on the south side of the Campbells Bay-Otter Lake Road at a point 4 miles east of Highway 8, and opposite Lawless Lake.

Map (T): 31 F/15 E Fort Coulonge.

Mile 84.3 Turn-off to Waltham; continue straight ahead along highway.

85.0 Waltham, at junction road to Pembroke.



Map 13. Waltham feldspar quarry.

Waltham Quarry

FELDSPAR, PERISTERITE, HORNBLENDE, PYROXENE, TITANITE, MAGNETITE, EPIDOTE, SERPENTINE, MICA, ALLANITE, PYRITE, CALCITE, MOLYBDENITE

In pegmatite dyke cutting granite gneiss

Pink to grey peristerite with a blue iridescence occurs at this abandoned feldspar mine. The chief constituents of the pegmatite are microcline and quartz. Black massive hornblende and crystal aggregates of pyroxene and titanite are common. Less abundant accessories include magnetite, epidote, serpentine, mica, allanite, pyrite, and calcite. Molybdenite has been reported.

The deposit was worked in 1915 by Rock Products of New Jersey. Two small openings have been made into a wooded cliff on the east side of a creek. They are now partly overgrown. The property belongs to Mr. William Lamarche of Waltham.

Road log from Waltham (Mile 85.0 on Highway 8):

Mile 0.0 Junction Highway 8 and road to Pembroke; proceed west along Highway 8.

1.8 Junction single lane road on right. Proceed on foot along this road for about 1/2 mile to a creek; turn right and proceed along the east side of the creek for approximately 350 yards to the openings on the right. At this point, there are some feldspar blocks in the creek bed.

Refs.: 45 pp. 104-105; 56 p. 44.

Maps (T): 31 F/15 W Fort Coulonge.
(G): 249 Coulonge and Black Rivers area, County of Pontiac (Que. Dept. Natural Resources).

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GLOSSARY

Acmite — $NaFeSi_2O_6$. H=6. Dark green to almost black or greenish brown; prismatic, commonly elongated crystals. Fuses readily and gives yellow flame. Occurs in nepheline syenite or syenite. A variety of aegirine (clinopyroxene).

Actinolite — $Ca_2(Mg, Fe)_5Si_8O_{22}(OH)_2$. H=5-6. Bright green to greyish green, fibrous or radiating prismatic aggregates. Variety of amphibole.

Allanite — $(Ca, R)_2(Al, Fe, Mg)_3Si_3O_{12}(OH)$. H=6.5. Black, less commonly dark brown tabular aggregates, or massive with conchoidal fracture. Vitreous or pitchy lustre. Generally occurs in granitic rocks or in pegmatite and is commonly surrounded by an orange-coloured halo. Distinguished by its weak radioactivity.

Amazonite — $KAlSi_3O_8$. H=6. Green variety of microline feldspar. Occurs in pegmatites. Used for jewellery and ornamental purposes.

Amethyst — SiO_2. H=7. Mauve to purple variety of quartz. Used as a gemstone.

Amphibole — A mineral group consisting of complex silicates including tremolite, actinolite and hornblende. Common rock-forming mineral.

Amphibolite — A metamorphic rock composed essentially of amphibole and plagioclase feldspar.

Analcime — $NaAlSi_2O_6 \cdot H_2O$. H=5-5.5. Colourless, white, yellowish or greenish, vitreous transparent, trapezohedral crystals or massive, granular. Distinguished from garnet by its inferior hardness. Often associated with other zeolites.

Anatase — TiO_2. H=5.5-6. Yellowish or reddish brown pyramidal or tabular crystals with adamantine lustre; also grey or blue massive. Also known as octahedrite.

Anhydrite — $CaSO_4$. H=3-3.5. White, bluish or greyish granular massive with vitreous lustre. Alters to gypsum by absorption of water. Distinguished from gypsum by its superior hardness. Used as a soil conditioner and in the manufacture of portland cement.

Anorthosite — An igneous rock composed almost entirely of plagioclase.

Apatite — $Ca_5(PO_4)_3(F, Cl, OH)$. H=5. Green, blue, colourless, brown, red hexagonal crystals, or granular, sugary massive. Vitreous lustre. May be fluorescent. Distinguished from beryl and quartz by its inferior hardness; massive variety distinguished from calcite and dolomite by its superior hardness and lack of effervescence in HCl, and from massive diopside and olivine by its inferior hardness. Used in the manufacture of fertilizers and detergents.

Aragonite $CaCO_3$. H=3.5-4. Colourless to white or grey and, less commonly, yellow, blue, green, violet, rose-red, prismatic or acicular crystals; also columnar, globular, stalactitic aggregates. Vitreous lustre. Transparent to translucent. Distinguished from calcite by its cleavage and higher specific gravity (2.93). Effervesces in dilute HCl.

Arsenopyrite FeAsS. H=5.5-6. Light to dark grey metallic striated prisms with characteristic wedge-shaped cross-section; also massive. Tarnishes to bronze colour. Ore of arsenic; may contain gold or silver.

Asbestos Fibrous variety of certain silicate minerals such as serpentine (chrysotile) and amphibole (anthophyllite, tremolite, actinolite, crocidolite) characterized by flexible, heat- and electrical-resistant fibres. Chrysotile is the only variety produced in Canada; it occurs as veins with fibres parallel (slip fibre) or perpendicular (cross-fibre) to the vein walls. Used in the manufacture of asbestos cement sheeting, shingles, roofing and floor tiles, millboard, thermal insulating paper, pipe covering, clutch and brake components, reinforcing in plastics, etc.

Barite $BaSO_4$. H=3-3.5. White, pink, yellowish, blue tabular or platy crystals; granular massive. Vitreous lustre. Characterized by a high specific gravity (4.5) and perfect cleavage. Used in the glass, paint, rubber, and chemical industries, and in oil-drilling technology.

Bastnaesite $(Ce, La)(CO_3)F$. H=4-4.5. Yellowish to reddish brown and grey platy, lath-shaped or granular masses with dull, greasy or pearly lustre; also greenish brown earthy. Occurs with other rare element minerals. Soluble in HCl. Difficult to identify in hand specimen.

Beryl $Be_3Al_2Si_6O_{18}$. H=8. White, yellow, green, blue, hexagonal prisms, or massive with conchoidal or uneven fracture. Vitreous, transparent to transluscent. Distinguished from apatite, by its superior hardness, from topaz by its lack of perfect cleavage, from quartz by its higher specific gravity. Ore of beryllium which has numerous uses in the nuclear energy, space, aircraft, electronic and scientific equipment industries; used as alloying agent with copper, nickel, iron, aluminium, and magnesium. Includes gem varieties: emerald (bright green), aquamarine (light blue or green), morganite (pink), yellow (heliodor).

"Black Granite" A commercial term used for igneous rocks such as gabbro, diorite, anorthosite used as building and monument stones.

Brucite $Mg(OH)_2$. H=2.5. White, grey, light blue or green tabular, platy, foliated or fibrous aggregates, also massive. Pearly or waxy lustre. Soluble in HCl. Distinguished from gypsum and talc by its superior hardness and lack of greasy feel. Resembles asbestos but lacks silky lustre. Is more brittle than muscovite. Used for refractories and as a minor source of magnesium metal.

Cabochon A polished gemstone having a convex surface; transluscent or opaque minerals such as opal, agate, jasper, and jade are generally cut in this style.

Cancrinite $Na_8(AlSiO_4)_6(HCO_3)_2$. H=6. Yellow, pink, grey, massive or prismatic crystals; vitreous to greasy lustre. Associated with nepheline and sodalite in nepheline syenite. Effervesces in warm HCl.

Carbonatite Carbonate rock formed by the reaction of basic magma with limestone and dolomite.

Celestite $SrSO_4$. H=3-3.5. Transparent, colourless, white or pale blue tabular crystals; also fibrous massive. Vitreous lustre. Perfect cleavage. Resembles barite but has lower specific gravity. Ore of strontium.

Cerite Ce silicate. H=5.5. Rose-pink to red, brown and grey prismatic crystals or massive granular. Vitreous lustre. Transparent. Uncommon mineral not readily identified in hand specimen.

Chalcopyrite $CuFeS_2$. H=3.5-4. Brass yellow massive, or tetrahedral crystals. Iridescent tarnish. Brass colour distinguishes it from pyrrhotite. Distinguished from pyrite by its inferior hardness, from gold by its superior hardness and lower density. Also called copper pyrite. Ore of copper.

Chert Massive opaque variety of chalcedony; generally drab coloured (various tints of grey or brown).

Chlorite $(Mg, Fe, Al)_6(Al, Si)_4O_{10}(OH)_8$. H=2-2.5. Transparent green flaky aggregates. Distinguished from mica by its colour and non-elastic flakes.

Chondrodite $2Mg_2SiO_4.Mg(F, OH)_2$. H=6-6.5. Orange-yellow grains and granular masses. Vitreous to slightly resinous lustre. Subconchoidal to uneven fracture. Occurs in crystalline limestone. Orange colour is distinguishing feature. Also distinguished from tourmaline by its inferior hardness, from apatite by its superior hardness. Member of humite group.

Chrysotile Fibrous variety of serpentine (asbestos).

Cleavelandite Platy, tabular or lamellar variety of albite. White with pearly lustre.

Clinohumite $Mg_9Si_4O_{16}(F, OH)_2$. H=6. Yellow to orange granular masses or nodules. Vitreous to resinous lustre. Occurs in crystalline limestone. Member of humite group (see chondrodite).

Clinozoisite $Ca_2Al_3Si_3O_{12}(OH)$. H=7. Pale green to greenish grey prismatic crystals; also granular or fibrous masses. Vitreous lustre. Perfect cleavage. Member of epidote group. Occurs in metamorphic rocks.

Columbite $(Fe, Mn)Nb_2O_6$. H=5.2. Brownish black to black prismatic or tabular crystals forming parallel groups; also massive. Submetallic lustre. Occurs in pegmatites. Ore of niobium which is used in high-temperature steel alloys.

Cordierite $(Mg, Fe)_2Al_4Si_5O_{18}$. H=7. Blue to purplish blue, bluish grey, colourless massive or irregular grains. Vitreous lustre. Subconchoidal fracture. Alters readily to muscovite or chlorite. Distinguished by its colour and by its alteration products. Occurs in metamorphic rocks (schists, gneisses). Gem variety is known as iolite or dichroite.

Corundum Al_2O_3. H=9. Blue, red, yellow, brown hexagonal prisms or barrel-shaped, pyramidal, flat tabular crystals. Uneven to conchoidal fracture. Adamantine to vitreous lustre. Distinguished by its hardness and characteristic barrel-shaped form. Used as an abrasive. Red (ruby) and blue (sapphire) varieties are used as gemstones.

Crystalline limestone A limestone that has been metamorphosed or recrystallized. Also known as marble. Used as building, monument, and ornamental stone. Dolomitic crystalline limestone is one containing a high proportion of dolomite.

Cyrtolite A radioactive zircon containing uranium and rare elements.

Diopside $CaMgSi_2O_6$. H=6. Colourless, white to green monoclinic variety of pyroxene.

Dolomite $CaMg(CO_3)_2$. H=3.5-4. Colourless, white, pink, yellow or grey rhombohedral or saddle-shaped crystals; also massive. Vitreous to pearly lustre. Slightly soluble in cold HCl. Ore of magnesium which is used in the manufacture of light-weight alloys.

Dyke A long narrow body of igneous rocks that cuts other rocks.

Epidote $Ca_2(Al, Fe)_3Si_3O_{12}(OH)$. H=6-7. Yellowish green to deep green prismatic crystals, also fibrous or granular masses. Vitreous lustre. Yellow-green colour is distinguishing feature. Occurs in metamorphic and granitic rocks, and in basalt.

Euxenite $(Y, Ca, Ce, U, Th)(Nb, Ta, Ti)_2O_6$. H=5.5-6.5. Black massive or prismatic crystals forming parallel or radial groups. Brilliant, submetallic or greasy lustre. Conchoidal fracture. Radioactive. Distinguished from other radioactive minerals by X-ray methods.

Feldspar A mineral group consisting of alumino-silicates of potassium and barium (monoclinic), and of sodium and calcium (triclinic). Orthoclase and microcline belong to the first group, plagioclase to the second. Used in the manufacture of ceramics, porcelain-enamel, porcelain, scouring powders, and artificial teeth.

Fergusonite $(Y, Er, Ce, Fe)(Nb, Ta, Ti)O_4$. H=5.5-6.5. Black prismatic or pyramidal crystals; also massive. Brilliant to submetallic lustre on fresh surfaces. Alters to grey, yellowish or brownish on exposed surfaces. Subconchoidal fracture. Radioactive. Occurs in granite pegmatites. Distinguished from other radioactive minerals by X-ray methods.

Fluorescence Property of certain substances to glow when exposed to light from an ultraviolet lamp. It is caused by impurities in the substance or by defects in its crystal structure. Two wave lengths are commonly used to produce fluorescence: long wave (3,200 to 4,000 Angstrom units), short wave (2,537 Angstrom units).

Fluorite CaF_2. H=4. Transparent, colourless, blue, green, purple, yellow, cubic or, less commonly octahedral crystals; also granular massive. Vitreous lustre. Good cleavage. Often fluorescent; this property derives its name from fluorite. Used in optics, steel-making, ceramics.

Gabbro A dark coarse grained igneous rock composed mainly of calcic plagioclase and pyroxene. Used as a building and monument stone.

Galena PbS. H=2.5. Dark grey metallic cubic crystals or crystal aggregates; also massive. Perfect cleavage. Distinguished by its high specific gravity (7.58) and perfect cleavage. Ore of lead.

Garnet Silicate of Al, Mg, Fe, Mn, Ca. H=6.5-7.5. Transparent red dodecahedral crystals, or massive granular; also yellow, brown, green. Distinguished by its crystal form. Used as an abrasive. Clear garnet is used as a gemstone.

Gneiss A coarse-grained foliated metamorphic rock composed mainly of feldspar, quartz, and mica. Used as a building and monument stone.

Goethite $HFeO_2$. H=5-5.5. Dark brown, reddish or yellowish brown, earthy, botryoidal, fibrous, bladed or loosely granular masses; also prismatic, acicular, tabular crystals or scaly. Has characteristic yellowish brown streak. Weathering product of iron-rich minerals. Ore of iron.

Gold Au. H=2.5-3. Yellow metallic irregular masses, plates, scales, nuggets. Rarely as crystals. Distinguished from other yellow metallic minerals by its hardness, malleability, high specific gravity (19.3). Precious metal.

Granite Grey to reddish coloured relatively coarse-grained igneous rock composed mainly of feldspar and quartz. Used as a building and monument stone.

Graphic granite A granite in which the quartz is arranged in the feldspar in geometrical patterns, resembling hieroglyphic writing. An attractive ornamental stone.

Graphite C. H=1-2. Dark grey to black metallic flaky or foliated masses. Flakes are flexible. Greasy to touch. Black streak and colour distinguish it from molybdenite. Usually occurs in metamorphic rocks. Used as a lubricant, in "lead" pencils, and refractories.

Gypsum $CaSO_4.2H_2O$. H=2. White, grey, light brown, granular massive; also fibrous (satin spar), or colourless transparent crystals (selenite). Distinguished from anhydrite by its inferior hardness. Occurs in sedimentary rocks. Used in construction industry (plaster, wallboard, cement, tiles, paint) and as a soil conditioner and fertilizer. Satin spar and alabaster (fine grained translucent variety) are used for carving into ornamental objects.

Hematite Fe_2O_3. H=5.5-6.5. Reddish brown to black massive, botryoidal, or earthy; also foliated or micaceous with high metallic lustre (specularite). Characteristic red streaks. Greasy to dull lustre. Ore of iron.

Heulandite $CaAl_2Si_7O_{18}.6H_2O$. H=3-4. Colourless, white, pink, orange tabular crystals. Vitreous, pearly lustre. Distinguished from other zeolites by its crystal form.

Hornblende $NaCa_2(Mg, Fe, Al)_5(Si, Al)_8O_{22}(OH)_2$. H=6. Member of amphibole group. Dark green, brown, black prismatic crystals or massive. Vitreous lustre. Common rock-forming mineral.

Hydromagnesite $Mg_4(OH)_2(CO_3)_3.3H_2O$. H=3.5. Colourless or white, transparent, flaky, acicular or bladed crystal aggregates forming tuffs, rosettes or encrustations; also massive. Vitreous, silky or pearly lustre. Associated with serpentine, brucite, magnesite. Effervesces in acids. Distinguished from calcite by its habit.

Hydrotalcite $Mg_6Al_2(OH)_{16}.CO_3.4H_2O$. H=2. White, light brownish, transparent foliated lamellar aggregates; also platy. Pearly to waxy lustre. Greasy to touch. Distinguished from talc by its effervescence in dilute HCl and by its superior hardness. Associated with talc, serpentine.

Iron-formation Metamorphosed sediment containing iron minerals and silica.

Jarosite $KFe_3(SO_4)_2(OH)_6$. H=2.5-3.5. Yellow to brownish pulverulent coating associated with iron-bearing rocks and with coal. Distinguished from iron oxides by giving off SO_2 when heated.

Jaspilite A rock consisting of alternating bands of red jasper and iron oxides. An attractive ornamental rock.

Kaolinite $Al_4Si_4O_{10}(OH)_8$. H=2. Chalk-white, greyish, yellowish or brownish earthy masses. Dull lustre. Clay mineral formed chiefly by decomposition of feldspars. Becomes plastic when wet. Used as a filler in paper, and in manufacture of ceramics.

Kyanite Al_2SiO_5. H=4-5, 6-7. Blue, green, greyish blue long bladed crystals and bladed masses. Vitreous to pearly lustre. Hardness is 4-5 along length of crystal and 6-7 across it. Occurs in schist and gneiss. Colour and variable hardness are distinguishing characteristics. Used in the manufacture of mullite refractories.

Leonhardtite $MgSO_4.4H_2O$. Dull white encrustations. Bitter, metallic taste. Difficult to distinguish in hand specimen from other sulphates. Also referred to as starkeyite.

Limestone Soft, white, grey or buff sedimentary rock formed by the deposition of calcium carbonate. Dolomitic limestone contains variable proportions of dolomite and is distinguished from the normal limestone by its weaker (or lack of) effervescence in HCl. Used as a building stone and as road metal. Shell limestone (coquina) is a porous rock composed mainly of shell fragments.

Lyndochite Th-Ca-Euxenite. H=6.5. Black lustrous flat prismatic crystals. Conchoidal fracture. Vitreous lustre. Occurs in pegmatites. Named for Lyndoch Township.

Marble See crystalline limestone.

Marcasite FeS_2. H=6-6.5. Pale bronze to grey metallic radiating, stalactitic, globular or fibrous forms; twinning produces cockscomb and spear shapes. Yellowish to dark brown tarnish. Massive variety difficult to distinguish from pyrite in hand specimen.

Martite Fe_2O_3. H=5.5-6.5. Black octahedral crystals. Dull to splendent lustre. Pseudomorphous after magnetite.

Microcline $KAlSi_3O_8$. H=6. White, pink to red, or green (amazonite) crystals or cleavable masses. Member of feldspar group. Distinguished from other feldspars by X-ray or optical methods.

Molybdenite MoS_2. H=1-1.5. Dark bluish grey metallic tabular, foliated, scaly aggregates or hexagonal crystals; also massive. Sectile with greasy feel. Distinguished from graphite by its bluish lead-grey colour and by its streak (greenish on porcelain, bluish grey on paper). Ore of molybdenum.

Molybdite MoO_3. Very soft yellow fibrous or earthy crusts or coatings. A secondary mineral formed by alteration of molybdenite. Most material called molybdite in nature is probably ferrimolybdite ($Fe_2Mo_3O_{12}.8H_2O$).

Monazite (Ce, La, Y, Th)PO_4. H=5-5.5. Yellow, reddish brown or brown equant or flattened crystals and grains. Resinous to vitreous lustre. Radioactive. Resembles zircon but is not as hard. Distinguished from titanite by its superior hardness and radioactivity. Occurs in granitic or pegmatitic rocks. Ore of thorium.

Natrolite $Na_2Al_2Si_3O_{10}.2H_2O$. H=5. Colourless, white or reddish needle-like crystals often forming radiating or nest-like aggregates; also nodular, or as slender prisms. Vitreous to pearly lustre. Distinguished from other zeolites by its acicular habit. Occurs with other zeolites in amygdaloidal basalts, and in some igneous rocks.

Olivine (Mg, Fe)$_2SiO_4$. H=6.5. Olive-green, vitreous, granular masses or rounded grains; also yellowish to brownish black. Distinguished from quartz by having a cleavage; from other silicates by its olive-green colour. Soluble in hot dilute HCl. Used in manufacture of refractory bricks. Transparent variety (peridot) is used as a gemstone.

Orthoclase $KAlSi_3O_8$. H=6. Red pink or white feldspar. Short prismatic crystals. Vitreous lustre. Perfect cleavage. Distinguished from plagioclase feldspars by absence of twinning striations.

Paragneiss A gneiss derived from a sedimentary rock.

Pegmatite A very coarse grained dyke rock.

Peristerite White albite having a blue schiller. May be used as a gemstone.

Phlogopite $KMg_3AlSi_3O_{10}(OH)_2$. H=2.5. Amber to light brown variety of mica. Used in electrical industry.

Plagioclase (Ca, Na)(Al, Si)$AlSi_2O_8$. H=6. White or grey tabular crystals or cleavable masses having twinning striations on cleavage surfaces. Vitreous to pearly lustre. Distinguished from other feldspars by its twinning striations.

Pyrite FeS_2. H=6-6.5. Pale brass-yellow metallic crystals (cubes, pyritohedrons, octahedrons) or massive granular. Iridescent when tarnished. Distinguished from other sulphides by its colour, crystal form, and superior hardness. Source of sulphur.

Pyroaurite $Mg_{18}Fe_6(OH)_{48}.(CO_3)_3.12H_2O$. H=2.5. Colourless, yellowish, blue, green, or white flaky, nodular or fibrous. Pearly or waxy lustre. Crushes to talc-like powder. Effervesces in HCl. Becomes golden yellow and magnetic when heated.

Pyrochlore $NaCaNb_2O_6F$. H=5-5.5. Dark brown, reddish brown to black octahedral crystals or irregular masses. Vitreous or resinous lustre. Light brown to yellowish brown streaks. Distinguished from perovskite by its lustre and streak, from titanite by its crystal form. Ore of niobium.

Pyroxene A mineral group consisting of Mg, Fe, Ca and Na silicates related structurally. Diopside, enstatite, aegirine, jadeite, etc. are members of the group. Common rock-forming mineral.

Pyroxenite An igneous rock composed mainly of pyroxene with little or no feldspar.

Pyrrhotite $Fe_{1-x}S$. H=4. Brownish bronze massive granular. Black streak. Magnetic; this property distinguishes it from other bronze sulphides.

Quartzite A quartz-rich rock formed by the metamorphism of a sandstone. Used as a building and monument stone, and, if colour is attractive, as an ornamental stone; high purity quartzite is used in the glass industry.

Radioactive minerals Minerals that give off radiation due to spontaneous disintegration of uranium or thorium atoms. Detected by a Geiger counter.

Rozenite $FeSO_4.4H_2O$. White or greenish white, finely granular, botryoidal or globular encrustations. Metallic astringent taste. Difficult to distinguish in hand specimen from other iron sulphates with which it is associated.

Rutile TiO_2. H=6-6.5. Brownish red to black striated prismatic or acicular crystals; also massive. Crystals are commonly twinned forming elbow shapes. Adamantine lustre. Resembles cassiterite, but has lower specific gravity and has light brown streak (cassiterite has white streak). Ore of titanium.

Sandstone Sedimentary rock composed of sand-sized particles (mostly quartz).

Scapolite $(Na, Ca)_4[(Al, Si)_4O_8]_3(Cl, CO_3)$. H=6. White, grey, or less commonly pink, yellow, blue, green prismatic and pyramidal crystals; also massive granular with splintery, woody appearance. Vitreous, pearly to resinous lustre. Distinguished from feldspar by its square prismatic form, its prismatic cleavage, its splintery appearance on cleavage surfaces. May fluoresce under ultraviolet rays. Clear varieties may exhibit chatoyancy (cat's-eye effect) when cut into cabochons.

Schist Metamorphic rock composed mainly of flaky minerals such as mica and chlorite.

Serpentine $Mg_6(Si_4O_{10})(OH)_8$. H=2-5. White, yellow, green, blue, red, brown, black massive; may be mottled, banded or veined. Waxy lustre. Translucent to opaque. Asbestos (chrysotile) is the fibrous variety. Formed by alteration of olivine, pyroxene, amphibole, or other magnesium silicates. Found in metamorphic and igneous rocks. Used as an ornamental building stone (verde antique) and for cutting and/or carving into ornamental objects.

Sillimanite Al_2SiO_5. H=7. White, colourless fibrous or prismatic masses. Vitreous or silky lustre. Distinguished from wollastonite and tremolite by its superior hardness. Occurs in schists and gneisses.

Skarn An altered rock zone in limestone and dolomite in which calcium silicates (garnet, pyroxene, epidote, etc.) have formed.

Sodalite $Na_8(AlSiO_4)_6Cl_2$. H=6. Royal blue to purplish blue granular masses, dodecahedral crystals. Vitreous lustre. Resembles lazurite but is harder, also distinguished by its association: sodalite in nepheline rocks, lazurite in crystalline limestone.

Specularite Black variety of hematite having a high lustre.

Sphalerite ZnS. H=3.5-4. Yellow brown or black, granular to cleavable massive; also botryoidal. Resinous to submetallic. Honey-brown streak. Soluble in HCl, and gives off H_2S. Ore of zinc.

Spinel $MgAl_2O_4$. H=7.5-8. Dark green, brown, black, deep blue, pink or red grains or octahedral crystals; also massive. Conchoidal fracture. Vitreous lustre. Distinguished from magnetite and chromite by its superior hardness and lack of magnetic property.

Starkeyite See leonhardtite.

Stilbite $CaAl_2Si_7O_{18}.7H_2O$. H=4. Colourless, pink, white, platy crystal aggregates commonly forming sheaf-like aggregates. Vitreous, pearly lustre. Transparent. Sheaf-like form distinguishes it from other zeolites with which it is associated.

Sunstone A feldspar (orthoclase or oligoclase) containing flaky inclusions of goethite or hematite which cause bright copper-coloured reflections. Used as a gemstone.

Syenite An igneous rock composed mainly of feldspar with little or no quartz. Used as a building and monument stone.

Szájbelyite $(Mg, Mn)(BO_2)(OH)$. H=3-3.5. White, fine fibrous or platy matted or hair-like aggregates. Silky lustre. Soluble in acids. Uncommon mineral not readily identified in hand specimen.

Talc $Mg_3(Si_4O_{10})(OH)_2$. H=1. Grey, white, green, finely granular or foliated. Translucent with greasy feel. Massive varieties are known as steatite and soapstone, and because of their suitability for

carving are used for ornamental purposes. Formed by alteration of magnesium silicates (olivine, pyroxene, amphibole, etc.) in igneous and metamorphic rocks. Used in cosmetics, ceramics, paint, rubber, insecticide, roofing, and paper industries.

Tetrahedrite-tennantite $Cu_{12}Sb_4S_{13}$-$Cu_{12}As_4S_{13}$. H=3.5-4. Flint grey to iron black, metallic, tetrahedral crystals; also massive granular to compact. Brown, black, or deep red streak. Ore of copper; may contain silver, antimony values.

Thorianite ThO_2. H=6.5. Dark grey to black cubic crystals or rounded grains. Dull to submetallic lustre. Grey streak. Radioactive. Soluble in nitric and sulphuric acids. Occurs in pegmatites, crystalline limestone, stream gravels.

Thorite $ThSiO_4$. H=5. Black to reddish brown tetragonal prisms with pyramidal terminations; also massive. Resinous to submetallic lustre. Conchoidal fracture. Radioactive. Distinguished by crystal form, radioactivity. Source of thorium.

Titanite $CaTiSiO_5$. H=6. Brown, wedge-shaped crystals; also massive granular. May form cruciform twins. Adamantine lustre. White streak. Distinguished from other dark silicates by its crystal form, lustre and colour. Also known as sphene.

Tourmaline $Na(Mg, Fe)_3Al_6(BO_3)_3(Si_6O_{18})(OH)_4$. H=7.5. Black, deep green, blue, pink, brown, amber-coloured prismatic crystals; also columnar, massive granular. Prism faces striated vertically. Vitreous lustre. Conchoidal fracture. Distinguished by triangular cross-section in prisms, by striations, fracture. Used in manufacture of pressure gauges; transparent variety used as a gemstone.

Tremolite $Ca_2Mg_5Si_8O_{22}(OH)_2$. H=5-6. White, grey striated prismatic crystals, bladed crystal aggregates, fibrous. Perfect cleavage. Vitreous lustre. Generally occurs in metamorphic rocks. Fibrous variety used for asbestos; clear crystals are sometimes used as a gem curiosity.

Uraninite UO_2. H=5-6. Black, brownish black cubic or octahedral crystals; also massive, botryoidal. Submetallic, pitchy to dull lustre. Uneven to conchoidal fracture. Radioactive. Distinguished by high specific gravity (10.3 to 10.9), crystal form, radioactivity. Ore of uranium.

Uranophane $CaO.2UO_3.2SiO_2.7H_2O$. H=2-3. Yellow fibrous, radiating aggregates or massive. Occurs with uraninite.

Uranothorite Hydrous silicate of Th, U. H=4.5-5. Black prismatic crystals or grains. Pitchy lustre. May have orange-coloured sun-burst effect on enclosing rock. Radioactive. Occurs in granitic and pegmatitic rocks. Granular variety distinguished from uraninite, thorite by X-ray methods.

Vesuvianite $Ca_{10}Mg_2Al_4(Si_2O_7)_2(SiO_4)_5(OH)_4$. H=7. Yellow, brown, green, lilac, transparent prismatic or pyramidal crystals with vitreous lustre; also massive, granular, compact or pulverulent. Distinguished from other silicates by its tetragonal crystal form; massive variety distinguished by its ready fusibility and intumescence in blowpipe flame. Also known as idocrase. Transparent varieties may be used as a gemstone.

Wilsonite An altered scapolite. Pink, rose-red, mauve, purple, massive. Translucent. Vitreous lustre. Was named for Dr. J. Wilson of Perth who discovered it in the Perth area.

Xenotime XPO_4. H=4-5. Yellow, brown, grey, black prismatic crystals. Vitreous to resinous lustre. Perfect cleavage. Distinguished from zircon by its inferior hardness.

Zeolites A group of hydrous silicates related in composition but not in crystallization; water is given off continuously when heated but can be taken up again. Heulandite, chabazite, stilbite, natrolite, anacime belong to this group.

Zircon $ZrSiO_4$. H=7.5. Pink, reddish to greyish brown tetragonal prisms terminated by pyramids; also colourless, green or grey. May form knee-shaped twins. Vitreous to adamantine lustre. May be radioactive. Distinguished by its crystal form, hardness. Ore of zirconium and hafnium. Used in moulding sand, ceramics, and refactory industries; transparent varieties used as gemstones.

Zoisite $Ca_2Al_3Si_3O_{12}(OH)$. H=6.5. Grey to brownish grey, yellowish brown, mauvish pink, green aggregates of long prismatic crystals (striated); also compact fibrous to columnar masses. Vitreous to pearly lustre. Transparent to translucent. Massive variety distinguished from amphibole by its perfect cleavage. Transparent varieties used as gemstones; pink variety known as thulite, deep blue variety as tanzanite.

CHEMICAL SYMBOLS FOR CERTAIN ELEMENTS

Ag - silver

Al - aluminum

As - arsenic

Au - gold

B - boron

Ba - barium

Be - beryllium

Bi - bismuth

C - carbon

Ca - calcium

Cb - columbium (niobium)

Ce - cerium

Cl - chlorine

Co - cobalt

Cr - chromium

Cu - copper

Er - erbium

F - fluorine

Fe - iron

H - hydrogen

K - potassium

La - lanthanum

Mg - magnesium

Mn - manganese

Mo - molybdenum

Na - sodium

Nb - niobium

Ni - nickel

O - oxygen

P - phosphorus

Pb - lead

R - rare-earth elements

S - sulphur

Se - selenium

Si - silicon

Sn - tin

Sr - strontium

Ta - tantalum

Th - thorium

Ti - titanium

W - tungsten

Y - yttrium

Yb - ytterbium

Zn - zinc

Zr - zirconium

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