PAPER 73-13

ROCKS AND MINERALS FOR THE COLLECTOR

Cobalt-Belleterre-Timmins; Ontario and Quebec

Ann P. Sabina

1974

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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ROCKS AND MINERALS FOR THE COLLECTOR, COBALT - BELLETERRE - TIMMINS; ONTARIO AND QUEBEC

Ann P. Sabina

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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ABSTRACT

Occurrences of minerals, rocks and fossils are described for localities in the Timagami, Cobalt, Gowganda, Matachewan, Matheson and Timmins regions in Ontario, and from the Ville-Marie and Belleterre areas in Quebec. The collecting area includes two of the greatest precious metal mining camps in the world: the Cobalt silver camp that ranks third in the total cumulative production of silver in the world, and the Porcupine gold field whose all-time production is exceeded only by the Witwatersrand gold mines in South Africa. In addition, there are numerous collecting localities in the less celebrated mining camps of Elk Lake, Gowganda, Matachewan and Belleterre.

The spectacular discoveries of the Cobalt silver deposits in 1903 and 1904, following within a decade the world-captivating Klondike Rush shifted the attention of prospectors and miners to this part of eastern Canada where the initial discoverers engaged in building the T. & N.O. railway were joined by experienced prospectors from the West and from other points. Stimulated by the successful developments at Cobalt and guided by geological reports issued by the Ontario Bureau of Mines and by the Geological Survey of Canada, the same band of prospectors extended their search into the then-remote north country and were rapidly rewarded with further discoveries of silver ore at Elk Lake and at Gowganda, culminating in the sensational discoveries of native gold in the Porcupine district in 1909. Thus, within a few years, the area was the scene of the greatest silver rush and the greatest gold rush ever experienced by Ontario. With the establishment of these two mining camps, the attention of the gold-seekers was focused on Kirkland Lake which became the second greatest gold-producing camp in Canada, and the third-ranking gold-producer in the world. About half a century later, northeastern Ontario was the scene of a modern-day prospecting rush generated by the discovery of a colossal base metal orebody in the Timmins area; that discovery became the largest silver-lead-cadmium producer in the world.

Other deposits in the area include those of copper, copper-zinc, nickel, iron and asbestos. There are also occurrences of molybdenite, barite, magnesite, and antimony minerals. Fossils occur in the only Paleozoic rocks in the area: those extending north from Lake Timiskaming. Rocks suitable for ornamental purposes include porphyries, jaspery iron-formation, conglomerate, granite, soapstone and chrome-mica rock.

Most of the collecting localities are the dumps of inactive mines and prospects. Road-cuts furnish a number of collecting sites. In general, operating mines are not collecting areas but visits to the surface plants are, in some cases, arranged for visitors. Some of the famous old mines, no longer accessible, are described for historical interest.

RÉSUMÉ

L'auteur décrit les venues de minéraux, de roches et de fossiles dans les régions de Timagami, Cobalt, Gowganda, Matachewan, Matheson et Timmins en Ontario, et dans les régions de Ville-Marie et de Belleterre au Québec. Les zones propices au prélèvement d'échantillons comprennent deux des plus importants chantiers d'extraction de métaux précieux au monde: le chantier minier de Cobalt qui se classe troisième au monde pour la production cumulative totale d'argent, et la mine d'or de Porcupine dont la

production jusqu'à présent n'est surpassée que par celle des mines d'or de Witwatersrand en Afrique du Sud. De plus, il existe de nombreux endroits favorables dans les chantiers miniers moins connus de Elk Lake, Gowganda, Matachewan et Belleterre.

La découverte spectaculaire des gisements d'argent de Cobalt en 1903 et 1904, dans les dix années qui suivirent la célèbre ruée vers l'or du Klondike, détourna l'attention des prospecteurs et des mineurs vers cette partie de l'est du Canada où les premiers découvreurs qui travaillaient à la construction du chemin de fer T. & N.O. furent rejoints par les prospecteurs expérimentés de l'Ouest et d'ailleurs. Stimulés par le succès des explorations à Cobalt et guidés par les rapports géologiques du Bureau des mines de l'Ontario et de la Commission géologique du Canada, ces mêmes prospecteurs étendirent leurs recherches vers les territoires isolés du Nord et firent rapidement la découverte de minerai d'argent à Elk Lake et à Gowganda, suivie de la découverte sensationnelle d'or natif dans le district de Porcupine en 1909. Ainsi, en quelques années, la région a été le théâtre de la plus grande ruée vers l'argent et vers l'or jamais connue dans la province. A la suite de l'établissement de ces deux chantiers miniers, l'attention des chercheurs d'or s'est tournée vers Kirkland Lake qui s'est classé au second rang des plus importantes mines d'or au Canada et la troisième plus grande productrice d'or au monde. Environ un demi-siècle plus tard, le nord-est de l'Ontario était la scène d'une nouvelle ruée engendrée par la découverte d'un immense gisement de métaux communs dans la région de Timmins; ce gisement devint la plus importante exploitation d'argent de plomb et de cadmium au monde.

Dans cette même région, l'auteur cite la présence d'autres gisements, soit de cuivre, de zinc, de nickel, de fer et d'amiante. Il y a aussi des minerais de molybdénite, de barytine, de magnésite et d'antimoine. Les fossiles se retrouvent dans les seules roches paléozoiques de la région soit celles qui s'étendent du nord du lac Témiscamingue. Parmi les roches qui conviennent à des fins ornementales, il y a les porphyres, le jaspe de la formation ferrifère, les conglomérats, le granite, la pierre de savon et la roche à chrome et mica.

La plupart des endroits favorables au prélèvement d'échantillons sont les déblais des mines inactives et les venues minérales. Les tranchées de route constituent aussi des sites propices.

De façon générale les mines en exploitation ne sont pas accessibles, mais dans certains cas, des visites aux installations de surface peuvent être organisées pour les visiteurs. Quelques anciennes mines bien connues, qui ne sont plus accessibles, sont décrites à cause de leur intérêt historique.

Frontispiece: The McIntyre Mine, Porcupine district's great gold producer.
(G.S.C. photo 161453)

ROCKS AND MINERALS FOR THE COLLECTOR: COBALT - BELLETERRE - TIMMINS; ONTARIO AND QUEBEC

INTRODUCTION

This booklet describes mineral, rock and fossil occurrences in the Cobalt, Timmins, Timagami, Gowganda, Matachewan and Matheson areas in Ontario, and in the Ville-Marie and Belleterre areas in Quebec. The occurrences in the adjacent area from Kirkland Lake, Ontario to Val d'Or, Quebec are described in Geological Survey of Canada Paper 73-30.

Most of the collecting localities are accessible by automobile from main roads and from secondary roads branching from them; in some cases, a short hike is required. 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 for deposits that 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 157.

Many of the inactive mines have not been operated for several years and entering shafts, tunnels, and other workings is dangerous. Collecting in operating mines is generally not permitted; their descriptions are included only as a point of interest to the collector. Some of the occurrences are on private property and are held by claims; their listing in this booklet does not imply permission to visit them. Please respect the rights of property owners at all times.

The localities were investigated in the summer of 1972 by the author ably assisted by Frances Gombos. The field investigation and report were facilitated by information received from E.G. Bright, Ontario Ministry of Natural Resources, Timmins, from L. Moyd, National Museum of Canada, Ottawa, and from L. Carson Brown, Ontario Ministry of Natural Resources, Toronto. The laboratory identification of minerals by X-ray diffraction was performed by G.J. Pringle, 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

The entire collecting area is within the Canadian Shield - an immense body of Precambrian rocks occupying more than half of Canada and part of northern United States. During Precambrian time there were repeated cycles of inundation, sedimentation, mountain-building, intrusion and erosion producing a variety of igneous, metamorphic and volcanic rocks. Within these rock formations are contained the great metallic minerals resources of northeastern Ontario and northwestern Quebec.

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 Paleozoic Era that followed. Great thicknesses of sediments were deposited by Paleozoic seas

TABLE I

AGE (millions of years)	ERA	PERIOD	ROCKS FORMED	WHERE TO SEE THEM
	Cenozoic	Quaternary	Gravel, sand, clay, till	Lakeshores, stream-beds, eskers
65		Tertiary	Not represented	in collecting area
225	Mesozoic		Not represented	in collecting area
	Paleozoic	Permian Pennsylvanian Mississippian Devonian	Not represented	in collecting area
		Silurian Ordovician	Limestone, dolomite, sandstone, shale	Dawson Point; road-cuts along Highway 65 East
570		Cambrian	Not represented	in collecting area
	PRECAMBRIAN ERA — Proterozoic		Nipissing diabase	Cobalt mines; road-cuts Highway 11 near junction Highway 11B; road-cuts Highway 560.
			Conglomerate	Road-cut Highway 11 Mile 61.5; Cobalt mines; Ragged Chute dam; road-cuts Highway 66 West.
			Greywacke, quartzite	Cobalt mines
			Arkose	Cobalt mines; road-cuts Highway 560.
2480	PRECAMBRIAN ERA — Archean		Granite	Ville-Marie occurrences; road-cuts Highways 11, 66.
			Syenite, syenite porphyry	Road-cuts Highway 112; Young-Davidson, Matachewan Consolidated, Ryan Lake mines.
			Peridotite	Cedar Lake, Ryan Lake, Rahn Lake, Hedman, Alexo mines.
			Serpentinite	Bowman, Reeves mines.
			Dunite	Slade-Forbes Mine.
			Gabbro, diorite	Temagami Mine; road-cuts Highway 11.
			Granodiorite	Tyranite Mine.
			Greywacke, argillite	Timmins area gold mines.
			Quartz-feldspar porphyry	Timmins area gold mines.
			Rhyolite	Temagami Mine.
			Andesite	Lorraine, Alexo mines.
			Volcanic rocks	Cobalt, Gowganda, Timmins mines.
			Basalt	Mount Kompis.
			Iron-formation	Sherman Mine, Mattarrow Mine.
			Schist	Ronda, Northland, Kenilworth, Canadian Jamieson mines.

over much of the Shield and still remain along its margins. The sedimentary rock formation north of Lake Timiskaming is a remnant of Paleozoic deposition.

In more recent times – during the Pleistocene Period – great ice sheets spread southward across the Shield moulding the landscape as we know it today and leaving behind accumulations of sand, gravel and till. As the ice withdrew, lake waters were ponded in an area extending north from Lake Timiskaming to form glacial Lake Ojibway-Barlow. Upon its retreat, the lake left a thick mantle of clay that forms the Great Clay Belt of northeastern Ontario and northwestern Quebec. Other deposits of recent times include beach sands and stream detritus.

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

COLLECTING ALONG THE ROUTE

The route is shown in Figure 1; it consists of Highway 11 in Ontario with numerous side trips leading from it.

Information on each locality is systematically listed as follows: mileage along Highway 11 from its junction with Highway 11B to Highway 101; name of mine or occurrence; minerals or rocks found in deposit (shown in capital letters); mode of occurrence; brief notes on the locality with special 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 Ministry of Natural Resources, and the Quebec Department of Natural Resources.

COBALT – BELLETERRE – TIMMINS; ONTARIO AND QUEBEC

Mile 0 The road log commences at the junction of Highway 11 with Highway 11B, the turn-off to Cobalt. The main road log proceeds north along Highway 11 and several side trips originate from it.

Road log to occurrences in Timagami area (Localities are described in text following road log.):

Mile 0 Junction highways 11 and 11B (turn-off to Cobalt); proceed south along Highway 11.

1.0 Road on left leads 0.4 mile to Cobalt Refinery. Operations at the refinery ceased in 1971.

1.4 Road-cuts expose Nipissing diabase of Proterozoic (Keweenawan) age.

4.2 Latchford Mining Museum on left.

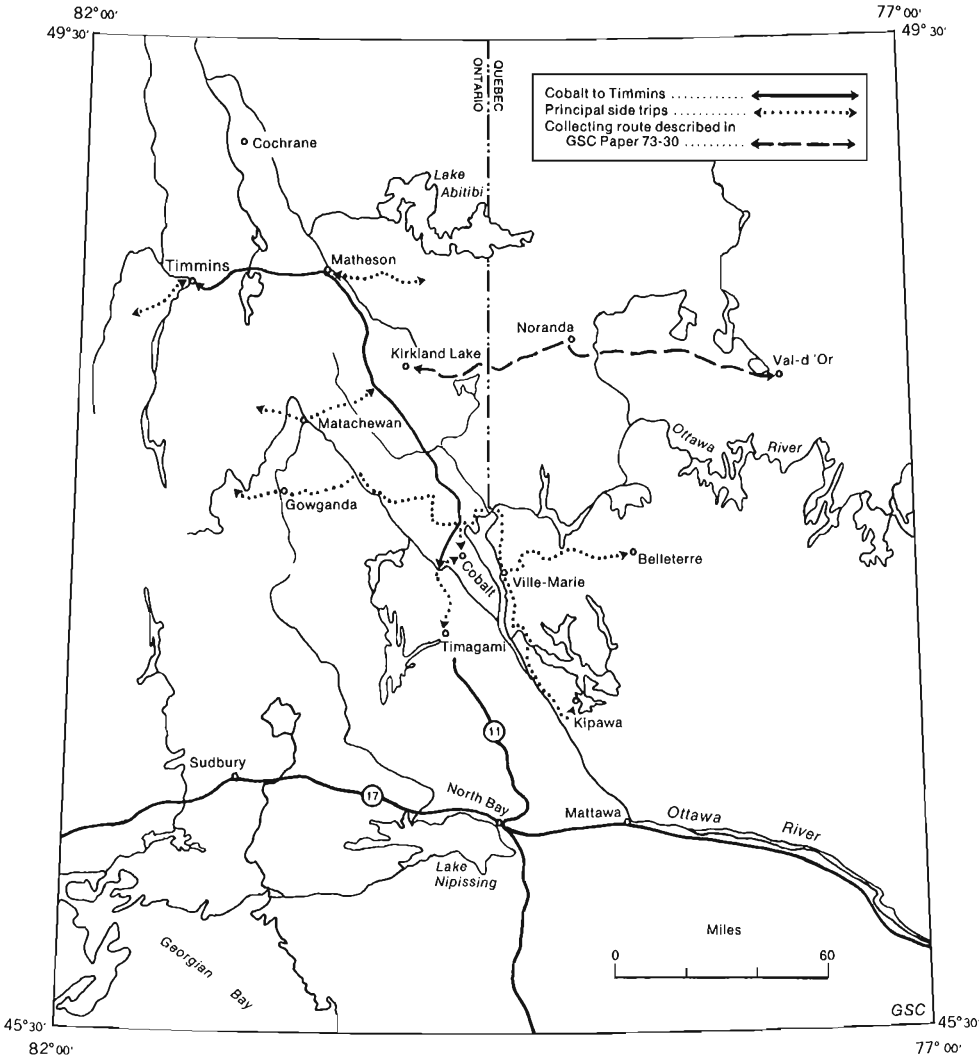


Figure 1. Index map showing collecting route.

Mile 8.5	Road-cut on right exposes conglomerate of Proterozoic (Huronian) age. Conglomerate and diabase are exposed by intermittent road-cuts for the next 4 miles.
13.1	Road-cuts expose volcanic rocks of Archean (Keewatin) age.
13.4	Junction Rib Lake Road on left.
13.8 to 14.9	Road-cuts expose dark grey volcanic rocks.
15.2	Pike Lake.
15.3 to 15.6	Road-cuts expose pink to grey granitic rocks of Archean (Algoman) age.
16.0	James Lake on right.
16.1	Grey volcanic rocks are exposed by road-cuts for the next mile.
16.6	Junction single-lane road (on right) to Northland Mine.
17.4	Granite Lake on right.
17.5	Road-cut on left exposes Keewatin volcanic rocks with thick epidote crusts on surfaces.
18.3	Pink and grey granitic rocks are exposed intermittently by road-cuts for the next 2 miles.
19.8	Junction Andorra Road on left.
21.4	Picnic site at Net Lake on right.
21.6	Junction (on left) trail to Net Lake Mine.
22.3	Bridge over Net Lake narrows.
22.35	Junction road (on right) to Cedar Lake Mine.
22.6	Road-cuts expose granitic rocks.
23.1	Junction (on right) single-lane road to Little Dan Mine.
23.3	Road-cuts expose basalt of Archean age.
24.1	Junction (on right) Milne-Sherman Road to Sherman Mine.
25.2	Timagami, at railway station.

Mile 26.0 Turn-off to Finlayson Point Park.

26.3 Junction Timagami Mine Road.

49.2 Junction Highway 64.

Maps (T): 31 M/SW Haileybury
(G): P321 Haileybury, districts of Timiskaming and Nipissing (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

Northland Mine

PYRITE, PYRRHOTITE, CHALCOPYRITE

In green schist

Pyrite was formerly shipped from this deposit. The ore consisted of massive pyrite with pyrrhotite and minor chalcopyrite. The deposit was discovered in 1903 and was worked between 1906 and 1910 by Northland Mining Company. The workings consisted of a 300-foot shaft and several open cuts located north of the shaft.

The mine is located on the west shore of the southern part of James Lake. It is also referred to as the Rib Lake Mine, the James Lake Mine and the Harris Mine.

Road log from Highway 11 at Mile 16.6

Mile 0 Turn right (west) onto single-lane road.

0.2 Fork; bear right.

0.4 South end of James Lake. The dump at the water's edge is visible from this point. Cross creek and proceed 200 yards along the shore to the mine.

Refs.: 38 p. 132; 76 p. 40-41; 203 p. 104; 212 p. 71-72

Maps (T): 31 M/4E Timagami
(G): 35c Anima-Nipissing Lake area, districts of Timiskaming and Nipissing, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

P321 Haileybury sheet, districts of Timiskaming and Nipissing (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

Net Lake Mine

MOLYBDENITE, PYRITE, CHALCOPYRITE

In quartz veins cutting greenstone and in quartz breccia

Molybdenite occurs as individual flakes and as rosettes measuring up to 1/2 inch in diameter in quartz. Some pyrite and chalcopyrite are associated with the ore.

A 50-foot shaft was sunk in the deposit in about 1909 and about 200 tons of rock and ore were removed; no ore shipments were made at the time. During World War I, J.W. Barton of Toronto shipped 1,216 pounds of hand-cobbed ore to the Mines Branch, Ottawa for recovery of molybdenite which amounted to 94 pounds. Later, a fire destroyed the camp and boiler house; operations were not renewed.

The mine is on a ridge between Highway 11 and the west shore of Net Lake. Access is by an overgrown trail leading east from Highway 11 at Mile 21.6; the distance from the highway to the deposit is about 500 yards. The shaft and dump are located at the end of the trail and small pits and dumps are found within 250 feet to the north and east of the shaft.

Ref.: 210 p. 99-101

Maps (T): 31 M/4W Timagami
(G): 51e Northeastern portion of the Timagami Lake area, district of Nipissing, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

P321 Haileybury sheet, districts of Timiskaming and Nipissing (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

Cedar Lake (Trebor, Cuniptau) Mine

PYRRHOTITE, PENTLANDITE, CHALCOPYRITE, PYRITE, SERPENTINE, CALCITE, BROCHANTITE, ARAGONITE, TALC

In serpentinized peridotite

Pyrrhotite and pentlandite are associated with chalcopyrite and pyrite in calcite veins and in peridotite; they occur as disseminations and in massive form. Massive greyish to dark green serpentine is associated with the ore. White massive calcite fluoresces deep pink when exposed to "long" ultraviolet rays. Bright green brochantite forms a finely granular encrustation on the ore-bearing rock. Other minerals found on the dumps include aragonite, as a white crust on pyrrhotite, and talc as colourless silky flakes on calcite.

The deposit is located on a gossan-covered knoll on the west side of a pond about a mile south of Cedar (Kanichee Lake). The gossan represents the

alteration products (iron oxides) of the sulphide orebody. Early exploration (prior to 1920) consisted of several trenches and two shafts. Between 1933 and 1936, Caniptau Mines, Limited sank a 245-foot shaft and installed a pilot smelter. Production amounted to 99,284 pounds of copper, 65,434 pounds of nickel, and small amounts of gold, silver, platinum and palladium. The deposit was later investigated by Ontario Nickel Corporation, Limited (1937-1948) and by Trebor Mines Limited (1948-1949). The property now belongs to Kanichee Mining Incorporated which plans to place it into production in 1973 as an open pit mine.

Road log from Highway 11 at Mile 22.35:

Mile 0	Turn right (west) onto secondary gravel road leading from the south side of the bridge over Net Lake narrows.
0.1	Fork; bear left.
0.4	Junction; continue straight ahead.
1.2	Junction; continue straight ahead.
2.9	Cedar Lake Mine on left. The shaft, near an old mine building, has been fenced.

Refs.: 103 p. 211-213; 131 p. 24; 169 p. 54-55; 172 p. 204-205; 252 p. 1, 21

Maps (T): 31 M/4W Timagami
(G): 51e The northeastern portion of the Timagami Lake area, district of Nipissing, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

P321 Haileybury sheet, districts of Timiskaming and Nipissing (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

Little Dan Mine

ARSENOPYRITE, PYRITE, PYRRHOTITE, CHALCOPYRITE, JAROSITE, GOETHITE, CHLORITE

In veins cutting altered greenstone

The mine dumps contain arsenopyrite in massive form and as aggregates of microscopic crystals with pyrite, and with small amounts of pyrrhotite and chalcopyrite in sheared greenstone. Yellow jarosite and rusty brown goethite form dull powdery coatings on the ore-bearing rock. White granular calcite associated with the sulphides fluoresces weakly in a reddish pink colour when exposed to "long" ultraviolet rays.

The deposit was worked for gold which was carried by the arsenopyrite. Original development was commenced in about 1904 by Major R.G. Leckie.

In the following years, three shafts were sunk to depths of about 50 feet and some ore was shipped. In 1933, Manitoba and Eastern Mines Limited acquired the property and extended shaft No. 1 to 525 feet; operations were suspended in 1937. The No. 1 shaft and dump are located at the east end of Arsenic Lake and No. 2 shaft is at the southeast end of the lake and 300 yards southwest of No. 1. Shaft No. 3 is located about 380 yards southeast of No. 1 and near Highway 11.

A single-lane road, 0.2 mile long, leads west from Highway 11 at Mile 23.1 to shaft No. 1 near the shore of Arsenic Lake.

Refs.: 103 p. 217-218; 131 p. 35; 169 p. 52-54; 228 p. 170

Maps (T): 31 M/4W Timagami
(G): 51e The northeastern portion of the Timagami Lake area, district of Nipissing, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

P321 Haileybury sheet, districts of Timiskaming and Nipissing (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

Sherman Mine

JASPER, MAGNETITE, HEMATITE, PYRITE, STILPNOMELANE, CHLORITE

In iron-formation

Jasper, in tones ranging from bright crimson to deep brownish red, occurs in an iron-formation consisting of interlayered bands of grey quartzite, jasper and chert, chloritic and tremolitic tuff, and finely granular magnetite. The rock takes a high polish and makes a striking ornamental stone. Hematite, pyrite (including nodules measuring up to 2 inches in diameter), stilpnomelane, and chlorite have also been found in the deposit.

The iron ranges of the Timagami area have been known since 1899 and were investigated by trenching and diamond drilling in 1904 and 1905, and at various times later. Recent exploration of the deposit was conducted by Voyager Exploration Limited (1957-1960), and by Strathagami Mines Limited (1961-1965). In 1966, Cliffs of Canada Limited, the present operator, undertook development of the property and brought it into production in 1968. The mine consists of three open pits and is equipped with a crusher, concentrator and a pellet plant. The annual output is one million tons of pellets which is shipped by rail to the Dofasco plant in Hamilton.

The Milne-Sherman Road leads west from Highway 11 at Mile 24.1 to the mine, a distance of 3 miles. The pits are located 1 to 2 1/2 miles from the plant; one is situated south of Tetapaga Lake, another on the south side of Iron Lake, and another at the southeast end of Vermillion Lake which was partially dewatered to allow mining of the underlying orebody. Group tours

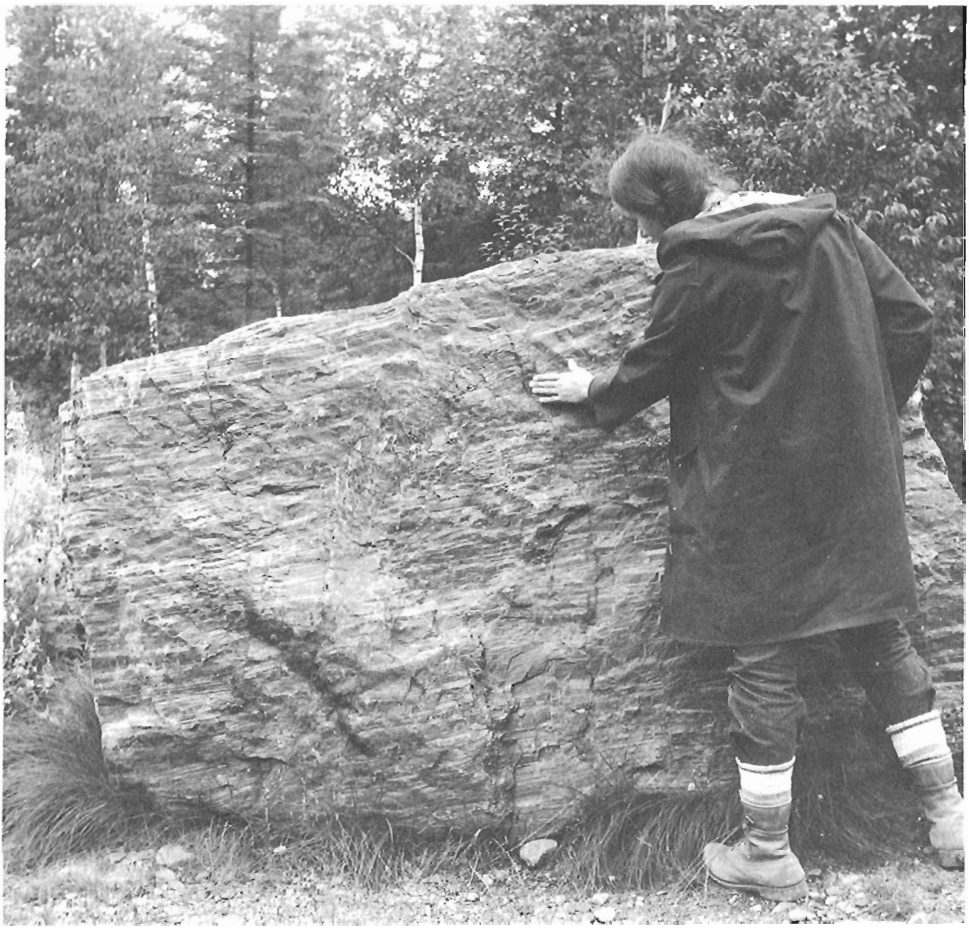


Plate I. Boulder of banded iron-formation from the Sherman Mine. Visitors may examine it at the viewing stand on the Milne-Sherman Road near the mine. (G.S.C. photo 161470)

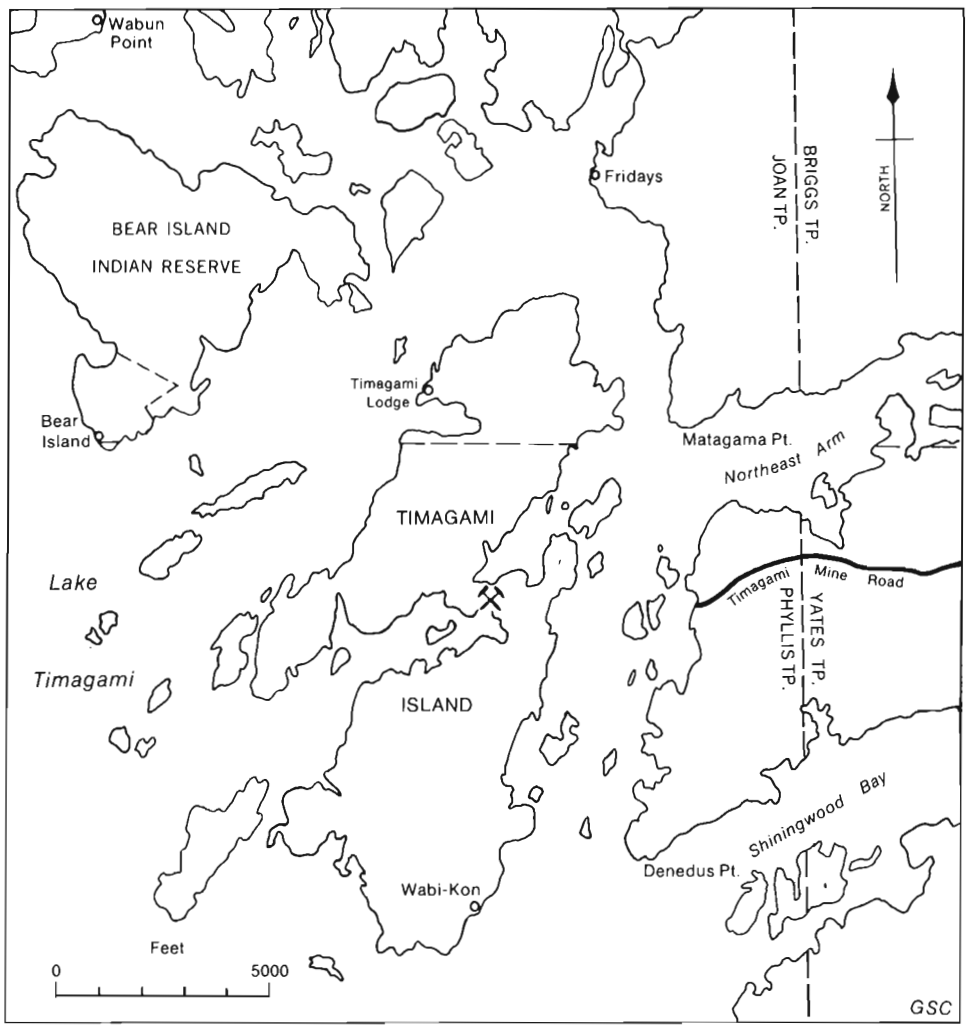
of the plant and viewing of open pit operations may be arranged by writing to the company. A large specimen of the iron ore and a viewing stand are located on the Milne-Sherman Road at a point 2.3 miles from Highway 11.

Refs.: 10 p. 9-11; 111 p. 106-107; 131 p. 22-23; 235 p. 273; 238 p. 230, 251; 244 p. 79, 301

Maps (T): 31 M/4W Timagami

(G): 51e The northeastern portion of the Timagami Lake area, district of Nipissing, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

P321 Haileybury sheet, districts of Timiskaming and Nipissing (Ont. Ministry Natur. Resour., 1 inch to 2 miles)



Map 1. Temagami (Copperfields) Mine, Timagami Island

Temagami (Copperfields) Mine

PYRITE, CHALCOPYRITE, MILLERITE, LINNAEITE, PYRRHOTITE, VIOLARITE, BRAVOITE, GERSDORFFITE, MAGNETITE, SPHALERITE, GALENA, SPERRYLITE

At contact of diorite and rhyolite

This mine is a former producer of copper, gold and silver. Two types of ore were mined; low grade pyrite ore and high grade chalcopyrite ore. In the former, chalcopyrite, millerite, linnaeite (or siegenite), pyrrhotite, and possibly violarite and bravoite were associated with pyrite in rhyolite. The chalcopyrite ore contained pyrite, millerite (as grains and aggregates of striated acicular prismatic crystals measuring up to 3 centimetres long), gersdorffite (as cubic crystals measuring about 1/2 centimetre in diameter), magnetite, sphalerite (dark brown to black), galena (uncommon), and sperrylite (rare). The gangue minerals were quartz and dolomite; cavities in the gangue were commonly lined with crystals of quartz and of carbonate that were coated with crystals of the sulphides. Porous, oval-shaped pyrite nodules are composed of irregularly stacked minute lustrous pyrite cubes with some quartz and dolomite.

Both open pit and underground methods were used to mine this deposit that was discovered in the fall of 1951 during a diamond drilling campaign conducted by H. W. Knight Jr. In 1954, Temagami Mining Company Limited intersected two high-grade massive sulphide deposits and started production in the following year. Development consisted of two open pits and a 2516-foot shaft located 1,500 feet southwest of the pits. The mine was equipped with a 200-ton per day mill. Operations ceased in 1972 due to ore exhaustion. Production at the end of 1971 amounted to nearly 12 million pounds of copper, 10,155 ounces of gold, and 186,861 ounces of silver from 641,275 tons of ore milled. The name of the company was changed in 1964 to Copperfields Mining Corporation Limited.

The mine is located on the south shore of the isthmus joining the northern and southern halves of Timagami Island in Timagami Lake. Access is by boat, a distance of about a mile, from the end of the Timagami Mine Road on the eastern shore of Timagami Lake. The Timagami Mine Road (about 11 miles long) leads east from Highway 11 at a point 1.1 miles south of Timagami village.

Refs.: 165 p. 317-321; 166 p. 27-43; 172 p. 201; 173 p. 25-27; 207 p. 369; 247 p. 117; 251 p. 97

Maps (T): 41 I/16E Lake Timagami
(G): 2057 Northwestern Timagami area, Nipissing District (Ont. Ministry Natur. Resour., 1 inch to 1/2 mile)

This is the last occurrence described for the side trip to Timagami; the main road log along Highway 11 is resumed.

Mile 0 Junction Highway 11 and Highway 11B, the turn-off to Cobalt, formerly one of the great mining camps of the world.

The Cobalt-South Lorrain Area

The deposits of the Cobalt-South Lorrain-Elk Lake-Gowganda area have yielded some 600 million ounces of silver (of which about 88 per cent came from the Cobalt camp), 45 million pounds of cobalt, 16 million pounds of nickel, and 5 million pounds of copper since silver ore was discovered at Cobalt in 1903. The area ranks as one of the greatest silver producing areas of all time, exceeded only by Potosi, Bolivia and Butte Montana; it produced the highest grade of silver ever mined in quantity.

The discovery was made by Fred LaRose, a former miner from the phosphate mines north of Ottawa and a blacksmith employed by the Timiskaming and Northern Ontario Railway being constructed at the time. But the first claims for silver were filed by two woodsmen employed in cutting railway ties – James H. McKinley and Ernest F. Darragh who, after noticing fragments of a white metal stuck to timber dragged over the ground, located a vein containing flakes of native silver at the south end of Cobalt Lake (then known as Long Lake); their samples assayed 4,000 ounces of silver per ton. The LaRose discovery, staked jointly by him and his foreman, Duncan McMartin, was registered as a copper property, nickeline being mistaken for native copper. In staking the claim, they failed to notice the blackened plates and nuggets of native silver embedded in a weathered surface vein on the claim; the identification was made later by Willet G. Miller of the Ontario Bureau of Mines. The LaRose-McMartin claim was developed as the LaRose Mine, and claims staked later in the year by Tom Hebert and Neil King became the Nipissing Mine and the O'Brien Mine respectively.

News of these phenomenally rich surface showings reached the Ontario Department of Mines and Willet G. Miller, first provincial geologist of Ontario, was commissioned to investigate the deposits. He collected for the Department a suite of spectacular specimens of native silver from the LaRose claim, assisted prospectors in identifying the silver-cobalt-nickel ore, and reported the discovery of a new silver field to the mining world; on his return to the area in 1904, he named the new railway station Cobalt, a name he deemed more appropriate than the existing name (Long Lake). The prospecting rush that began in 1905 was sparked by the news of the sensationally rich first shipment of ore that contained slabs of native silver and was made by William G. Trethewey in 1904. All of Coleman Township was rapidly staked, and the number of companies organized to develop the deposits swelled from four in 1904 to 405 in 1905. The camp drew experienced miners from the Gatineau-Lièvre district's mica-apatite mines, then on the decline. The output of silver increased from 206,875 ounces in 1904 to 2,451,356 ounces in 1905 and the yield of each successive year doubled that of the preceding year until 1908 when the output was 19,437,875 ounces of silver. In 1904, the camp out-ranked the Lake Superior district which until then, was Ontario's leading producer of silver.

In the wake of the Cobalt discoveries, prospecting activity radiated outward and discoveries of silver ore were subsequently made in Casey and Harris townships (New Liskeard area), and at Elk Lake and Maple Mountain in 1906, in South Lorrain Township in 1907, and in the Miller Lake-Gowganda Lake area in 1908. The production of silver peaked in 1911 when 31,507,791 ounces were won; it continued at a high level until the early 1920's. By 1929 most of the mines ceased operations due to a decrease in the price of silver and to depletion of the ore, and Silver Centre, at the southern end of the silver mining area, became a ghost town. The decline was interrupted first in 1950-51 and again in 1960 when a demand for cobalt and later for silver resulted in renewed activity in some of the old mines and in the discovery of new

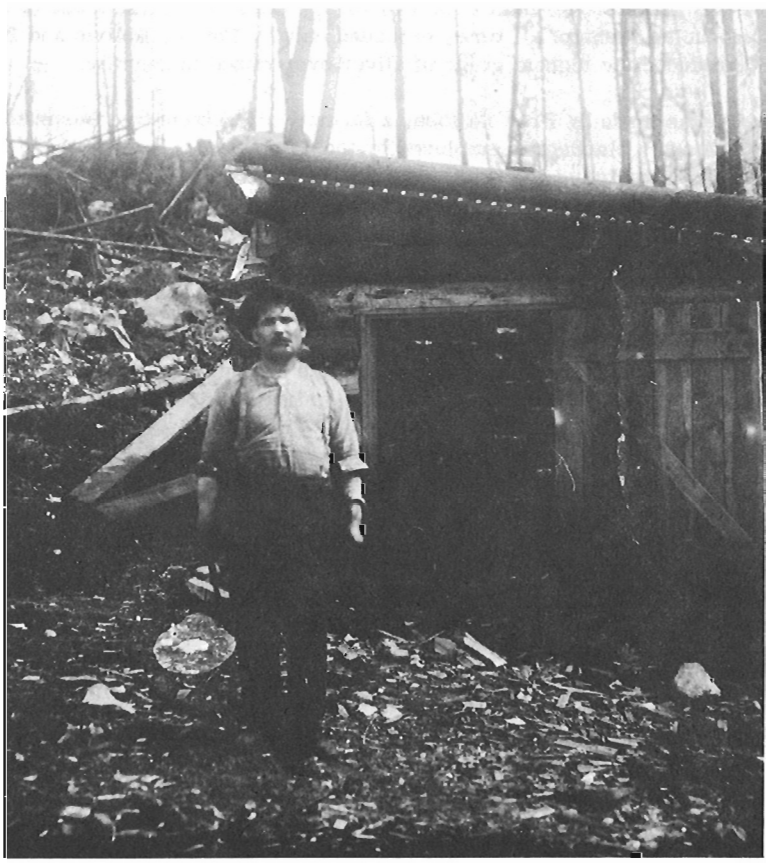


Plate II. Fred LaRose at his cabin in 1907. LaRose is the Ottawa Valley miner and blacksmith who went to northern Ontario to work in the construction of the Timiskaming and Northern Ontario Railway and became one of the original discoverers of silver-cobalt ore in the Cobalt camp. (Public Archives of Ontario picture collection RG13, OBM 1907, p. 140)

veins. By 1963, eight mines were operating in the Cobalt and Gowganda areas but this was reduced to three in 1972. The Cobalt Refinery operated by Kam-Kotia Mines Limited was closed in 1971.

The importance of Cobalt lies not only in the mineral wealth it has wrought, but also in the strong stimulus it gave prospectors to repeat their success at Cobalt, thereby extending their search into the then-remote areas to the northwest, the north and the northeast. Their efforts were rewarded within a decade with discoveries of additional silver fields at Gowganda, Elk Lake, Maple Mountain and South Lorrain, and of the gold fields of Porcupine, Larder Lake, Kirkland Lake, and the adjacent area in Quebec.

An annual Miners' Festival featuring special events related to the historic mining era is held at Cobalt in August.

Refs.: 45 p. 7-14; 59 p. 4-5; 60 p. 7-8; 143 p. 1-7; 151 p. 130-131; 155 p. 689-692; 170 p. 2-5.

Road log along Highway 11B to Cobalt mines (Localities are described in text following road log):

Mile 0 Junction (southern) Highways 11 and 11B; proceed onto Highway 11B.

0.6 Junction Gillies Depot Road on right.

1.5 Conglomerate rock is exposed on left. The rock is Huronian in age and its pebbles and boulders represent most of the older rock types of the region; the pink granite pebbles or boulders are characteristic of this rock and distinguish it from an older conglomerate in the district. (Ref.: 127 p. 85)

2.2 Volcanic rocks of Archean (Keewatin) age are exposed along the highway; the rocks of this age are the oldest in the district.

3.0 Junction West Cobalt Road South on left.

3.4 Junction West Cobalt Road North on left, and Coleman Road on right. The road log for mines along the Coleman Road is given on page 20).

3.7 Townsite Mine; tours of some of the mines in the area originate at the office in the head-frame on right.

3.75 Highway bends to the right; road straight ahead leads to Buffalo Mine.

4.15 Cobalt Mining Museum on left.

4.2 Highway turns sharply to the right; road on left leads to Coniagas Mine. The headframe encased by the grocery store is Shaft No. 4 of the Coniagas Mine.

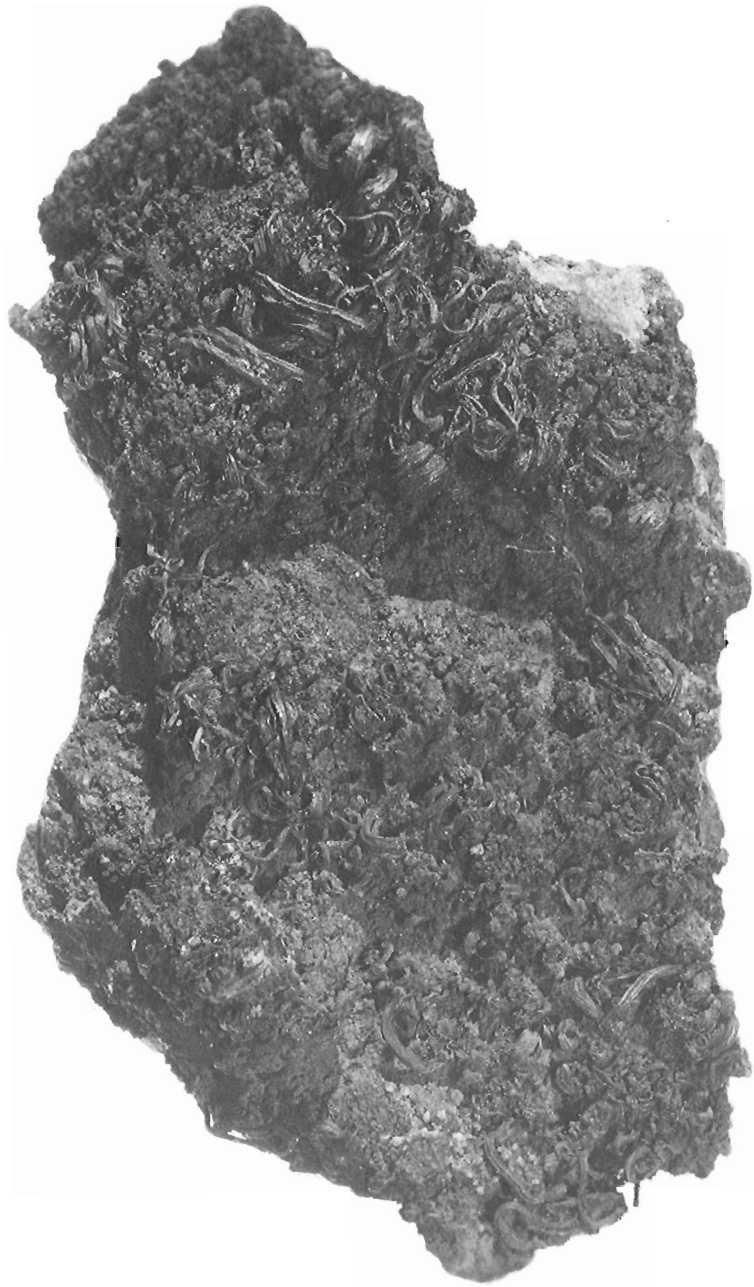


Plate III. Native silver in wire form, Cobalt area. Specimen is actual size. (G.S.C. photo 202304)

4.25 Tourist Information Booth, railway station and Cobalt Lake (elevation 968 feet above sea level) on right; road on left leads to the Nipissing Mine and to the Hudson Bay Mine.

4.6 Junction at LaRose bridge. Road on right leads to Brady Lake and to the following mines (described on pages 34 to 37): LaRose Mine, Right of Way Mine, and Nipissing 404 Mine. The road log for mines along the Cobalt-Brady Lake Road begins at this junction (see page 39).

5.2 The highway parallels a ridge (on right) capped by conglomerate.

5.4 Junction Cross Lake Road on right. The road log for mines along the Cross Lake Road is given on page 52.

7.0 Junction Cross Lake Road on right.

7.1 Junction Highway 567 to Silver Centre, a former mining community that ceased to exist when the once-flourishing mines closed. The road log to mines along Highway 567 is given on page 55.

The road log along Highway 11B continues to New Liskeard, and to the north junction of highways 11 and 11B.

9.0 Haileybury, at junction Highway 588.

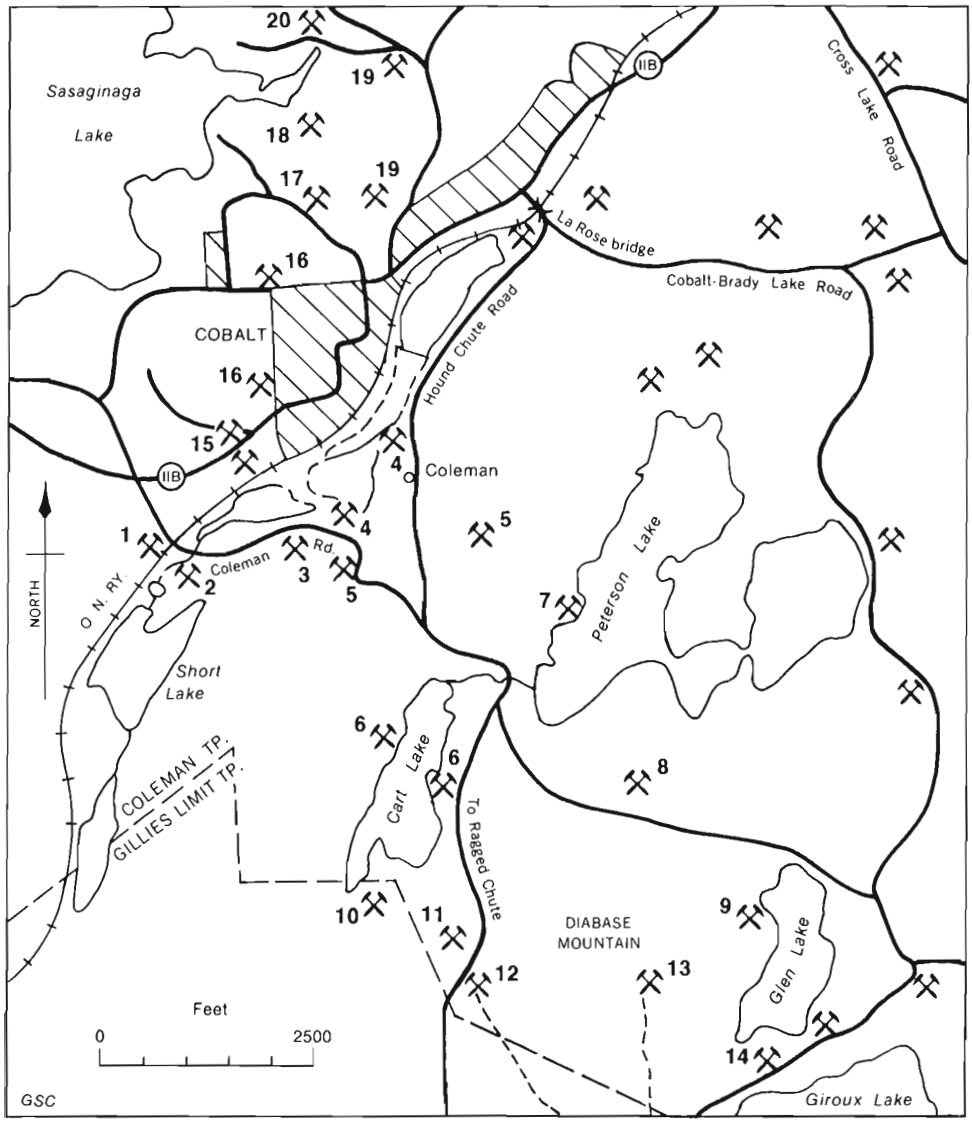
14.3 New Liskeard, at junction Highway 65 (at Paget and Whitewood streets). The road log for occurrences along Highway 65 is given on pages 66 to 68).

15.5 Junction Highway 65E. This highway provides access to: Dawson Point occurrence, Langis Mine, and to the following localities in adjacent Quebec: Wright Mine, Ville-Marie granite occurrences, lac Sairs amazonite occurrence, Lorraine Mine, and Belleterre Mine; the descriptions begin on page 85).

16.0 Junction Highway 11.

The Cobalt, South Lorrain Mines

NATIVE SILVER, NICKELINE, SMALTITE, ALLARGENTUM, DYSCRASITE, SAFFLORITE, SKUTTERUDITE, COBALTITE, ARSENOPYRITE, BREITHAUPTITE, CHALCOPYRITE, TETRAHEDRITE, ACANTHITE, GALENA, MARCASITE, SPHALERITE, PYRITE, PYRARGYRITE, STEPHANITE, CLINOSAFFLORITE, RAMMELSBERGITE, GLAUCODOT, ALLOCLASITE, PYRRHOTITE, GRAPHITE, NATIVE BISMUTH, DJURLEITE, BISMUTHINITE, VIOLARITE, GOETHITE, MOLYBDENITE, MILLERITE, SAMSONITE, BORNITE, SIEGENITE, FREIESLEBENITE, NATIVE GOLD, NATIVE ARSENIC, DOLOMITE, CALCITE, CHLORITE, ALBITE, ACTINOLITE, HEMATITE, MAGNETITE, TITANITE, RUTILE, ANATASE, EPIDOTE, ALLANITE, WOLFRAMITE, APATITE, AXINITE, STILPNOMELANE, PREHNITE, ERYTHRITE, ANNABERGITE



1. Silver Queen Mine
2. Princess Mine
3. McKinley-Darragh Mine
4. Cobalt Lake Mine
5. Nipissing 404 Mine
6. Seneca Superior Mine
7. Peterson Lake Mine
8. Nipissing 407 Mine
9. Penn Canadian, Bailey mines
10. Provincial Mine
11. Savage Mine
12. Mensilvo Mine
13. Silverfields (Alexandra) Mine
14. Niho Mine
15. Townsite Mine
16. Buffalo Mine
17. Coniagas Mine
18. Trethewey Mine
19. Nipissing Mine
20. Hudson Bay Mine

Map 2. Cobalt, Coleman Road, Hound Chute Road.

In carbonate veins cutting Archean volcanic rocks, Proterozoic sedimentary rocks, and Nipissing diabase, and in the wall-rock.

The ores are believed to have originated from the intrusion of sheets of diabase into the existing sedimentary and volcanic rocks. Most of the ore was mined from above the 500-foot level except at the Miller Lake (Gowganda area) mines where ore persisted to depths of over 1,000 feet. The ore-bearing calcite and dolomite veins occupy fractures and faults in the volcanic and sedimentary rocks, and in the diabase.

The most characteristic minerals of the veins are native silver, nickeline (niccolite), and smaltite. Native silver – the chief ore mineral — is intimately associated with allargentum and dyscrasite (rare) forming mixtures in which the individual minerals are indistinguishable in the hand specimen. The silver generally occurs as masses or slabs, as grains, flakes, films, wires, irregular veinlets and as filiform or dendritic forms in white, grey or black calcite and in intergrowths of metallic minerals of which the most common constituents are nickeline and smaltite or safflorite; it rarely occurs as crystals.

The most important nickel and cobalt minerals are nickeline (niccolite), smaltite, and safflorite. These ore minerals occur individually and as complex intergrowths forming grains, or granular, botryoidal and colloform masses, or rosette-like and dendritic aggregates, and veinlets in carbonate (calcite or dolomite) veins measuring up to 4 feet wide (average width being less than 2 inches) and up to 3,500 feet long. Less commonly, the ore minerals occur in the wall-rock adjacent to the veins, and in shear zones in which calcite cements rock fragments dislodged by rock movement. Minerals commonly associated with the principal ore minerals include skutterudite, cobaltite, arsenopyrite, breithauptite (an indicator of high grade ore), chalcopyrite, tetrahedrite, acanthite, galena, marcasite, sphalerite, pyrite, pyrargyrite, and stephanite. Other constituents of this ore are clinosafflorite, rammelsbergite, glaucodot, alloclasite, pyrrhotite, graphite, native bismuth, djurleite, bismuthinite, violarite, goethite, molybdenite, millerite (as hair-like crystals), samsonite, bornite, siegenite, freieslebenite, native gold, and native arsenic; these minerals are generally intergrown, many occurring in small amounts recognized only by microscopic examination.

The gangue minerals that contain the ore minerals in the veins are predominantly grey or pink dolomite (weathers brown) and pink, white, grey or black calcite (generally more translucent than dolomite); the grey to black colour of the carbonates is due to inclusions of metallic minerals (sulphides and arsenides), and is an indication of an ore-bearing vein. Quartz and chlorite are also important gangue minerals; minor constituents include albite, actinolite, hematite, magnetite, titanite, rutile, anatase, epidote, allanite, wolframite (rare), apatite ("micro" crystals), axinite ("micro" crystals), stilpnomeland (rare), and prehnite (rare). Vugs in the carbonates occurring in some of the mines fluoresce when exposed to ultraviolet rays. In addition to occurring in ore veins, epidote occurs with calcite in veins cutting diabase.

Secondary minerals associated with the orebody are pink to rose-coloured erythrite and light green annabergite; they generally occur as powdery encrustations on ore specimens. Minerals other than those listed have been found in only certain mines and are noted in the appropriate descriptions in the text.

The white, grey, charcoal, or pinkish carbonates variously patterned with the silvery grey and pinkish grey metallic ore minerals present a contrast in lustre when polished

resulting in an attractive stone that is used locally for jewellery. Equally attractive is the rock known as Cobalt conglomerate that occurs in many of the mines; it is composed of a black background enclosing pink to red granite pebbles ranging in size from a fraction of an inch to several inches in diameter. The rock takes a good polish and is suitable for use as an ornamental stone.

Specimens can be collected from the dumps at numerous formerly operated mines in the vicinity of Cobalt. Descriptions are given for those mines that are readily accessible. Tours through the surface plants of operating mines are conducted by the companies involved at specified times, and arrangements should be made in advance by writing to the appropriate company.

Refs.: 89 p. 24-27; 90 p. 239-249; 91 p. 280-282, 286-288; 104 p. 35-40; 127 p. 9-29; 145 p. 76-79; 146 p. 108-139; 142 p. 150-186; 141 p. 187-195; 144 p. 196-231; 151 p. 130-131.

Further details follow for mines accessible by automobile and/or a short hike; since several mines are located along each side-road, the road logs to a group of mines are given and they precede the descriptions of the individual mines.

Road log to mines along the Coleman Road and the Hound Chute Road (Mile 3.4, Highway 11B; see page 15. The descriptions of the mines follow the road log.):

Mile 0	Junction Coleman Road and Highway 11B; proceed onto the Coleman Road.
0.15	Silver Queen Mine on right.
0.25	Trail on right to Princess Mine.
0.4	McKinley-Darragh Mine on right.
0.55	Junction single-lane road on right to the McKinley-Darragh Mine; opposite the junction are other workings of this mine.
0.70	Kendal shaft (Nipissing Mine) on right (see page 36).
0.75	Junction alternate single-lane road on right to the McKinley-Darragh Mine.
0.90	Junction Hound Chute Road; proceed straight ahead.
0.95	Junction road on right to Seneca Superior (Cart Lake) Mine.
1.1	Junction road on left to Peterson Lake Mine.
1.15	Junction road on left to Glen Lake and to Nipissing 407 Mine, Penn Canadian Mine, and Bailey Mine; continue along Hound Chute Road.
1.35	Seneca Superior (Cart Lake) Mine on right; the shaft between the lake and the road was sunk on the Worth vein (see page 22).

1.55 Junction on right single-lane road to Provincial Mine.

1.65 From about this point, the road parallels the air pipeline to Hound Chute.

1.80 Savage Mine, Mensilvo Mine; road on left leads to the Silverfields Mine, Hiho Mine.

1.9 Junction; follow right fork.

6.8 Hound Chute hydro-electric dam on Montreal River.

9.3 Ragged Chute compressed air plant.

Silver Queen Mine

Between 1905 and 1939, this mine produced nearly one and a half million ounces of silver as well as 168,000 pounds of cobalt; its most productive years were from 1906 to 1909 and the peak was reached in 1908 when nearly half the total silver and 80 per cent of the cobalt were produced. It was worked from an inclined shaft, about 200 feet deep. The deposit was staked in 1904 by the Timiskaming and Hudson Bay Mining Company, the oldest mining company in the area having been formed in 1903 before the discovery of silver. During its most productive years, the mine was operated by Cobalt Silver Queen Mining Company.

The mine and dumps are located at Mile 0.15 on the Coleman Road.

Refs.: 104 p. 161; 197 p. 25-30

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Princess Mine

During mining operations, striated, rounded masses of smaltite measuring up to 18 inches by 8 inches, and abundant erythrite were encountered. The deposit was worked by a shaft to a depth of 230 feet. Production began in 1907; from 1908 until 1923 the mine was operated by LaRose Consolidated Mines, and for a few years thereafter by McKinley-Darragh-Savage Mines of Cobalt Limited. To the end of 1922, the mine yielded 3,713,806 ounces of silver.

The mine is located about 100 yards south of the Coleman Road at Mile 0.25.

Refs.: 104 p. 97-99; 200 p. 105-106

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

McKinley-Darragh Mine

This deposit was the first to be staked in the Cobalt area; the Discovery vein was staked at the south end of Cobalt Lake in August, 1903 by James H. McKinley and Ernest F. Darragh. Between 1906 and 1922, nearly 20 million ounces of silver were recovered by McKinley-Darragh-Savage Mines of Cobalt, Limited; some of the production was derived from recovery of native silver from the gravels in the vicinity of the Discovery vein. A concentrator was built in 1907. Other companies involved in production were Mining Corporation of Canada Limited (1928 to 1932), and Cobalt Properties Limited (1934 to 1939).

The mine consisted of several shafts, the deepest being 450 feet; they are located on both sides of the Coleman Road between Mile 0.4 and 0.55, and along the loop-road leading south from the Coleman Road at Mile 0.55 and 0.75.

Refs.: 104 p. 113-120; 200 p. 106-114

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Cobalt Lake Mine

Shaft No. 6 of this former producer is located near the south shore of Cobalt Lake and about 100 feet north of the McKinley-Darragh shaft at Mile 0.55 on the Coleman Road. Another of the Cobalt Lake Mine shafts is on the east side of the Lake about 1,000 feet to the northeast of Shaft No. 6. The veins serviced by both lay beneath the lake; mining was conducted by Cobalt Lake Mining Company Limited from 1906 until 1914, by Mining Corporation of Canada from 1914 to 1932, and later by Cobalt Properties Limited and Silanco Mining and Refining Company Limited.

A mill was erected near Shaft No. 6. In 1915 the level of the lake was lowered, and in 1936 a dam was built across it to facilitate exploration and mining. The mine was an important producer of silver (about 7 million ounces) and of cobalt. About 20 years ago, the Hellens Mining and Reduction Company Limited built a cyanide mill for treatment of the tailings dumped into the south end of Cobalt Lake by various companies; the building is located near Shaft No. 6 and is visible from the Coleman Road at Mile 0.6.

Refs.: 170 p. 106-107; 200 p. 90-100

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Seneca Superior (Cart Lake) Mine

In addition to the silver-cobalt ore minerals common in the Cobalt deposits, maucherite was found in association with nickeline and breithauptite at this mine. Original

work on the property was done by the Kerry Mining Company from 1906 to 1911. About $5\frac{1}{2}$ million ounces of silver were produced from one ore shoot (Worth vein) between 1912 and 1916 by Seneca Superior Silver Mines Limited; the Worth vein proved to be one of the outstanding veins in the Cobalt camp. The ore was located beneath Cart Lake near the east shore and was mined from a 200-foot shaft. Other shafts were sunk on the west side of the lake. The property was re-examined in the 1920's by Mining Corporation of Canada Limited and in the 1960's by Agnico Mines Limited; both companies removed some ore, the latter for treatment at the Penn mill. Operations were suspended in 1967.

Access to the west side of Cart Lake is by way of a road leading south from the Coleman-Hound Chute Road at Mile 0.95; the shaft from which the bulk of the ore was mined is near the shore of the Lake at Mile 1.35. The workings immediately south of the Seneca Superior Mine are those of the Gould Mine which produced some ore between 1913 and 1915.

Refs.: 104 p. 152-156; 142 p. 154; 161 p. 141; 162 p. 130; 200 p. 61-62, 68

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Peterson Lake Mine

The mine consists of a number of shafts that were sunk along the western and northeastern shores of Peterson Lake, and in two of the islands. Almost a million ounces of silver and about 27,000 pounds of cobalt were produced between 1908 and 1966. The Peterson Lake No. 1 shaft is located near the shore of the lake and is reached by a road, 0.05 mile long, leading north from the Coleman-Hound Chute road at Mile 1.1. The shaft is 217 feet deep and most of the dump has been removed. The underground workings extended beneath Peterson Lake. Original work on the property was done in 1906 by Peterson Lake Silver Cobalt Mining Company Limited. It was subsequently leased by numerous companies and, in 1963, acquired by Silver Town Mines Limited. Other workings, not serviced by roads, are located along the shore of the Lake to the north of No. 1 shaft.

Refs.: 170 p. 186-187; 200 p. 57-70

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Nipissing 407 Mine

Magnetite occurs in small amounts with the silver-cobalt ore minerals. A small amount of ore was obtained between 1924 and 1926 from veins containing high grade silver. The deposit was worked again by Agnico Mines Limited from 1963 to 1971, the ore being milled at the Penn Mill. The company deepened the existing shaft from 347.5 feet to 460 feet.

The mine is located about 200 yards north of the road to Glen Lake at a point 0.45 mile east of its junction with the Coleman-Hound Chute Road (see road log to Penn Canadian Bailey mines).

Refs.: 146 p. 132; 156 p. 122-123; 157 p. 120; 200 p. 87-90; 253 p. 50

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Penn-Canadian Mine, Bailey Mine

The silver-bearing veins in the adjoining Penn-Canadian and Bailey mines were discovered in about 1905. The orebody lies beneath Diabase Mountain, a prominent hill (elevation of 1240 feet above sea level), on the west side of Glen Lake composed of Nipissing diabase. The Penn-Canadian Mine is the more northerly one; it was first worked by Big Pete Canadian Mines Limited (1905) and by Cobalt Central Mines Company (1906-1908) which also installed a concentrating plant. Penn-Canadian Mines Limited operated the mine from 1908 until 1919 from two shafts, one (to a depth of 310 feet) located on the west side of Glen Lake, the other (to a depth of 110 feet) located 250 feet north of the lake. Until 1921, the mine produced nearly 3 3/4 million ounces of silver; since then operations have been carried out spasmodically by various companies. From 1968 until 1971, it was operated by Agnico Mines Limited.

The Bailey Mine was originally worked by Bailey Cobalt Mines Limited between 1906 and 1921. The underground workings were investigated in 1951-1952 by New Bailey Mines Limited and a minor amount of production was obtained. Recent operations were conducted by Glen Lake Silver Mines Limited (1961 to 1969), by Agnico Mines Limited (1970 to 1971), and by Silver Shield Mines Incorporated since 1971. The mine consists of two shafts to depths of 283 feet and 455 feet respectively, an adit 550 feet long, and a mill. Between 1912 and 1966 it produced nearly 3 million ounces of silver.

Road log from the Coleman-Hound Chute Road at Mile 1.15 (see page 20):

Mile 0 — Proceed onto road to Glen Lake.

0.03 — Cobalt conglomerate outcrops on right.

0.45 — Turn-off (left) to Nipissing 407 Mine.

0.75 — Junction road to Penn-Canadian and Bailey mines. This turn-off is 0.25 mile from the junction of the Cross Lake Road. Turn right.

1.0 — Penn-Canadian and Bailey mines.

Refs.: 104 p. 156-157, 172; 120 p. 92-95; 161 p. 105, 108-109; 162 p. 104-105, 108-109; 170 p. 160-161, 184-185; 251 p. 301-302; 253 p. 50, 51

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Provincial Mine

Sheets and nuggets of native silver were associated with smaltite and nickeline in a vein discovered in 1906 by Thor Brown and G.R. McLaren, students prospecting under the direction of Willet G. Miller, Provincial geologist. The discovery was made in the Gillies timber limit, a 100-square mile tract of pine-treed land on both sides of the Montreal River where mining activity was prohibited due to the danger of forest fires. The restriction was removed by the Ontario government following the rich silver discoveries in adjacent Coleman Township, and the government undertook prospecting within the timber limits and located the ore.

Exploration of the deposit by two shafts was conducted by the Ontario government. The results at depth were disappointing and in 1909, the government terminated the operation having made a profit of $34,094 on its only mining venture. The Cobalt Provincial Mining Company Limited worked the deposit until 1913, and various companies were involved in its operations at subsequent intervals. Production to 1940 netted some 287,000 ounces of silver and 54,000 pounds of cobalt. The main shaft was sunk to a depth of 360 feet, a second one to 110 feet. From 1965 to 1968, Sudbury Contact Mines Limited operated the mine and produced some silver.

The mine is located south of Cart Lake. Access is by a road, 0.25 mile long, leading west from the Coleman-Hound Chute Road at Mile 1.55.

Refs.: 60 p. 8-10; 104 p. 172-174; 155, p. 692; 158 p. 141; 159 p. 165; 160 p. 153; 161 p. 121; 201 p. 96-99

Maps (T): 31 M/5E Cobalt
(G): 2051 Cobalt silver area, southwestern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Savage Mine, Mensilvo Mine

The Savage and Mensilvo (Silver Bar) deposits were discovered in 1905; they are located along the Coleman-Hound Chute road at Mile 1.80, the Savage mine being the more northerly. The Savage Mine was principally a silver producer whereas cobalt was the major metal produced from the Mensilvo Mine along with silver and some nickel and copper. With the silver, cobalt and nickel minerals, the deposits contain chalcopyrite, sphalerite and galena. Both mines consist of a number of shafts from 40 to 290 feet deep; their underground workings are connected.

The original work on the Savage Mine was performed between 1909 and 1928 by McKinley-Darragh-Savage Mines of Cobalt, Limited. Subsequent operations were conducted spasmodically by various operators until the 1960's when Silver Summit Mines Limited dewatered the mine and brought it back into production for a few years.

The Mensilvo Mine was first worked by Silver Bar Mining Company Limited between 1905 and 1909 after which intermittent operations were conducted by several companies including Mensilvo Mines Limited (1946 to 1954) and Silver Crater Mines Limited (1954 to 1956). From 1961 to 1962, it was privately worked by Mr. J.J. Gray of Toronto,

and in 1962 Silver Summit Mines Limited acquired the property and worked it in conjunction with its adjoining Savage Mine until 1967. The latter company erected a crushing and milling plant and several mine buildings to service both mines.

Most of the mine workings are located on the east side of the Coleman-Hound Chute Road at Mile 1.80.

Refs.: 97 p. 125-126; 98 p. 140-141; 104 p. 120-121; 156 p. 143-144; 157 p. 138-139; 158 p. 138-139; 159 p. 160-161; 160 p. 147-148; 201 p. 86-96

Maps (T): 31 M/5E Cobalt
(G): 2051 Cobalt silver area, southwestern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Silverfields (Alexandra) Mine

Some minerals not commonly found in the cobalt ores were identified from the Silverfields deposit. Included are: pararammelsbergite; proustite closely associated with tetrahedrite, stephanite, pyrrhotite; ullmanite associated with tetrahedrite, pyrargyrite and proustite; matildite, as grains and lamellae in galena; bravoite, associated with pyrite; smythite, associated with pyrrhotite, galena, sphalerite, chalcopyrite and marcasite. These uncommon minerals are visible under magnification. Pebbles composed of massive sulphides (chalcopyrite, pyrrhotite, pyrite, sphalerite, galena, arsenopyrite and freibergite) occur in the conglomerate; they measure up to 2 inches in diameter.

The Silverfields (Alexandra) Mine is located on the south slope of Diabase Mountain. A 310-foot shaft was sunk on the property in 1909 and some development work was done during the next 10 years. In 1962, Silverfields Mining Corporation Limited acquired the property and began preparations for mining from the old shaft. Mine buildings were erected and equipment installed. The shaft was deepened to 434 feet in 1963, and to 502 feet in 1967. The mill commenced operations in 1966; until then, the ore was milled at the Agnico Mines Limited Penn mill. Silver and cobalt and some copper were produced. The company continued operations until 1971 when the property was acquired by Teck Corporation Limited.

Road log from Mile 1.80 on the Coleman-Hound Chute Road:

Mile 0 Junction; follow the road on left proceeding east.

0.55 Junction; turn left and follow steep road up Diabase Mountain. (Road straight ahead leads to the Hiho Mine).

0.8 Silverfields Mine.

Refs.: 98 p. 137; 120 p. 98-99; 146 p. 136; 142 p. 162, 185; 144 p. 214, 216, 223, 225; 156 p. 139-140; 157 p. 126-128; 158 p. 135-136; 159 p. 157-158; 160 p. 143-144; 161 p. 109; 162 p. 114-115; 201 p. 83-86; 251 p. 300, 318

Maps (T): 31 M/5E Cobalt
(G): 2051 Cobalt silver area southwestern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Hiho Mine

The mine consists of the University No. 3 and the Cleopatra workings with shafts to a depth of 298 feet in the former and 243 feet in the latter. High grade silver ore was encountered in recent operations at the University No. 3 shaft; the vein extended beneath Giroux Lake. Native silver and ruby silver were found in the wall-rock adjacent to the vein. Leaf silver has also been reported from the veins which also contained minor amounts of galena, sphalerite and chalcopyrite.

The deposit was worked intermittently from 1905 when it was discovered until 1970. Operators included University Mines Limited, Cleopatra Mining Company Limited, LaRose Mines Limited, LaRose-Rouyn Mines Limited, Silver-Miller Mines Limited, and more recently, Hiho Silver Mines Limited which produced silver, cobalt, and minor amounts of nickel and copper between 1963 and 1971. The ore was treated at the Glen Lake Silver Mines Limited mill.

Silver Shield Mines Incorporated acquired the property in 1971.

The mine is located on the north shore of Giroux Lake. Access is via the road to the Silverfields Mine; at the junction at Mile 0.55 continue straight ahead for 0.15 mile to the Hiho Mine.

Refs.: 120 p. 96-97; 156 p. 129-130; 157 p. 126-128; 158 p. 129-130; 159 p. 150; 160 p. 137-138; 161 p. 114-115; 162 p. 109-111; 201 p. 73-79, 105-106; 253 p. 51

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Ragged Chute Compressed Air Plant

During the mining boom in Cobalt, a cheap source of power was required to service the new mines; as a result, a hydraulic compressed air plant, the world's largest, utilizing the low falls (a 50-foot drop over 1,000 feet) at Ragged Chute on the Montreal River was constructed. It is still in operation. On Sundays, when the mines are not in operation, the unused compressed air is released causing water to gush out in a giant columnar spray extending over 100 feet above the river.

Cobalt conglomerate rocks are exposed along the vertical banks and in the bed of the Montreal River at the site.

The plant is reached by the Coleman-Hound Chute road; it is 9.3 miles from the junction on Highway 11B. The compressed air is transmitted by pipes to Cobalt and the pipeline is visible at numerous points along the road.

Plate IV. Ontario Hydro's Ragged Chute compressed air plant on the Montreal River. The columnar spray of water gushes out from a blow-off pipe in the river bank and reaches a height of over 100 feet. Blocks of Cobalt conglomerate are strewn along the river-bed. (Photo courtesy Ontario Hydro)

This is the last occurrence along the Coleman-Hound Chute road; the description of other Cobalt occurrences along Highway 11B follows.

Townsite Mine

This former silver-cobalt-nickel-copper producer was originally worked in 1906 by Cobalt Townsite Mining Company Limited; it yielded some 13 million ounces of silver from 1908 until 1917. Production ceased in 1939. During mining operations, several boulders weighing about a ton and composed of high grade silver ore were found in the overburden on the claim. The original operator worked the deposit until 1914, and between that date and 1932 mining was conducted by Mining Corporation of Canada Limited. More recently it was acquired by Agnico Mines Limited.

Most of the production was from a 430-foot shaft on the south side of Highway 11B at Mile 3.7 (see page 15). In the summer of 1972, tours to the Cobalt mines originated at this location. Another shaft (320 feet deep) is located at the intersection on the opposite side of the road. Two other shafts were opened on the property.

Refs.: 104 p. 78-81; 170 p. 112-113; 200 p. 100-104

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Buffalo Mine

The original claim was staked in 1904 on a vein containing smaltite discovered by Alexander Longwell. From 1905 until 1959, this mine produced some 14 million ounces of silver and about 150,000 pounds of cobalt. Associated with the silver and cobalt ores, were the sulphides, galena, chalcopyrite, sphalerite, arsenopyrite and pyrite. The mine was worked from numerous shafts, the deepest being 235 feet. They are located along a ridge on the west side of Cobalt. The early work (1906 to 1919) was done by Buffalo Mines Limited; subsequent operators included Mining Corporation of Canada, Limited (1919 to 1932) and Cobalt Properties, Limited (1934 to 1939). In 1949 and in the 1960's, small scale work was performed by R. C. McAllister and partners.

Access is by following the road leading north from Highway 11B at Mile 3.75 (see page 15). The main working (Shaft No. 12) is located 150 feet north of Highway 11B and others are located within 800 feet to the north and northwest of No. 12; all are on the west side of the road. Shaft No. 7 is reached by following the road leading west from the Townsite Mine for a distance of 1,000 feet. Across the road from Shaft No. 12 is the City of Cobalt Mine, a former silver-cobalt producer.

Refs.: 45 p. 12; 98 p. 132; 104 p. 66-70; 127 p. 20; 158 p. 124; 159 p. 155; 160 p. 141; 170 p. 94-95; 199 p. 162-169

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour. 1 inch to 1,000 feet)

Coniagas Mine

The headframe enclosed by a grocery store opposite the Cobalt railway station is Shaft No. 4 of the Coniagas Mine; its workings extended to a depth of 375 feet, the deepest on the claim, but it was much less productive than the openings on other parts of the claim. The silver-bearing vein was discovered in an outcrop on the property in 1904 by W.G. Trethewey who was also responsible for the original work. The vein was about 18 inches wide and contained, in the calcite, slabs of native silver measuring a square foot with a thickness of an inch or more, together with large irregular knobs and masses of native silver. A shaft was sunk on the richest section of the vein. There are several shafts on the property; No. 2 reaching a depth of 285 feet, was the most productive.

Plate V. Coniagas Mine, Shaft No. 4; the headframe has been enclosed within a local grocery store in Cobalt. (G.S.C. photo 161463)

From 1905 to 1943, the deposit yielded close to 34 million ounces of silver, some 300,000 ounces of cobalt, and a small amount of copper and nickel making this one of the most productive mines in the Cobalt area. Chalcopyrite was associated with the silver-cobalt minerals.

The deposit was discovered in 1904 by W. G. Trethewey on his second day of prospecting in Cobalt. He sold the claim to Coniagas Mines, Limited which operated it continuously until 1924 when a fire destroyed the concentrator (built in 1907) and Shaft No. 2. The ore was shipped to the company's smelter in Thorold, Ontario where the smelter was in operation from 1908 until 1926. Although most of the known ore was mined out, spasmodic mining was subsequently carried out by various interests including Cobalt Properties, Limited (1932-1937), Messrs. A. Murphy and A. P. Landry (1937-1943), and Sanymac Mining and Development Company, Limited (1943).

The mine is reached by proceeding left (west) from the sharp bend on Highway 11B at Mile 4.2 (see page 15) for about 100 feet to a junction; turn right (north) onto the road to Sasaginaga Lake and proceed 0.2 mile to the mine on the right side of the road.

Refs.: 104 p. 82-86; 136 p. 209A; 155 p. 691; 170 p. 118-119; 199 p. 139-154

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Trethewey Mine

The discovery of this deposit and the first shipment of ore were made in 1904 by W. G. Trethewey who, on the same day discovered the rich silver vein on the Coniagas property. Trethewey Silver Cobalt Mines, Limited was formed to work the deposit which it did until 1920. A concentrator was built on the site. From 1920 until 1924, Coniagas Mines, Limited continued operations, and some work has been done since by various operators. Until 1943, 6 3/4 million ounces of silver, some 200,000 pounds of cobalt, and a small amount of nickel were won from the mine which consisted of six shafts reaching depths of from 67 to 186 feet.

The mine is located immediately to the north of the Coniagas Mine.

Refs.: 104 p. 140-143; 155 p. 691; 199 p. 133-139

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Nipissing Mine

The Nipissing (RL400) Mine was one of the most prolific producers of silver in the Cobalt area. One vein, the Meyer vein, yielded 13 million ounces of silver, and an

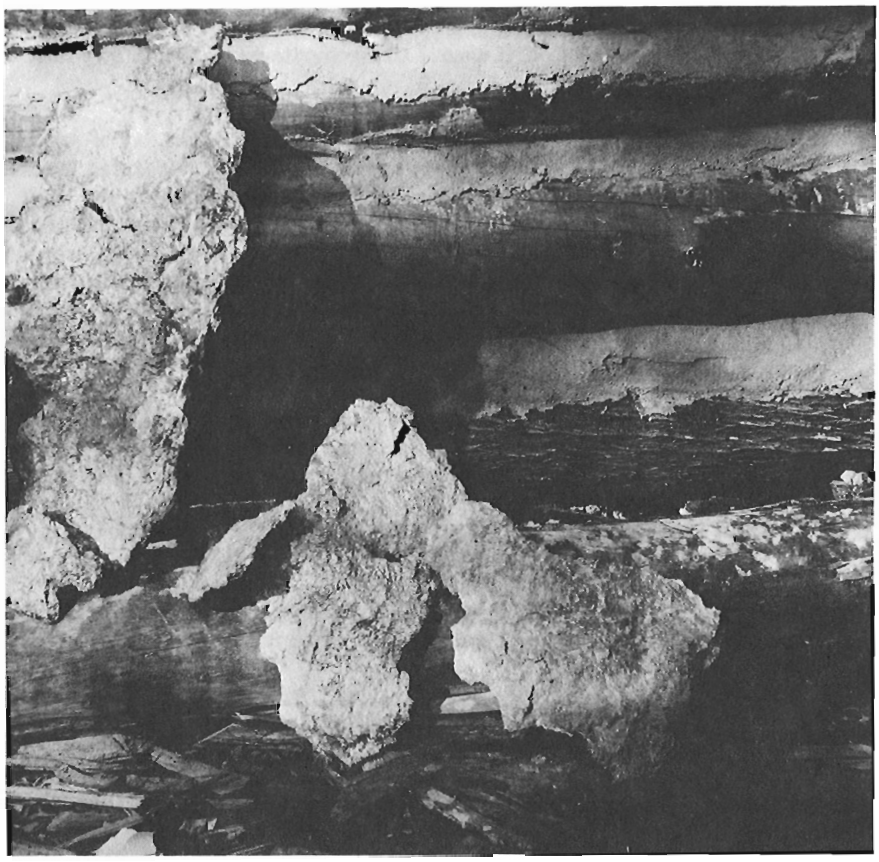


Plate VI. Slabs of native silver removed from the Trethewey Mine in 1907. The upright slab weighed 79 pounds. (Archives of Ontario picture collection RG 13, OBM 1910, p. 30)

ore shoot measuring 690 feet long and 5 or 6 inches wide assayed 800 to 1,000 ounces of silver per ton. The ore at this mine consisted mainly of smaltite and native silver in pink calcite. During mining of Vein 64, vugs were encountered in calcite; they were lined with calcite crystals studded with crystals of argentite, stephanite, and ruby silver. Galena, chalcopyrite, and hematite were reported from some of the veins. In the dump of Shaft 64, marcasite concretions in carbonaceous sedimentary rock have been found.

Most of the production was from two shafts: No. 64 that serviced vein 64 was sunk to a depth of 902 feet from which a winze reached a total depth of 1,002 feet from the surface, and No. 73 reaching a depth of 328 feet below which a winze extended to 548 feet. The latter serviced three of the most productive veins including the outstanding Meyer vein; an aerial tram connected it with the Nipissing mill on Claim 404 at the southeastern end of Cobalt Lake. Two additional shafts were used to hoist the ore.

The Meyer vein was discovered in 1907 and work on it began in the same year by The Nipissing Mines Company, Limited. By the end of 1908 four shafts had been sunk on the property. Mining continued until 1932 and in the following year the company's mill was destroyed by fire.

Road log to the mine from Highway 11B at Mile 4.25 (see page 17):

Mile 0 — At bend on Highway 11B opposite Cobalt railway station, proceed straight ahead (north).

0.1 — Community Centre on left.

0.2 — Turn-off (on left) to Nipissing Mine southern workings. To reach them turn left and proceed 0.05 mile to a junction. Shaft 80 of the Nipissing Mine is to the left of the junction; straight ahead and up the ridge is part of the Coniagas Mine. To reach Shaft No. 73 of the Nipissing Mine, turn right at the junction and proceed about 500 feet to the mine. On the ridge above this shaft, are the workings of the Trethewey Mine. To reach Shaft No. 64 (Nipissing Mine), continue straight ahead from Mile 0.2.

0.4 — Junction; turn left.

0.5 — Fork; bear left.

0.55 — Shaft No. 64 (Nipissing Mine) on left.

Refs.: 38 p. 111-113; 104 p. 46-57; 126 p. 99-102; 199 p. 114-125; 226 p. 120-121

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Hudson Bay Mine

This deposit was discovered by the Timiskaming and Hudson Bay Mining Company, Limited, a company that was incorporated in the spring of 1903, before the discovery of silver in the district; it was formed by a group of pioneer New Liskeard residents including farmers, business-men, and professional men for the purpose of prospecting northern Ontario. Before the Cobalt rush, it had staked claims in the Boston Creek and Larder Lake areas. When news of the Cobalt discoveries broke out, the company turned its attention to that area and became in 1904, the first incorporated company to stake claims in the Cobalt district. In about 1906, the rich veins on the Hudson Bay property were discovered and were worked continuously until 1914, and again from 1916 until 1920. A concentrator was built in 1910. In 1909, the company's name was changed to Hudson Bay Mines, Limited. From 1920 until 1953, the mine was worked during short intervals by various companies. Production to 1953 yielded close to $6\frac{1}{2}$ million ounces of silver, about 185,000 ounces of cobalt, and some nickel and copper. The mine consisted of two shafts and some open pits, one measuring 40 feet wide.

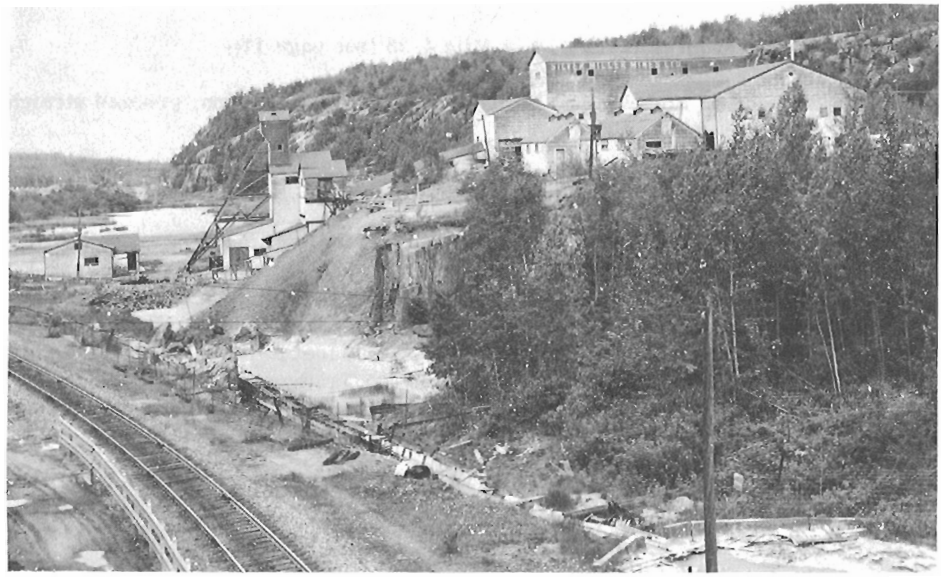


Plate VII. LaRose Mine. Cobalt conglomerate is exposed along the ridge behind the mine. (G.S.C. photo 161468)

Associated with the silver minerals in the dumps, are massive pyrite and chalcopyrite. Secondary minerals that have formed coatings or crusts on the calcite include, bright green brochantite, and colourless to white finely granular and platy gypsum.

To reach the mine, follow the road log to the Trethewey Mine. From Shaft 64 (Trethewey Mine), continue along the road for 700 feet; the mine is to the right (north) of this point.

Refs.: 57 p. 2-3; 104 p. 142-144; 137 p. 65; 199 p. 125-133

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

LaRose Mine

The second application for claims in the Cobalt area was made jointly in September, 1903 by Fred LaRose, a Hull (Quebec) blacksmith employed in railway construction in Cobalt, and Duncan McMartin, his foreman; the discovery of 'float' and a vein was made by LaRose opposite Station 113 on the Timiskaming and Northern Ontario railway about 1,300 feet from Long (Cobalt) Lake. After exposing the vein by an open cut, LaRose learned from Ontario Bureau of Mines geologist W. G. Miller that the ore was

silver although in registering the claim, he had specified copper as the discovery mistaking it for nickeline. He sold his share of the claims to the newly formed LaRose Mines, Limited for $30,000. The mine became one of the main producers of silver (a little over 26 million ounces to 1948), and a substantial producer of cobalt (about 1 million pounds). From one spectacularly rich vein mined from an open cut, over a million ounces of silver was won; the vein averaged 5,600 ounces per ton and one ore shoot, 850 feet long, averaged 700 to 1,000 ounces of silver per ton, and in places assayed 3,000 to 14,000 ounces per ton. Early in 1906, a mass of silver ore weighing 400 pounds was removed from the 215-foot level. In addition to the silver-cobalt minerals, chalcopyrite, galena, sphalerite, pyrrhotite and pyrite were present in the orebody, and after the mining for silver and for cobalt had ceased, chalcopyrite was mined as an ore of copper. Rare minerals identified from the deposit include xanthoconite, pyrargyrite and breithauptite.

The mine was developed by several open cuts and adits on the west side of a cliff facing the railway, and by several shafts. From the Main shaft a depth of 665 feet is reached, the workings extending beneath the railway tracks. The operations of the mine until 1914 were regarded as being exceptionally profitable; production decreased in the next 10 years, and the mine was flooded by a cave-in in 1924. Small scale leasing operations were conducted until 1949 when Silver-Miller Mines, Limited began exploration work. A concentrator was put into operation in 1952; cobalt and less important amounts of silver being produced. In 1957 only copper was produced. Operations have since ceased at the mine and the mill has been used to treat ore from other properties of the company. The open-cut on the south side of the Silver-Miller shaft marks the site of the main LaRose vein.

The mine is located on the east side of the railway and to the north of the LaRose bridge at Mile 4.6 (see page 17).

Refs.: 45 p. 9; 46 p. 36-37; 104 p. 93-95; 127 p. 15, 25; 144 p. 213; 155 p. 689; 170 p. 147; 199 p. 79-95; 215a p. 200

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Right of Way (North) Mine

The rusty headframe at the railway tracks on the south side of the bridge off Mile 4.6 (see page 17) is that of Shaft No. 2 of the Right of Way Mine. The property consisted of a strip, 100 feet wide, straddling the T. and N.O. railway from Cobalt Lake northward to Mile 104. It was operated by Right of Way Mines Limited between 1906 and 1919, the most productive period being prior to 1909.

The mine was developed by two shafts, one (70 feet deep) opposite the LaRose Mine adit, the other below and south of the LaRose bridge; the underground workings of the latter extended to 538 feet and were used for exploration and mining of adjoining properties. The mine produced nearly 3 million ounces of silver.

Refs.: 170 p. 198-199; 199 p. 104-111.

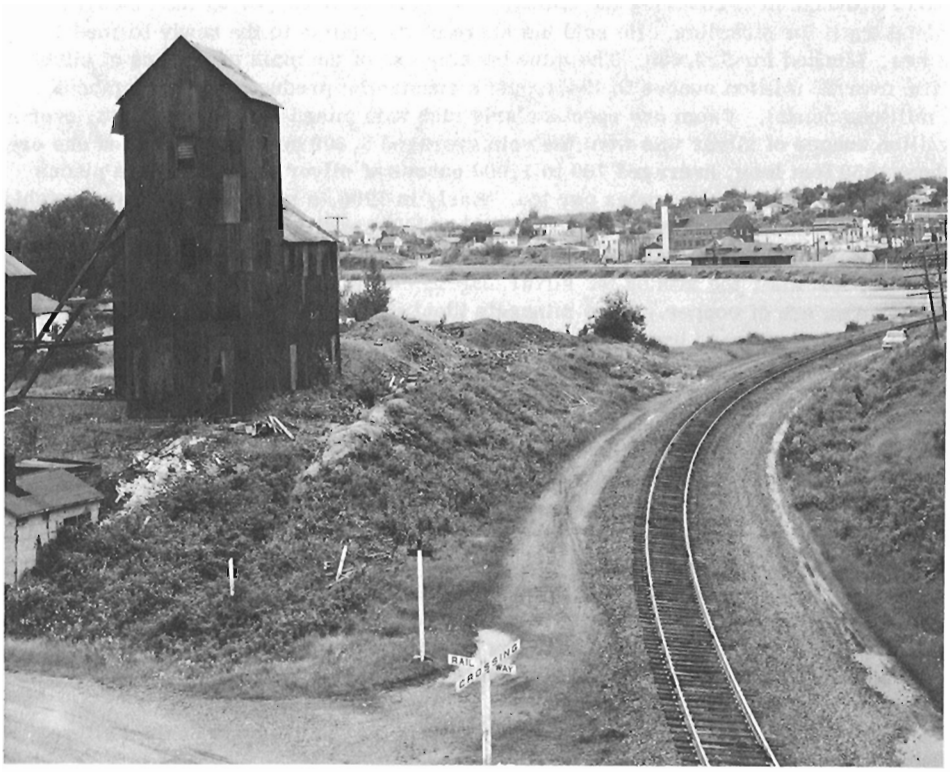


Plate VIII. Right of Way Mine and town of Cobalt. The Ontario Northland Railway (in foreground) was formerly called the Timiskaming and Northern Ontario Railway; its construction was coincidental with the discovery of the silver and gold riches of northern Ontario, many of its employees becoming part-time prospectors whose efforts were rewarded with the discovery of a number of deposits. (G.S.C. photo 161469)

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Nipissing 404 Mine

The discovery of a silver-bearing vein on this property on October 22, 1903 by Tom Hebert was the third recorded silver discovery in the Cobalt district. The discovery vein outcropped on the cliff of a 60-foot knoll at the base of which were strewn lumps of native silver fallen from the weathered vein. In 1904, Nipissing Mining Company Limited was formed to explore and develop the property; its operations were continuous until 1932. Since that date mining was carried out at intervals and the company became (in 1952) Nipissing-O'Brien Mines Limited, which was acquired in 1958 by Agnico

Mines Limited, now Agnico-Eagle Mines Limited. Chitaroni Minerals Limited has leased and worked some of the old shafts since 1964, the ore being treated at the Deer Horn Mines Limited O'Brien mill.

The mine has been worked by numerous open cuts and shafts, and by an 1800-foot adit at the shore of Cobalt Lake, just south of Shaft No. 81. The workings are in an area extending from the east side of the south half of Cobalt Lake to Peterson Lake. One of the most productive shafts (the Kendall Shaft) is located next to the McKinley-Darragh Mine; it is about 100 feet west of the Coleman Road at Mile 0.70 (see page 20), and was used to service the discovery vein. Two mills were erected on the site.

During mining operations, crystals of cobaltite measuring $\frac{1}{2}$ inch in diameter were reported to be abundant in Vein 8 (near Peterson Lake), and dyscrasite was found to be particularly abundant in Vein 19. Secondary minerals associated with the ore minerals included erythrite, annabergite, heterogenite, asbolite, and a black oxidation product of silver referred to as "buttermilk silver" by the miners. Chalcopyrite, pyrrhotite, pyrite, galena and sphalerite have also been found in the deposit.

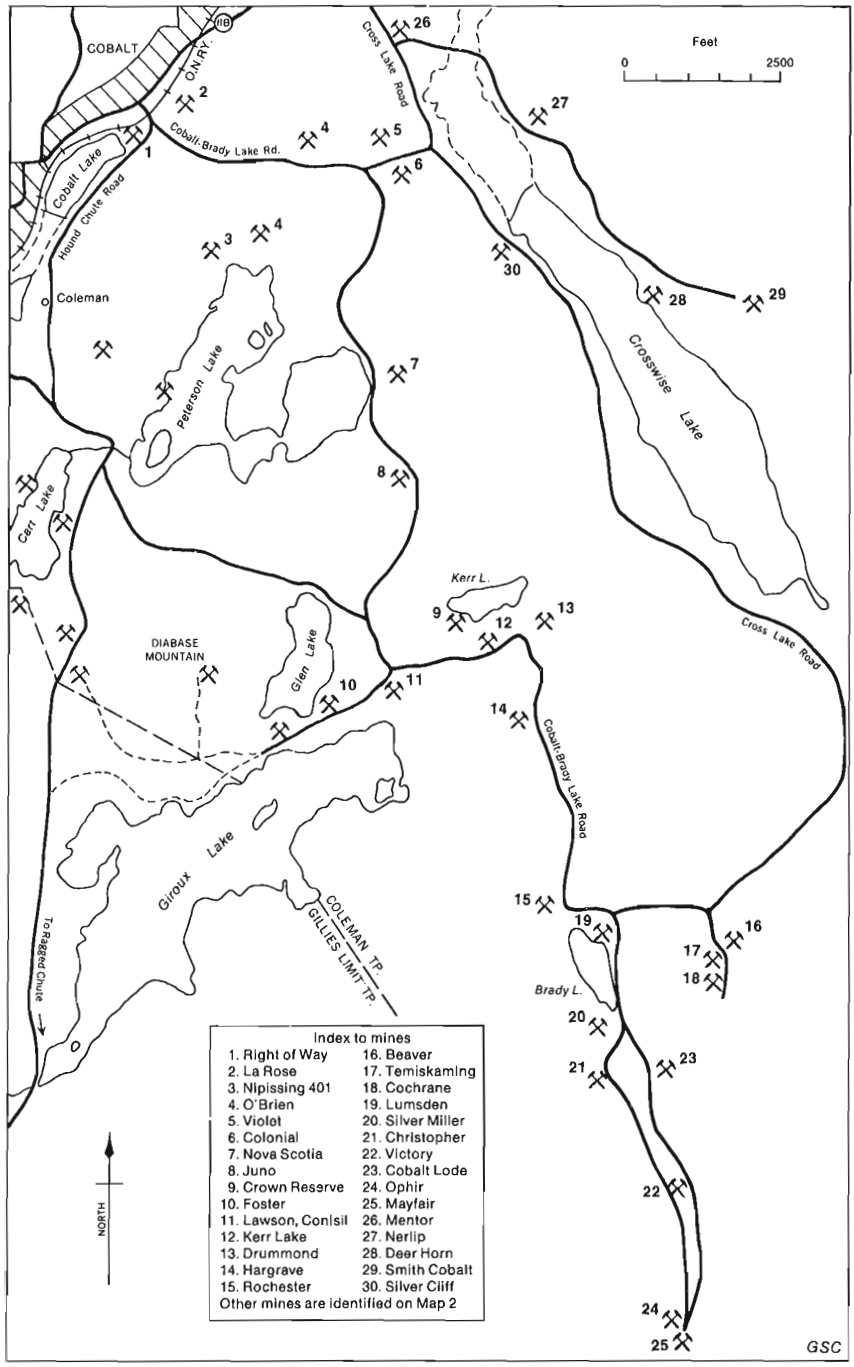
Access to the mine is via the Hound Chute Road.

Road log from Mile 4.6 on Highway 11B (see page 17):

Mile 0	Turn right (east) and proceed across LaRose bridge.
0.1	Turn-off to LaRose Mine and LaRose cabin on left.
0.15	Junction Hound Chute Road; turn right.
0.25	Turn-off (right) to Right of Way Mine.
0.55	Road on left leads the Nipissing 404 Mine shafts and mill site; to reach other workings of this mine continue straight ahead.
0.65	Shaft No. 2 is at base of ridge on right.
0.75	Shaft No. 81 is on right.
1.0	Road on left leads to several shafts on Nipissing Hill, and continues east to Peterson Lake and Shafts 12 and 8.
1.2	Junction Coleman Road. To reach the Kendall shaft, turn left and proceed 0.25 mile to the mine on left side of road.

Refs.: 45 p. 9-10; 104 p. 44, 57-62; 155 p. 689; 157 p. 123; 158 p. 125; 160 p. 132, 134; 161 p. 104-105, 106; 200 p. 73-87

Maps (T): 31 M/5E
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1 mile)



Map 3. Brady Lake Road, Cross Lake Road.

Road log to mines along the Cobalt-Brady Lake road (Descriptions of the mines follow the road log.):

Mile 0	Highway 11B at turn-off to LaRose bridge; proceed across bridge.
0.1	Turn-off (left) to LaRose Mine.
0.15	Junction Hound Chute Road; continue straight ahead.
0.2	Trench and small dumps of the old Chambers-Ferland (Aladdin) Mine, a former silver-cobalt producer.
0.25	Turn-off (right) to Nipissing 401 Mine.
0.4	Turn-off (right) to O'Brien Mine (Shaft 33).
0.5	Turn-off (left) to O'Brien Mine (main workings).
0.75	Junction Cross Lake Road. Road on left leads to the Violet Mine and to mines at Cross (Crosswise) Lake (see page 52).
0.9	Turn-off (left) to Colonial Mine.
1.5	Nova Scotia Mine on left, Peterson Lake on right.
1.9	Juno Mine on right.
2.4	Junction; road to Glen Lake on right. Continue straight ahead.
2.5	Turn-off (left) to Crown Reserve Mine.
2.55	Junction; road on right leads to Foster Mine. Dump at junction is that of the Lawson Mine.
2.65	Trench (on left) is the site of an extremely rich silver-bearing vein mined in the early days; it was referred to as the "Silver Sidewalk", and was part of the Lawson Mine. It is 18 feet deep.
2.8	Turn-off (right and left) to Kerr Lake Mine.
3.0	Turn-off (left) to Drummond Mine.
3.1	Hargrave Mine.
3.9	Turn-off (right) to Rochester Mine.
4.1	Junction; road on left leads to Beaver, Timiskaming, and Cochrane mines.
4.15	Lumsden Mine on right.
4.25	Turn-off (left) to the Silver-Miller Brady Lake mill-site.

4.45 Junction at south end of Brady Lake; road on right leads to the Silver-Miller Mine, Christopher Mine, and Victory Mine, and the road on left leads to the Cobalt Lode Mine. Both roads lead to the Ophir Mine and the Mayfair Mine.

Nipissing 401 Mine

This property, operated until 1932 by Nipissing Mines Company, Limited, is located immediately north of the company's 404 claim and was one of their highly productive claims. It was worked from three shafts, one near the east side of Cobalt Lake and two south of the Cobalt-Brady Lake Road. Access to the latter is by a single-lane road leading south from Mile 0.25 on the Cobalt-Brady Lake Road; Shaft 127 is on the west side of the access road at a point 0.1 mile from the Cobalt-Brady Lake Road, and Shaft 10 is 0.15 mile further south. The property now belongs to Agnico-Eagle Mines Limited.

Some of the silver was obtained by scraping, with a putty-knife, the black secondary silver that formed a coating on fracture surfaces; this ore assayed up to about 1000 ounces of silver per ton and was referred to as "buttermilk silver" by the miners.

Ref.: 199 p. 95-104

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1000 feet)

O'Brien Mine

This mine was the longest continuously operated mine in the Cobalt area. Operations commenced in 1905 by M.J. O'Brien, Limited, two years after the discovery of the silver-bearing vein by Neil King who was employed in the construction of the railway; the Main shaft was sunk on the discovery vein. Except for an interruption of two years (1905-1907) due to litigation proceedings, the operations were unbroken until 1937. Intermittent operations by leasing were conducted until 1952 when the company became amalgamated with Nipissing Mines Company Limited, and became Nipissing-O'Brien Mines Limited; mining continued until 1958 when the property was acquired by Agnico Mines Limited. The mine was worked by Agnico until 1967. It consists of several shafts with the Main Shaft reaching a depth of 345 feet.

This was regarded as one of the great mines of the Cobalt camp. Most of its production was silver (in the order of about 40 million ounces) with an important amount of cobalt and some nickel and copper. Galena, chalcopyrite, pyrite, and nickeline occur in calcite in the mine dumps; the calcite fluoresces a vivid pink when exposed to ultra-violet rays, the "short" rays being more effective than the "long". Some epidote occurs in the calcite. Uncommon minerals that have been reported from the deposit include stromeyerite, wittichenite, and a mineral belonging to the polybasite-pearceite series. Crystals of galena (octahedrons $2\frac{1}{2}$ inches across), of cobaltite, and of polybasite have also been reported.

Most of the workings are located north of the Cobalt-Brady Lake Road and are accessible via the road leading north from Mile 0.5; Shaft 33 is 0.2 mile south by road from Mile 0.4.

Refs.: 45 p. 10; 49 p. 208, 227, 234-236; 104 p. 121-128; 144 p. 206, 207, 208; 160 p. 130-131; 199 p. 58-66

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Violet Mine

This former silver producer lies immediately east of the O'Brien Mine; one of its shafts that had been worked since 1917 became the property of O'Brien Mines Limited in 1922 as a result of a lawsuit. The deposit was discovered in 1905 by a Mr. Handy and was initially worked by Violet Mining Company. From about 1908 until 1925, LaRose Consolidated Mines Limited operated the mine and sank a new shaft in 1922 following the loss of one of its shafts in litigation proceedings. There was additional production in 1951-52 by Silanco Mining and Refining Company Limited, and in 1963-64 by Agnico Mines Limited.

The New Violet Shaft is on the north side of the road leading east from Mile 0.75 on the Cobalt-Brady Lake Road, at a point 0.1 mile from the junction; the Violet-O'Brien shaft is higher up the ridge, about 150 yards northwest of the New Violet shaft.

Refs.: 156 p. 121; 157 p. 119; 199 p. 19-27

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Colonial Mine

About $1\frac{1}{4}$ million ounces of silver and a small amount of cobalt were produced from this mine between 1907 and 1937. The deposit, discovered in 1904 by Murdoch (Murty) McLeod and George Glendenning, was originally worked by the Colonial Mining Company Limited (1906-1914), and later (1922-1926) by Menago Mining Company Limited. Subsequent small yields were obtained by various companies including Silanco Mining and Refining Company, Limited (1950-1954). The mill, erected in 1909, continued to operate for some years after 1954 by Coballoy Mines and Refiners Limited.

The workings, consisting of several open cuts, adits and shafts, and the mill-site are located on the north side of a ridge. The underground workings from one shaft reach a depth of 1,080 feet, about the deepest of any mine in Cobalt. The most productive veins were, however, mined from the adits.

The mine is situated on the north side of the Cobalt-Brady Lake Road at Mile 0.9.

Refs.: 57 p. 32; 199 p. 33-44

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Nova Scotia Mine

One of the earliest openings on this property was an open cut in a spectacular surface vein showing native silver in place for 60 to 75 feet. In other veins and in diabase, leaf silver was commonly encountered during mining operations. The deposit which produced about a million ounces of silver, approximately 100,000 ounces of cobalt and a little gold, was worked by several shafts (deepest being 250 feet) and open cuts; it was discovered in 1904 by J.B. Woodworth and Murdoch McLeod. The original operator, from 1906 to 1912, was Nova Scotia Silver-Cobalt Mining Company Limited; it erected a concentrating mill which was later used to treat ores from other mines. After 1912, the mine was worked intermittently by other operators until about 1957.

Associated with the silver and cobalt minerals were galena, chalcopyrite, and pyrite. Specimens encrusted with secondary minerals are found on the dumps; these minerals include yellowish brown earthy jarosite, bright green brochantite and paratacamite, and erythrite. Specimens of white calcite from the dumps fluoresce pink when exposed to "long" ultraviolet rays.

The mine is located at Mile 1.5 on the Cobalt-Brady Lake Road.

Refs.: 45 p. 13, 59, 60; 57 p. 25, 32; 200 p. 38-44

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Juno Mine

The Juno (Reliance) Mine, at Mile 1.9 on the Cobalt-Brady Lake Road, yielded about 46,000 ounces of silver between 1918 and 1922. Production was from a 227-foot shaft. The early work was done by various companies; between 1952 and 1955, Juno Metals Corporation worked the mine.

Minerals associated with the ore minerals included galena, chalcopyrite, sphalerite, and pyrite. Amphibole asbestos has been reported.

Ref.: 200 p. 47-51

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Crown Reserve Mine

This was one of the largest silver producers in the district; from 1908 until 1948, about 20,325,000 ounces of silver and over 33,000 pounds of cobalt were won. An outstanding vein — the Carson vein — yielded 9,100,000 ounces of high grade silver ore from a section that was 286 feet long and 150 feet deep for an average of 217 ounces of silver per square foot of vein area; one part of the vein was 33 inches wide and contained approximately 12,000 ounces of silver per ton. Three other veins produced over 2 million ounces of silver.

Since the deposit was located beneath the bed of Kerr Lake, lowering and subsequently dewatering of the lake were necessary prior to mining operations; the dewatering was accomplished from 1913 to 1915 in a joint venture by Crown Reserve Mining Company Limited, owner of the property, and by Kerr Lake Mining Company Limited, which owned the adjoining property to the south. Mining began in 1908 by the Crown Reserve Company on the Carson vein at the western end of the claim; the vein extended into the adjoining Silver Leaf property where it was discovered in 1907. The Crown Reserve Company worked its property until 1921 and leased and operated the Silver Leaf mine from 1909 until 1919. Spasmodic operations by various companies were conducted until 1955 after which the lake was allowed to flood. Between 1967 and 1970, Hiho Silver Mines Limited drained the lake and kept it dewatered in order to rework the dumps of the Crown Reserve Mine and those of the Kerr Lake Mine, both of which rested on the bed of the lake. The mine consists of two shafts whose underground workings reach depths of 460 and 800 feet respectively.

The mine is located north of the Cobalt-Brady Lake Road, and the turn-off to it is at Mile 2.5.

Refs.: 45 p. 24-26; 104 p. 101-113; 120 p. 97; 160 p. 138-139; 161 p. 110; 162 p. 110-111; 201 p. 39-44, 51

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Foster Mine

Native silver and smaltite were the chief ore minerals at this mine; base metal minerals including sphalerite, galena, chalcopyrite with pyrite and pyrrhotite were associated with the silver minerals. Several uncommon minerals have been reported from the deposit; they occur as microscopic intergrowths with other metallic minerals. Included are chalcocite, stromeyerite, bornite, polybasite, mckinstryite and larosite. The latter two minerals are new ones first identified from this mine.

The silver-bearing vein was discovered on this property in 1905 by Albert Foster and his son Clement; the latter was a mining engineer and one of the first from outside the Cobalt district to prospect the area. He began prospecting there in 1904. The Foster Cobalt Mining Company Limited began mining operations in 1906, and from 1909 until 1953 the property was leased and worked intermittently by several companies. In 1951, exploration was directed to the search for base metal minerals and a mill was

erected to treat the ore; results proved to be uneconomic and the project was abandoned in 1952. The property was acquired in 1953 by Cobalt Consolidated Mining Corporation Limited which in 1957 was reorganized and re-named Agnico Mines Limited; the mine was operated until 1960.

Since 1957, a mill known as the Penn Mill, has operated for treatment of silver-cobalt-nickel ores from several mines in the area; it has the largest capacity of any mill in the Cobalt area.

The Foster mine produced a little over one million ounces of silver, nearly half a million pounds of cobalt, and some nickel and copper. The production was obtained between 1951 and 1956. The main shaft is 225 feet deep and nearly all the production was from it. Several other shafts and an adit were used in the early days.

The mine is located between Glen and Giroux lakes, about 0.2 mile from the turn-off at Mile 2.55 on the Cobalt-Brady Lake Road.

Refs.: 45 p. 13; 96 p. 111-112; 144 p. 201, 203-209; 170 p. 132-133; 201 p. 64-73

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Lawson Mine, Conisil Mine

The Lawson Mine included the extremely rich silver-bearing vein referred to as the "Silver Sidewalk", now marked by an open cut on the north side of the Cobalt-Brady Lake Road at Mile 2.65; it was discovered in 1904 by Murdoch McLeod, a member of a prospecting syndicate whose other members were John McLeod, Donald Crawford and Thomas Crawford. When the claim was sold by one of the members for $250.00 to H.S. Lawson, court action to prevent the sale for such a small sum was instigated and four years later the property was taken over by the LaRose Consolidated Mines Company. Other rich veins were discovered south of the road and the mine was known as the Lawson Mine. It was worked for silver continuously from 1909 until 1917, and for silver and cobalt intermittently after that. In 1953, Silver-Miller Mines Limited acquired the property and conducted mining principally for cobalt until 1962. The ore was treated at the company's LaRose mill.

The workings consist of several shafts and open cuts; one shaft was sunk north of the open cut that marks the "Silver Sidewalk" vein, but the more important shafts are south and west of the turn-off (Mile 2.55 on the Cobalt-Brady Lake Road) to the Foster Mine. The most recently used shaft (No. 8) is 400 feet deep.

The Conisil Mine, on the east shore of Giroux Lake and about 500 yards south of the Lawson Mine, was operated by Silver-Miller Mines Limited from 1959 until 1967: both mines were later leased and worked by Hiho Silver Mines Limited. The underground workings of the Conisil Mine extended to those of the Lawson Mine. The main shaft, at the shore of the lake, is 625 feet deep; there are 5 adits adjacent to it, and one shaft was put down on Island 22 at the northeastern end of Giroux Lake. The deposit was formerly worked by Conisil Mines Limited (1946-1959) and, in the early days, by

Giant Silver Nugget Mines Limited. The property is also known as the Nugget claim because numerous silver nuggets were found in the overburden when it was originally prospected; the nuggets consisted of native silver with some metallic and gangue minerals.

A large nugget measuring 5 feet 5 inches by 2 feet 5 inches by 1 foot 6 inches and weighing 1,640 pounds was found while the Gem claim to the south was being prospected. It contained an estimated 9,715 ounces of native silver that occurred as plates forming masses and a filigree network in greywacke. It is believed to have been transported by glaciers from the Kerr Lake veins. The Ontario Department of Lands, Forests and Mines purchased the specimen for exhibition purposes.

Base metal mineralization (galena, chalcopyrite, sphalerite, and pyrrhotite) was encountered during mining operations at both mines. Native arsenic has been reported from the Conisil Mine, and loellingite from the Lawson Mine.

Refs.: 45 p. 12-13, 37; 57 p. 30-32; 62 p. 21-22; 98 p. 138-140; 104 p. 99-100, 330; 142 p. 164; 146 p. 129; 156 p. 141-142; 160 p. 145; 170 p. 120-121; 201 p. 55-63

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Kerr Lake (Jacobs) Mine

This mine was one of the great producers of the Cobalt camp; from 1905 until 1948 its yield was 28½ million ounces of silver and about 650,000 pounds of cobalt. The workings are located on both sides of the Cobalt-Brady Lake Road, those on the north side being the most extensive and productive. The northern part of the deposit lay beneath Kerr Lake, and the silver-bearing veins extended into the adjoining Crown Reserve property; the dewatering of the lake enabled mining of the veins. The orebody contained chalcopyrite, galena, sphalerite, pyrrhotite and pyrite in addition to the silver and cobalt minerals.

The discovery of an argentiferous vein on the shore of Kerr Lake in 1904 by N.C. Wright marked the second such discovery in the Kerr Lake area. The claim was sold to J.A. Jacobs of Montreal for $36,000.00 which was recovered in the first carload of ore shipped from the mine. In 1905, Kerr Lake Mining Company acquired the property and mined it until 1928. Reports indicate that for the first fifteen years of operations, mining was phenomenally successful and the mine had the distinction of shipping the highest average grade of ore of any mine then in operation. After 1928, intermittent mining was conducted by a number of companies including Cobalt Consolidated Mining Corporation Limited (1953-1956) which produced nickel, copper, and some gold in addition to silver and cobalt. More recently (1967-1970) Hiho Silver Mines Limited reworked the dumps, shipping the ore to the LaRose mill.

The mine workings consist of a number of shafts, most of them shallow. Shaft No. 13 (140 feet deep) is about 400 feet south of the Cobalt-Brady Lake Road at Mile 2.8 and Shaft No. 7 is about 180 feet north of this point. Most of the other openings and dumps on the north side of the road have been flooded by the lake.

Refs.: 45 p. 12, 32; 104 p. 87-92; 201 p. 45-50

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Drummond Mine

This deposit was discovered by M. P. Wright a few days before his brother discovered the silver-bearing vein at the Kerr Lake property. It was staked for the poet, W. H. Drummond and associates.

The mine was operated by Drummond Mines Limited from 1904 to 1913, by Cobalt Comet Mines Limited from 1913 to 1915, and by Kerr Lake Mines Limited from 1915 to 1917. It produced nearly 4 million ounces of silver and close to 250,000 pounds of cobalt. During mining operations, sheets of native silver were found in the ore. Chalcopyrite, galena, sphalerite, and pyrite have been reported from the deposit, along with smaltite and native silver. Specimens of pink calcite with vugs lined with "micro" crystals of quartz and calcite were found on the dumps.

The mine consisted of an open pit, several open cuts and shafts. The turn-off is at Mile 3.0 on the Cobalt-Brady Lake Road.

Refs.: 45 p. 12; 104 p. 158; 170 p. 128-129; 201 p. 27, 30

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, northeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Hargrave Mine

This mine is one of the smaller producers, having yielded about half a million ounces of silver; it is located at Mile 3.1 on the Cobalt-Brady Lake Road.

The mine was operated between 1908 and 1918 by Hargrave Silver Mines Limited, and other companies were involved in small-scale operations since that time. There are 2 shafts near the road.

Ref.: 201 p. 36-39

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Rochester Mine

The Rochester Mine was originally worked by Rochester-Cobalt Mines Limited in about 1909 but operations were unprofitable and the work was abandoned. Between 1917 and 1947 small-scale operations were conducted by various individuals. Only about 15,000 ounces of silver were produced from the mine.

Two shallow shafts, an open cut, and small dumps are located on the west side of the Cobalt-Brady Lake Road at Mile 3.9. This property and claims to the south were acquired in 1947 by Silver-Miller Mines Limited.

Refs.: 170 p. 92-93; 202 p. 38, 39, 44, 48, 51

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Beaver Mine

The Beaver Mine, originally worked between 1907 and 1924 by Beaver Consolidated Mines Limited, produced (to 1940) about 7 million ounces of silver, 139,000 pounds of cobalt, and some nickel. Its most productive period was prior to 1920.

The underground workings from the main shaft reached a depth of 1,675 feet, the deepest workings in the Cobalt area; a vein at the 1600-foot level contained native silver (40,000 to 50,000 ounces of silver was obtained from it) and abundant leaf silver in the wall-rock. Porphyritic rock containing amphibole phenocrysts was associated with the deposit. After 1924, mining was at a reduced scale. In 1955, the property was acquired by Agnico Mines Limited.

The road log to the mine is given in that of the Timiskaming Mine (see page 48).

Refs.: 104 p. 145-152; 202 p. 13-20

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Timiskaming Mine

The vein system at this deposit is the same as that at the Beaver Mine immediately to the north. The surface showings revealed smaltite and nickeline but little or no silver mineralization; persistent exploration at depth was rewarded with the discovery of rich silver-bearing veins. From the 499-foot level, a 25-ton carload of ore containing 202,806 ounces of silver was shipped in 1912; this was the richest per ton car lot shipped from Cobalt to that time. Production began in 1907, and until 1963, about 12 million ounces of silver and 200,000 pounds of cobalt were obtained. In 1912, 16,037 pounds of copper were recovered making this the first production of an economic amount of that metal in the Cobalt area.

The deposit was discovered in 1906 by a syndicate composed of Charles A. Richardson, R.A. Cartwright, J.L. Wheeler and B.E. Cartwright. The discovery vein contained smaltite and erythrite but little or no silver. Only when a depth of 80 feet was reached, did the owners strike silver ore, and "were astonished to find some 15 inches wide of solid metal glistening before them with native silver sticking out all over it" (Ref. 55 p. 136). The following day, May 18th, 1907, a large block of this ore was displayed in Cobalt where it caused great excitement "because its discovery under such apparently disadvantageous geological conditions had all along been so little expected". (Ref. 55 p. 136).

Mining of the deposit was conducted by The Timiskaming Mining Company, Limited, until 1920. A concentrating mill was installed on the site in 1908. The main shaft reached a depth of 1,600 feet and two other shafts were sunk to depths of 40 and 250 feet respectively. Since 1920, several companies have from time to time worked the deposit. In 1955, Agnico Mines Limited acquired the property.

Road log from the Cobalt-Brady Lake Road at Mile 4.1 (see page 39):

Mile 0 — At junction, turn left (east).

0.3 — Junction. Single-lane road on left leads 0.2 mile to the Fisher-Eplett Mine which was worked for a short time in the early days of the camp. To reach the Beaver and Timiskaming mines, continue straight ahead on main road.

0.35 — Turn-off (left) to Beaver Mine.

0.45 — Timiskaming Mine.

Refs.: 45 p. 77; 55 p. 135-138; 104 p. 128-134, 138-140; 153 p. 134-138; 170 p. 210-211; 201 p. 20-23; 202 p. 21-28

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Cochrane Mine

The Cochrane Mine, which adjoins the Timiskaming Mine, has produced a very small amount of silver and cobalt. Most of the production was obtained in 1914 by Cochrane Mines of Cobalt Limited from veins serviced by a shaft located 0.3 mile south (by road) of the Timiskaming Mine. Since that time, numerous companies have been engaged in exploring and mining the property, but only small shipments of silver and cobalt were made.

Ref.: 202 p. 28-31

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Lumsden Mine

This mine was a very small producer (about 20,000 ounces of silver and some cobalt), but exploration from its underground workings from 1947 until 1949 by Silver-Miller Mines Limited led to the discovery of prolific silver-bearing veins beneath Brady Lake; these veins were later mined from a shaft near the south end of the lake on Silver-Miller Mines Limited property.

The Lumsden Mining Company Limited was the original operator of the deposit from about 1910 to 1920. Other companies were later involved in prospecting and exploration but no important silver deposits were disclosed.

The mine is on the northeast side of Brady Lake and on the west side of the Cobalt-Brady Lake Road at Mile 4.15 (see page 39).

Ref.: 202 p. 38-40, 45

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Silver-Miller (Pan Silver) Mine

Underground exploration by Silver-Miller Mines Limited in 1947 from the old Lumsden Mine resulted in the discovery of rich silver ore beneath Brady Lake; news of the discovery sparked hopes among miners in the Cobalt area of other discoveries in formerly active mines, and new ore-bearing veins were found when exploration of old deposits was renewed.

The Lumsden shaft continued to be used by the company until 1949 when operations shifted to the old Pan Silver shaft (south side of Brady Lake) which it deepened from 200 to 629 feet and renamed Silver-Miller No. 4 shaft. The ore from the newly discovered vein system was exhausted in 1952, and production was obtained from other veins until 1960. The shaft has since been used by Agnico Mines Limited to work the adjoining Christopher property. Total production from the Brady Lake property in the period 1947 to 1957 was 7,380,000 ounces of silver, about 180,000 pounds of cobalt, and some nickel and copper. The ore was milled at the company's Brady Lake mill from 1949 to 1957 and subsequently at its LaRose mill.

The original work on the property was performed by Coleman Development Company Limited and by Pan Silver Mining Company Limited; the latter put down two shafts prior to 1909. In the interval to 1947, little work was done on the property.

The gangue minerals are quartz and calcite and cavities in the gangue are lined with "micro" crystals of quartz. Associated with the calcite in the dump of a small shaft at the side of the road leading south from the main shaft is red feldspar with epidote and small amounts of galena, sphalerite and chalcopyrite; the locality is approximately 350 feet from the Silver-Miller Mine.

Road log from Mile 4.45 on the Cobalt-Brady Lake Road (see page 40):

Mile 0 Turn right (southwest) at the junction.

0.05 Silver-Miller Shaft No. 4 on right and old Pan Silver shaft on left.

0.1 Shaft and dump on right. (Epidote-feldspar occurrence.)

Refs.: 45 p. 81-82; 202 p. 38-51; 208 p. 31

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Christopher Mine

Native silver in leaf and wire forms was at one time found in this deposit. Occurring with the silver and with the cobalt minerals in calcite-quartz gangue were pyrrhotite, sphalerite, chalcopyrite, pyrite, nickeline, galena and magnetite. Minerals that were found less commonly include ruby silver, native bismuth, tetrahedrite and argentite. The rare minerals xanthoconite and djurleite have been reported from the deposit. Octahedral crystals of cobaltite measuring about $\frac{1}{4}$ inch in diameter have been found in vugs in quartz-calcite veins; galena, sphalerite, chalcopyrite, pyrite, native bismuth and cosalite were associated with the crystals. Small yellow apatite crystals measuring up to 1/8 inch long were also reported from the vugs that contained the cobaltite crystals. Other minerals reported from the deposit are epidote and axinite associated with chalcopyrite in calcite, and a red yttrium silicate that was found as 1/8-inch fragments in calcite.

The deposit was originally worked in 1905. Columbus Cobalt Silver Company Limited put down the first shaft on the deposit. Another shaft was sunk in 1915 but no important ore was located. In 1950, Christopher Silver Mines Limited explored the deposit from one of the existing shafts, and from 1954 until 1966, Agnico Mines Limited was involved in its exploration and mining. The mine has produced (to the end of 1958) about $1\frac{1}{2}$ million ounces of silver as well as some cobalt, nickel and copper. Production was obtained from three shafts: from the Silver-Miller No. 4 shaft, the Christopher No. 2 shaft (415 feet deep), and from the Cobalt Lode shaft. The underground workings of the Cobalt Lode shaft are connected with those of the Christopher shaft.

Access is via the road leading to the Silver-Miller mine. From its Shaft No. 4, the road continues for 250 yards to a junction; follow the road on right for about 100 yards to the Christopher Mine. One of the original Columbus shafts is located 500 feet farther west.

Refs.: 49 p. 221; 118 p. 71, 75-77; 127 p. 28-30; 144 p. 213; 146 p. 132, 133; 159 p. 141; 202 p. 68-79

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Victory Mine

This mine, also known as the Consolidated Silver Banner Mine, was a minor producer of silver and cobalt. Numerous companies were involved in its operation including Victory Silver Mining Company (1921-1926), Consolidated Silver Banner Mines Limited (1950-1954), Silver Crater Mines Limited (1954-1956), and Amerigo Silver Mines Limited (1963-1965). The shaft is 618 feet deep. A small amount of silver was produced in 1964.

The silver-bearing minerals – native silver, argentite and ruby silver – were found in very small high-grade pockets. Leaf silver was also present. Other minerals associated with the deposit included native bismuth, native copper (as films), marcasite, chalcopyrite, siderite, skutterudite, cobaltite and actinolite.

Road log from Mile 4.45 in the Cobalt-Brady Lake Road (see page 40):

Mile 0 Turn right (west) at junction.

0.05 Silver-Miller Mine.

0.15 Turn-off (right) to Christopher Mine, Columbus Mine.

0.6 Victory Mine.

Refs.: 170 p. 122-123; 202 p. 57-68

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Cobalt Lode Mine

About forty years after its discovery, this deposit became an important producer of silver and cobalt, and a minor producer of nickel and copper. The sulphides – pyrite, pyrrhotite, galena, sphalerite, and chalcopyrite – occurred in the deposit along with the silver-cobalt-nickel mineralization. The lava contained bands of epidote associated with feldspar.

The deposit was originally worked by Pan Silver Mining Company in 1908, but only minor production was obtained until 1950 when Cobalt Lode Silver Mines Limited began mining newly discovered high grade silver ore. Production continued until 1957 and totalled nearly $4\frac{1}{2}$ million ounces of silver, 330,000 pounds of cobalt, and some nickel and copper. The production shaft is 622 feet deep and was used from 1954 until 1966 to mine some of the veins on the Christopher property.

The mine is on the east side of the road leading south from Mile 4.45 on the Cobalt-Brady Lake Road and 0.2 mile south of Mile 4.45 (see page 40).

Refs.: 170 p. 108-109; 202 p. 51-57

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Ophir Mine, Mayfair Mine

Some of the veins in these old mines produced only cobalt, others produced cobalt and silver; the production of both metals was small. Native bismuth has been reported from both mines; native silver was found at the Ophir Mine, and bog silver at the Mayfair Mine. The vein system of the Ophir property extends south into the Mayfair Mine; their underground workings are connected and the Mayfair shaft was used to mine the Ophir deposit.

Both mines were originally worked in 1910, one by Ophir Cobalt Mines, Limited, the other (Mayfair Mine) by Peoples' Silver Mines. Several companies were involved in exploration and mining since the early days, but the production (silver and cobalt) was small. The most recent work was done at the Mayfair Mine by Mayfair Mines Limited (1945-1946) and Silvermaque Mining Limited (1961-1962), and at the Ophir Mine by Silver Crater Mines Limited (1952-1957), the latter using the Mayfair shaft to work the Ophir veins.

The main shafts of the two mines are 400 feet apart, the Ophir being north of the Mayfair. Access is by the road leading south from the Victory Mine, or by the road leading south from the junction at the south end of Brady Lake. The mines are 0.3 mile from the Victory Mine and 0.9 mile from the junction at Mile 4.45 (see page 40) on the Cobalt-Brady Lake Road.

Refs.: 97 p. 128; 98 p. 137-138; 198 p. 27-41

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, southeastern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Road log to mines along Cross Lake Road (Descriptions of the mines follow the road log):

Mile 0	Junction Highway 11B and Cross Lake Road (Mile 5.4 on Highway 11B, page 17); proceed onto Cross Lake Road.
0.1	Nipissing mill on right.
0.2	Junction. Mentor Mine is on left. Road on left leads to the Nerlip Mine, Deer Horn Mine, and Smith Cobalt Mine. Road log continues straight ahead.
0.5	Junction; road on left leads to the Silver Cliff Mine. Road log continues along road on right.

0.6 Colonial Mine on left.

0.65 Violet Mine on right.

0.75 Junction Cobalt-Brady Lake Road (see page 39).

Mentor Mine

A 400-foot shaft was sunk on this property by Mentor Exploration and Development Company Limited in 1962. Twenty years earlier, Sycee Cobalt Silver Mines Limited explored the veins from the adjacent Nipissing 402 shaft.

There was no production from the deposit. The head-frame and small dumps are located on the north side of the junction at Mile 0.2 on the Cross Lake Road.

Refs.: 170 p. 260; 204 p. 198

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Nerlip Mine

The Nerlip Mine produced a small amount of cobalt and nickel, and some silver in the early 1940's. The property was prospected vigorously in the 1930's when the rich deposit at the adjoining Deer Horn (Cross Lake O'Brien) property became known. In 1931, a shaft was sunk to 90 feet by J.C. O'Donald and A.B. Pilliner. Most of the work, however, including deepening the shaft (to 760 feet), was done by Nerlip Mines Limited between 1936 and 1943. It was leased and worked by Augener Mines Limited in 1944-1945.

The mine is located on a ridge overlooking Cross (Crosswise) Lake. The headframe, some buildings and rock dumps remain on the site. The turn-off to the mine is 0.6 mile from the junction at Mile 0.2 on the Cross Lake Road (see page 52).

Ref.: 199 p. 11-17

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Deer Horn (Cross Lake O'Brien) Mine

The Deer Horn Mine ranks among the great producers of the Cobalt camp; prior to 1951, its yield was 19 million ounces of silver, and between 1960 and 1969 another 3 million ounces was won. The mine also produced about 700,000 pounds of cobalt and some nickel and copper.

The property was originally staked in 1907, but the rich silver-bearing veins were discovered later (in 1923) by M. J. O'Brien Limited which mined the deposit until 1940. Subsequently, the mine was operated by Cross Lake Lease (1940-1942), by Shag Silver Mines Limited (1949-1953), and finally by Deer Horn Mines Limited (1959-1969). The underground workings extend to a depth of 1,020 feet. The mine is located on a steep-sided ridge overlooking Cross Lake which occupies a northwest-trending fault several miles long.

Minerals common to the Cobalt deposits have been reported from this mine; included are loellingite, skutterudite, cobaltite, rammelsbergite, native silver, chalcopyrite, safflorite, tetrahedrite, arsenopyrite, chloanthite, nickeline, smaltite, breithauptite, gersdorffite, argentite, pyrite, pyrargyrite, galena, sphalerite (dark brown), pyrrhotite, and marcasite. Ullmannite, allargentum, and dyscrasite have also been identified. Nodules of pyrite measuring an inch in diameter and coated with gypsum and goethite were found in the dumps. Colourless to white calcite, also found on the dumps, fluoresces bright pink when exposed to "short" ultraviolet rays.

The turn-off to the mine is 1.1 miles from the junction at Mile 0.2 on the Cross Lake Road (see page 52). The headframe and mine buildings remain at the site.

Refs.: 141 p. 193-194; 142 p. 185; 160 p. 107-108; 170 p. 124-125; 200 p. 15-22; 251 p. 106; 255 p. 111

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Smith Cobalt Mine

This mine has produced a very small amount of cobalt. It was operated in 1934-1935 and in 1940 by Smith Cobalt Mines Limited; a shaft, from which underground workings extended to a depth of 500 feet, was used. Cobalt and some silver, nickel and copper mineralization was present.

Road log from the junction at Mile 2.2 on the Cross Lake Road (see page 52):

Mile 0	From junction at Mentor Mine, proceed along road on left.
0.6	Turn-off (left) to Nerlip Mine.
1.15	Turn-off (right) to Deer Horn Mine. The road becomes narrow at this point.
1.3	Junction; turn left (right fork leads to an old shaft on the Deer Horn property.
1.45	Deer Horn Mine.

Refs.: 170 p. 208-209; 200 p. 6-11

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Silver Cliff Mine

Heavy leaf silver was found in the wall-rock when this property was originally being explored. Between 1908 and 1954, the mine produced about half a million ounces of silver and approximately 15,000 pounds of nickel, 9,000 pounds of cobalt, and 6,000 pounds of copper. The production came from Adit No. 2 located on the south side of the mill. Other workings include a 160-foot shaft (opposite the mill) and two adits. The underground workings of the Colonial Mine to the west and of the King Edward Mine to the south were used to explore the Silver Cliff property.

Underground development of the property began in about 1907 by Silver Cliff Mining Company Limited. By 1911, two adits were driven, the shaft was put down, and a mill installed. After that date, various companies conducted operations spasmodically. The mill was reconditioned in the 1940's by A.B. Pilliner and associates, and has since been used to treat ore from the Silver Cliff and from other properties.

The mine and mill are located at the northwestern end of Cross Lake and 0.3 mile from Mile 0.5 on the Cross Lake Road (see page 52).

Refs.: 45 p. 93; 170 p. 202-204; 199 p. 44-52.

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Road log to mines along Highway 567 (Descriptions of the mines follow the road log):

Mile 0	Junction Highway 11B and Highway 567 in North Cobalt; proceed onto Highway 567.
1.35	Junction; road on right leads to Harrison-Hibbert Mine and Ruby Mine. The Hunter Cobalt Mine is opposite junction.
1.5	Turn-off (right) to Green-Meehan Mine and Red Rock Mine.
1.6	Turn-off (left) to Cobalt Contact Mine.
1.95	Turn-off (left) to Agaunico Mine and to Bucke Township Park.
5.0	Martineau Bay, Lake Timiskaming on left.
13.0	Turn-off (left) to Timiskaming Mission Historic Site. A plaque marks the site on the shore of Lake Timiskaming where a mission was established in 1863. The site is 2.2 miles from Highway 567.

Plate IX.

Silver Cliff Mine and mill on shore of Cross (Crosswise) Lake as seen from the Deer Horn Mine. Ridge behind the mine is composed of Nipissing diabase and volcanic rocks. (G.S.C. photo 161462)

Mile 16.6 Turn-off (left) to Maidens Bay and to Canadian Lorrain Mine and Nipissing Lorrain Mine.

17.55 Junction; road on left leads to the Montreal River power dam. Proceed along road on right.

18.4 Single-lane road on left to Bellellen Mine.

18.8 Junction at Frontier Mine. The former settlement of Silver Centre was located here. Proceed south (road on left) and up the ridge.

20.1 Keeley Mine.

Hunter Cobalt Mine

Three shafts and some pits and small dumps of the Hunter Cobalt Mine are located on the north side of Highway 567 about 100 yards north of the turn-off to the Harrison-Hibbert Mine (Mile 1.35). The deepest shaft is about 100 feet deep. The property was originally worked in about 1908 by Hunter Cobalt Silver Mining Company Limited; further exploratory work was performed in 1925-1926 by Cobalt Contact Mines. There is no record of production from the mine.

Cobaltite, chalcopyrite, pyrite and sphalerite occur in pink dolomite in the dumps.

Refs.: 46 p. 60; 196 p. 125-127

Maps (T): 31 M/5E Cobalt
(G): 2050 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour.), 1 inch to 1,000 feet)

Harrison-Hibbert Mine, Ruby Mine

About half a million ounces of silver were produced from each of these mines located in Ruby Valley; cobalt and some copper were also obtained. The minerals in the deposit included native silver, ruby silver, smaltite, chalcopyrite, pyrite, sphalerite, galena, specular hematite, chlorite, calcite (white) and dolomite (pink); small amounts of bornite and chalcocite have been reported. Calcite specimens obtained from the dumps fluoresce bright pink when exposed to "short" ultraviolet rays. Encrustations of erythrite and of colourless to white gypsum were observed on specimens in the dumps.

The Ruby Mine was the first to be worked. The shaft was put down to 56 feet in 1907 by Ruby Silver Mining and Development Company, Limited. The first production of silver was obtained in 1920 by Ruby Operative Cobalt Mines Limited, and some silver and cobalt were produced between 1922 and 1924 by Coniagas Mines Limited; but most of the production was obtained by Cobalt Contact Mines from 1927 to 1930. The deposit was worked by Harrison-Hibbert Mines, Limited between 1951 and 1954. The shaft is 161 feet deep.

The silver-cobalt bearing veins on the Harrison-Hibbert property were discovered by R. C. Harrison in 1947. The Discovery vein assayed 5,000 to 10,000 ounces of silver per ton and was encountered at a depth of 146 feet from the surface, the first 31 feet being overburden. The deposit was worked from a 258-foot shaft by Harrison-Hibbert Mines Limited until 1954, by Silvermaque Mining Limited in 1963, and by Pittsonto Mining Company Limited during the next two years.

Road log from Mile 1.35 on Highway 567 (see page 55):

Mile 0 Turn right (south).

0.25 Junction. Road on right leads 0.15 mile to the Harrison-Hibbert Mine. Continue straight ahead to reach the Ruby Mine.

0.3 Ruby Mine on left.

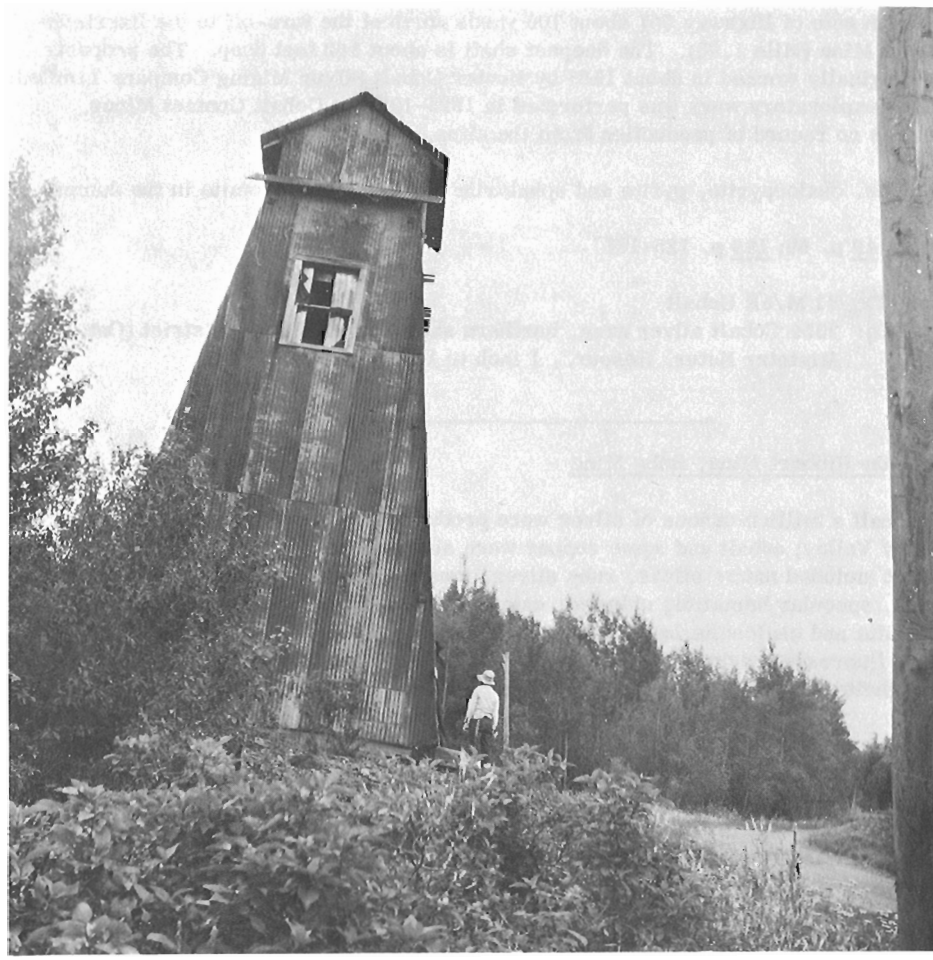


Plate X. The leaning headframe, Ruby Mine. (G.S.C. photo 161458)

Refs.: 46 p. 90; 104 p. 179-180; 156 p. 140-141; 157 p. 132; 158 p. 133-134; 196 p. 95-115

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Green-Meehan Mine, Red Rock Mine

Some very rich ore shoots were encountered at the time of the discovery of silver-bearing veins on the Green-Meehan and on the Red Rock properties, but neither mine became a great producer. In 1905, rich silver ore was found on the Green-Meehan property by Philip Green; in the following year, Green-Meehan Mining Company Limited undertook development of the property and sank a 200-foot shaft but the results at depth were disappointing. Between 1906 and 1907, Red Rock Silver Mining Company Limited put down a shaft to a depth of 110 feet (on the Red Rock property) where a rich ore shoot 16 feet long produced $20,000 worth of silver ore. Both mines were acquired by Consolidated Silver Cobalt Mines Limited in 1909 and were worked jointly until 1912. Other operators of the two mines included Edwards and Wright Limited (1917 to 1922) and Cobalt Contact Mines Limited (1925-1928); the latter company erected a mill at the Green-Meehan Mine and treated ores from the two mines and from other mines in the area. The Green-Meehan Mine consists of two shafts with depths of 200 feet and 85 feet respectively. There are three shafts on the Red Rock property, the deepest being 110 feet deep.

Pyrite, chalcopyrite and chlorite occur in white calcite specimens in the dumps; the calcite fluoresces deep pink under "long" ultraviolet rays. Stromeyerite and posnjakite (greenish blue scaly coatings on specimens) were also identified.

The Green-Meehan Mine and the foundation of the mill are located on the south side of Highway 567 at Mile 1.5 (see page 55). One shaft of the Red Rock mine is immediately south of the Green-Meehan main shaft, another (the main shaft) is about 100 yards east of the Ruby Mine, and the third is on the east side of the road leading south from the Ruby Mine at a point 300 yards from it.

Refs.: 46 p. 42-43, 57-58, 87; 104 p. 174-177; 170 p. 312-313; 196 p. 127-131

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Cobalt Contact Mine

Specimens composed of colourless to white calcite rhombohedra studded with tiny pyrite cubes were found on the dumps of this former cobalt-silver producer. The calcite crystals and the massive white calcite associated with them fluoresce bright pink when exposed to ultraviolet rays. Chalcopyrite, pyrite, cobaltite, chlorite, erythrite, and dolomite were also found in the dumps.

The mine produced cobalt and a minor amount of silver. The discovery of the silver-bearing vein on this claim in 1905 was the first silver discovery northwest of Cobalt. By 1909, Cobalt Contact Mining Company had located and explored all the important veins now known, and had put down a shaft to 130 feet. Additional work was done by Cobalt Contact Mines, Limited (1924-1926), and by various individuals and companies between 1930 and 1952. The workings include three shafts, the deepest being 230 feet.

The mine is located 0.15 mile east of Mile 1.6 on Highway 567 (see page 55). A small building and some dumps remain on the site.

Refs.: 46 p. 25; 170 p. 306-307; 196 p. 117-123

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Agaunico Mine

Cobaltite was the most common mineral at this deposit. Nickeline, chalcopyrite, pyrite, galena and sphalerite were also present, and specimens of bluish white quartz containing native gold were at one time found on the mine dumps. Colourless to white "dogtooth" crystals of calcite and massive white calcite from the dumps fluoresce bright pink under "short" ultraviolet rays, and reddish pink under "long" ultraviolet rays. Specimens of grey and white varved clay coated with erythrite are common on the dumps; the clay is post-glacial and occurs on the surface of the property.

Cobaltite was discovered near the present shaft in 1904 by Ira Benn. Until the 1930's, the deposit was worked intermittently by several companies with little success. Silver was present in the deposit but not in economic quantity; from about 1930 to 1957 it was worked successfully for cobalt. In 1952, economic silver-bearing veins were discovered and mining for silver was conducted until 1961 when the mine was closed.

The mine produced about 4 million pounds of cobalt, almost a million ounces of silver, nearly half a million pounds of nickel, and nearly 200,000 pounds of copper. It was the largest cobalt producer in the cobalt camp. The most recent operators were Silanco Mining and Smelting Corporation (1944-1953), Cobalt Consolidated Mining Corporation Limited (1953-1957), and Agnico Mines Limited (1957-1961).

The mine is located on the steep western shore of Lake Timiskaming. Access is by a road, 0.8 mile long, leading northeast from Mile 1.95 on Highway 567. The Bucke Township Park is located near the mine.

Refs.: 97 p. 117; 170 p. 304-305; 196 p. 137-154

Maps (T): 31 M/5E Cobalt
(G): 2052 Cobalt silver area, northern sheet, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Canadian Lorrain (Maidens) Mine

During mining operations, native silver in leaf and wire forms was found at this property. Smaltite, nickeline, and pyrite were also present in the calcite veins. The mine produced about 277,000 ounces of silver, 17,000 pounds of cobalt, and some nickel, between 1926 and 1943.

Development of the deposit began in about 1909 by Maidens Silver Mining Company Limited; two adits (each about 160 feet long) were driven south into a hill and two shafts were put down about 300 yards west of the adits. Canadian Lorrain Silver Mines Limited acquired the property in 1922 and continued work on it until 1927, the most productive year in the history of the mine; one of the shafts was deepened to 250 feet during this period. Minor production was obtained by Millwights Mines Limited between 1938 and 1940. Since that time, exploration work was performed by various companies, and the property was acquired by Agnico Mines Limited.

The mine is located on the north side of the road to Maidens Bay at a point 2.3 miles east of its junction with Highway 567 at Mile 16.6 (see page 57).

Refs.: 104 p. 230-233; 121 p. 34-36

Maps (T): 31 M/3W Fabre
(G): 2194 South Lorrain Township, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Nipissing Lorrain Mine

This mine produced about 350,000 ounces of silver and small amounts of cobalt and nickel; most of the production was obtained by Nipissing Mining Company Limited between 1925 and 1929. Minor work was done by other companies including the most recent (1966) operator, Millerfields Silver Corporation Limited. The workings extend to a depth of 550 feet.

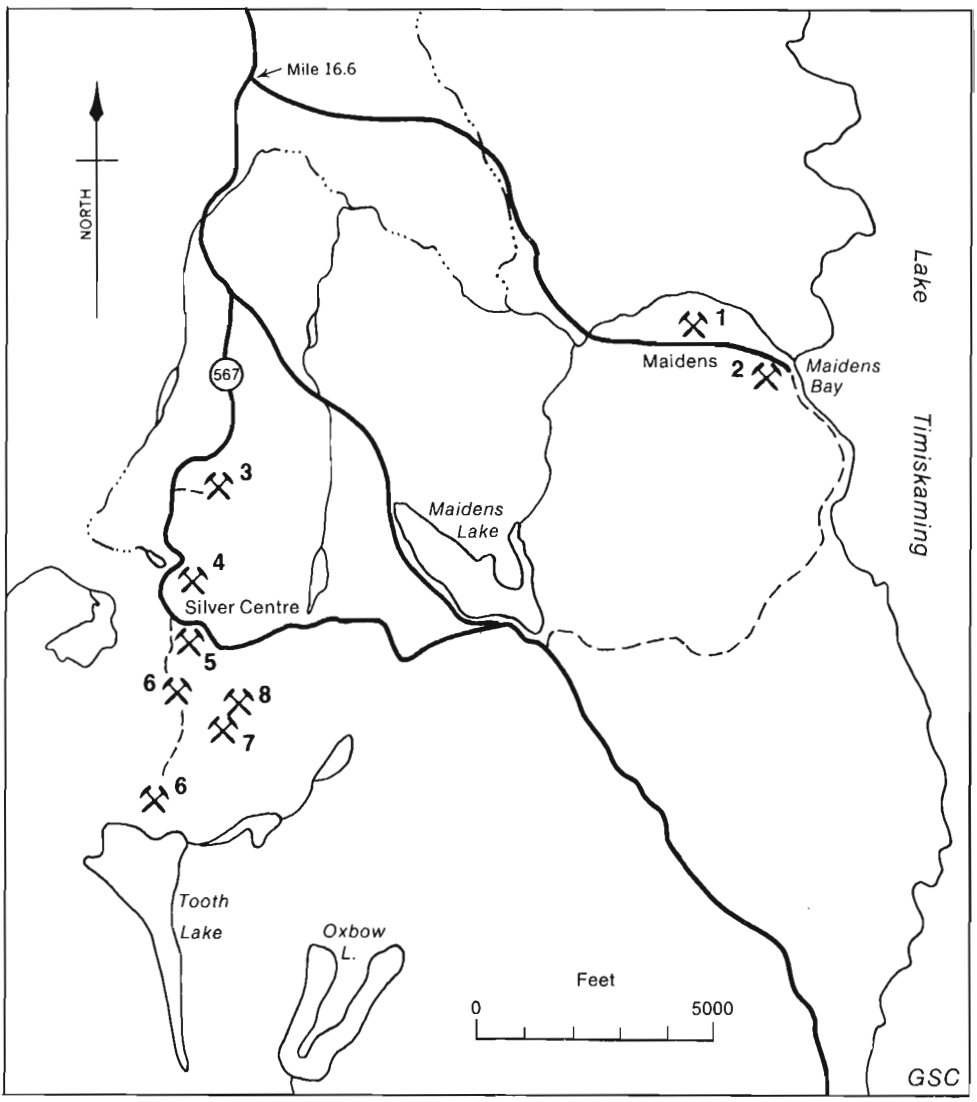
The mine is located on the steep shore of Maidens Bay, 2.7 miles from the junction of Highway 567 and the road to Maidens Bay.

Ref.: 121 p. 60-62

Maps (T): 31 M/3W Fabre
(G): 2194 South Lorrain Township, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Bellellen Mine

Small amounts of silver, cobalt, and nickel were mined from this deposit at various intervals betwenn 1910 and 1943 by several individuals and companies. Bellellen Silver Mines Limited operated the mine from 1909 to 1926 and most of the silver produced from the deposit was obtained in 1910 and 1911. Two shafts were used; one is 80 feet deep and from the other a depth of 342 feet is reached. The property belongs to J.H. Price of Cobalt.



1. Canadian Lorrain Mine
2. Nipissing Lorrain Mine
3. Bellellen Mine
4. Frontier Mine
5. Keeley Mine
6. Lorrain Trout Lake Mine
7. Curry Mine
8. Wettlaufer Mine

Map 4. South Lorrain area.

The mine is located about 300 yards east of Highway 567 at Mile 18.4 (see page 57).

Refs.: 104 p. 229-230; 121 p. 71-72, 73

Maps (T): 31 M/4E Timagami
(G): 2194 South Lorrain Township, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Frontier Mine, Keeley Mine

The Frontier Mine and the Keeley Mine were the largest producers in the South Lorrain area. Originally, they were operated by different companies, but in their last period of operation (1961-1966), they were worked jointly by Canadian Keeley Mines Limited (name changed in 1964 from Keeley Frontier Mines Limited). Their total production was about 19 million ounces of silver, 3 million pounds of copper, 25,000 pounds of nickel, and 10,000 pounds of copper; the Keeley Mine produced over half the silver, whereas all the copper, nearly all the nickel, and half the cobalt were obtained from the Frontier Mine. The silver output from the Keeley Mine was over half of the total production from South Lorrain Township.

Minerals found in the orebody included smaltite, cobaltite, chloanthite, nickeline, native silver, argentite, ruby silver, pyrite, arsenopyrite, marcasite, breithauptite, chalcopyrite, native bismuth, magnetite, stromeyerite, and less commonly, galena, sphalerite, covellite and dyscrasite. The rare minerals, matildite and pavonite, have been reported to occur with galena, chalcopyrite, bismuthinite, native bismuth, sphalerite and pyrite.

The gangue minerals were pink and white calcite, pink and white dolomite, quartz, chlorite and small amounts of apatite, tremolite and biotite. The white calcite specimens from the dumps fluoresce a bright pink under "short" ultraviolet rays and a reddish pink under the "long" rays. The massive white quartz contains vugs lined with colourless "micro" crystals of quartz. A dense, hard silicified carbonate in variegated tones of white, grey, pink and salmon-pink, has been reported from the deposit.

The native silver occurred as slabs weighing up to 10 pounds, as moss silver, and in leaf, wire, flaky, and matted forms; the wire and leaf forms were found in vugs in massive smaltite. Specimens of botryoidal smaltite coated with leaf silver were also encountered during early mining operations. Some of the silver mineralization occurred in a limonite-clay which resulted from the weathering (oxidation) of part of a vein that contained metallic minerals and of the adjacent wall-rock. The vein in which this was found was known as Wood's vein and was the most important on the property. The oxidation extended to a depth of 560 feet; weathering at depth was not encountered at any other mine in the Cobalt area. The clay was greyish, yellowish, reddish, greenish, or bluish in colour and consisted of limonite and clay minerals, some carbonate, native silver, argentite, ruby silver, wad, hematite, goethite, chlorite, and traces of malachite, azurite, erythrite, annabergite, scorodite, and chapmanite. The bluish clay was rich in wire, scaly, platy, and stalactitic silver. Leaf and spongy silver was associated with massive and botryoidal smaltite. Specimens of smaltite, nickeline, erythrite, annabergite, epidote, and carbonates are common in the dumps.

Silver-cobalt mineralization was discovered first at the Keeley property (in 1907) by J.M. Wood and R.J. Jowsey who, with Charles Keeley, were responsible for the first shipment of ore from an open pit in 1908. Smaltite and wire silver in calcite were found in the discovery vein. The property was sold to Keeley Mine Limited which worked it until 1913. There was little activity until 1921 when Dr. J. Mackintosh Bell discovered rich ore shoots, a discovery that revived prospecting interest in the South Lorrain area. Keeley Silver Mines Limited operated the mine and mill continuously from 1921 until 1931; it was re-opened in 1961 by Keeley Frontier Mines Limited.

High-grade ore was discovered at the Frontier Mine in 1921 by Horace F. Strong. The Mining Corporation of Canada Limited mined the deposit from 1921 until 1931 after which the mine was operated sporadically under lease. In 1961, Keeley Frontier Mines Limited re-opened the mine and brought it into production. In 1971, Agnico Mines Limited undertook a program of exploration of the deposit.

Each mine consists of numerous shafts. The main working shaft of the Keeley Mine is 570 feet deep, that of the Frontier is 641 feet deep. The deepest shafts at depths of 1,455 feet and 1,360 feet – are on the Frontier property. The underground workings of the two mines were connected in 1962.

The mines are located at the abandoned settlement of Silver Centre at the end of Highway 567 (see road log, page 57).

Refs.: 8 p. 9-11; 9 p. 688-692; 13 p. 368-371; 90 p. 249; 97 p. 122; 104 p. 190-228; 121 p. 25, 37-45; 144 p. 216, 217; 146 p. 132, 133-134; 159 p. 144-145; 164 p. 8; 253 p. 50

Maps (T): 31 M/4E Timigami
(G): 2194 South Lorrain Township, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Wettlaufer Mine, Curry Mine, Lorrain Trout Lake Mine

Exploration of these former producers by Agnico Mines Limited, began in 1968. They are located south and southeast of the Keeley Mine. Most of the work has been done on the Lorrain Trout Lake property.

The Wettlaufer Mine was the most successful of the early silver producers in South Lorrain; it yielded about $2\frac{1}{2}$ million ounces of silver, nearly all of it before 1913. Native silver is believed to have been first observed on this property in 1874 by Pat Manion, a lumberman who noticed a fragment of a gleaming silver metal exposed by an uprooted tree. The deposit was staked some 30 years later. Production began in 1909 and was obtained from one vein in diabase. Wettlaufer Silver Mines Limited operated the mine until 1913; there was limited production from subsequent operations by other companies. In 1957, it was acquired by Agnico Mines Limited along with the adjoining (to the southwest) Curry Mine. The shaft is 250 feet deep.

The Curry Mine produced almost 50,000 ounces of silver between 1916 and 1938. The original work (1912-1918) was done by Pittsburgh Lorrain Syndicate and most of the mine's production was obtained by that company. Two shafts were used, one 400 feet deep and the other 110 feet deep.

The Lorrain Trout Lake Mine (also referred to as the Trout Lake Mine) is being (in 1972) explored and prepared for production by Agnico-Eagle Mines Limited (name changed from Agnico Mines Limited). The early work, including the sinking of two shafts, was performed by Lorrain Trout Lake Mines Limited from 1923 to 1931, and nearly all of the mine's production of silver (just over 1 million ounces) and cobalt was obtained during this period. Minor amounts of silver, cobalt, and a little nickel resulted from subsequent operations. In 1954, Ramardo Mines Limited explored the deposit and leased it in 1968 to Agnico Mines Limited which then commenced exploration of No. 2 shaft and installed buildings and equipment. The company plans to sink the production shaft to 1,100 feet.

The mines are located south and southeast of the Keeley Mine. The Wettlaufer Mine is about 500 yards southeast of the Keeley, the Lorrain Trout Lake workings are about $\frac{1}{4}$ mile and $\frac{1}{2}$ mile south of the Keeley. The Curry Mine is immediately southwest of the Wettlaufer Mine.

Refs.: 104 p. 224-229; 121 p. 25, 27, 28-33, 74-79; 161 p. 105; 162 p. 104; 206 p. 47; 253 p. 50

Maps (T): 31 M/4E Timigami
(G): 2194 South Lorrain Township, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

This completes the description of mines in the Cobalt and South Lorrain mining camps.

The Elk Lake – Gowganda Area

Following the discoveries of rich silver ore in the vicinity of Cobalt, prospectors shifted their attention westward and northwestward. Their search was aimed at locating diabase – the rock favourable to the occurrence of the Cobalt silver ores. In August 1906, the White brothers found native silver at Anvil Lake (north of Lady Evelyn Lake), and in that autumn Thomas Saville discovered silver-cobalt mineralization at a locality 2 miles east of Elk Lake village (lot 1 concession V, James Township). As a result of these discoveries, prospectors invaded the Elk Lake area in 1907, numerous claims were staked, and the stampede pushed onward to the Gowganda Lake area where silver ore was discovered in 1908 near the shore of Leroy Lake. Later that summer, prospectors were rewarded with the discoveries of the richer silver-bearing veins near Miller Lake and those on the west side of Gowganda Lake. The spectacular ore specimens from these newly found localities were displayed at the Mining Recorder's office at Elk Lake and generated a surge of frenzied claim-staking by snow-shoe clad prospectors of the snow-covered area around Gowganda Lake in the winter of 1908-1909. In the summer (1909), prospecting spread toward Shining Tree with less encouraging results. During the "rush", 7,000 claims were staked in Gowganda and 2,000 in the surrounding area. The villages of Elk Lake (formerly, Elk City) and Gowganda (an Indian word meaning porcupine's home) sprang into existence as a result of the prospecting rush.

Development of the deposits rapidly followed their discoveries. Mining equipment was brought into the areas in the winter of 1909 by horse-drawn vehicles from the nearest

railway centres at Sellwood and Charlton. Underground exploration began in the spring. Since transportation posed an economic burden on mining, only high grade ore was shipped in the early days.

Production began in 1909 with the shipment of 2 tons of ore from the Bartlett Mine on the west side of Gowganda Lake. Most of the mining activity in the Elk Lake area took place between 1907 and 1913; there were no large producers and most of the old mines are now difficult to locate. The easily accessible ones are described in the text beginning on page 69. The mines in the Gowganda area began producing silver and cobalt in 1909, most of the production coming from the Miller Lake mines at O'Brien; operations at O'Brien ceased in 1972. Production to the end of 1966 from the Gowganda mines amounted to 58,533,152 ounces of silver, ranking the camp in second place to Cobalt.

The silver-cobalt deposits in the Elk Lake and Gowganda areas are mineralogically similar to those at Cobalt and at South Lorrain. Native silver, the chief economic mineral, is associated with the same suite of metallic minerals as are listed on page 17. There are, however, some differences. In the Elk Lake and Gowganda deposits, the gangue is calcite and quartz with some barite and little (at Elk Lake) or no (at Gowganda) dolomite, and the rock containing the veins is predominantly diabase. The ore-bearing veins at Elk Lake are associated with aplite dykes that cut the diabase and they contain large amounts of chalcopyrite and bornite. Loellingite is common in the Elk Lake-Gowganda district and rare at Cobalt. Bismuthinite, hematite, epidote and purple axinite occur in some veins in the Gowganda deposits.

Refs.: 12 p. 169-170; 16 p. 1-2; 25 p. 3; 33 p. 5-8; 34 p. 259; 60 p. 8; 117 p. 1; 142 p. 164; 145 p. 101-103; 170 p. 3; 254 p. 344

Road log to mines in the Elk Lake-Gowganda-Shiningtree area (Descriptions of the mines follow the road log):

Mile 0 — Junction Highway 65 (west) and Highway 11, west of New Liskeard; proceed west along Highway 65.

16.9 — Junction Highway 562.

21.7 — Granitic rocks are exposed on both sides of Highway 65.

40.3 — Elk Lake village, at junction Highway 560 on the north side of the bridge over Elk Lake, a broadening of the Montreal River. This is the turn-off to the Moose-Horn Mine. Road log continues over bridge.

40.8 — Junction Highways 560 and 65; road log continues along Highway 560. This is the turn-off to the Mother-Lode Mine.

41.2 — Road-cut on right exposes conglomerate of Proterozoic age.

42.8 — Trail on right leading to Bermead Mine.

42.9 — Reddish and greenish arkosic sandstone is exposed on both sides of the highway. This rock is of Proterozoic age and is exposed at intervals for the next 11 miles.

Mile 45.3 Junction road on right leading to Boland Lake and to Welsh Mine.

53.9 The highway is bordered on each side by steep-walled ridges composed of arkosic sandstone.

54.6 Longpoint Lake on right.

55.3 Junction Beauty Lake Road on left leading to the Kell Mine and to the Hudson Bay Mine.

55.9 Turn-off (right) to shore of Longpoint Lake.

59.4 Highway cuts through a ridge composed of Nipissing diabase of Proterozoic age.

60.2 Trail on left leads about 100 feet to an adit on the west side of a diabase ridge; pyrite, chalcopyrite, chlorite, quartz crystals ("micro", in massive quartz) and calcite were found on the dumps.

60.3 Bridge over Lost Lake.

60.7 Buff-coloured sandstone of Huronian age is exposed on right.

61.5 Conglomerate of Huronian age is exposed on right.

62.7 Leroy Lake on right, with Coleroy Mine dump on its shore.

62.8 Trail on right to Coleroy Mine. Volcanic rocks of Archean age outcrop along the highway.

63.4 Road-cut exposes diabase.

63.7 Turn-off (right) to Morrison Mine.

64.5 Gravel pit on right. White calcite (fluoresces pink under ultraviolet rays) occurs in a vein cutting diabase exposed along the wall of the pit.

64.7 Junction (on right) road to Miller Lake and to Walsh Mine.

65.3 Junction (on right) road to O'Brien and to Siscoe Mines.

66.1 Conglomerate is exposed on both sides of the highway.

66.9 Gowganda, at sharp bend in highway.

67.1 The knoll on right is composed of conglomerate of Huronian (Proterozoic) age.

67.6 Gowganda Lake on left.

68.4 Junction Edith Lake Road on right.

Mile 70.6 Diabase is exposed on both sides of the highway.

72.2 Junction road on left leading to Milner Lake and to Mann Mine.

74.1 Firth Lake on right.

77.3 Bridge over Wapus River. Diabase is exposed by road-cuts at both ends of the bridge.

77.7 The highway cuts through an esker.

78.6 Junction road on right leading to West Montreal River.

79.2 Bridge over Duncan Lake. The eastern shore of the lake is underlain by diabase, the western shore by volcanic rocks.

80.3 Turn-off to Breeze Creek camp.

80.6 Junction single-lane road on right leading to Tyranite Mine.

82.2 Road-cuts expose dark grey volcanic rocks of Archean age.

82.3 Porphyry Lake on left.

84.0 Junction trail on left to Matona Mine.

84.7 Bridge over Hydro Creek.

85.8 Road-cut exposes grey volcanic rock with surface coatings of calcite and epidote.

87.0 Causeway across Houston Lake.

89.1 Bridge over Shining Tree Creek.

89.9 Junction road on left leading to Gay Lake.

91.2 Bridge over West Montreal River.

91.7 Junction Grassy Lake Road on right.

93.7 Causeway across Michiwakenda Lake.

94.3 Ronda Mine on left.

99.5 Shining Tree village.

Maps (T): 31 M Ville-Marie
41 P Gogama
(G): 2150 Chown and Lawson Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Maps (G): (cont'd) 2151 Mickle and James Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

P151 Gogama sheet, districts of Sudbury and Timiskaming (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

P159 Elk Lake – New Liskeard sheet, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to 2 miles)

P374 Nicol Township, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

P475 Milner Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

P517 Van Hise Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

P518 Haultain Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

Moose Horn Mine

Nickeline, cobaltite, native bismuth, pyrite, calcite (fluoresces pink under "long" ultraviolet rays), chlorite, epidote (crusts on diabase), annabergite, and erythrite were found on the dumps near the main shaft of this property. Native silver and maucherite have been reported. The ore-bearing veins cut diabase and red aplite. During mining operations some high grade ore was encountered and a trial shipment of 3 tons of ore was made in 1910.

The mine was operated in 1908 by Charles Gifford, and between 1909 and 1914 by Moose Horn Mines Limited. It consists of a main shaft, about 125 feet deep, and two other shafts. This was the first property in the Elk Lake area to be equipped with a boiler and hoist, and to use a power drill. The site of the original discovery of silver mineralization in the Elk Lake area is approximately $1\frac{1}{2}$ miles east of this mine and about a mile south of Highway 560.

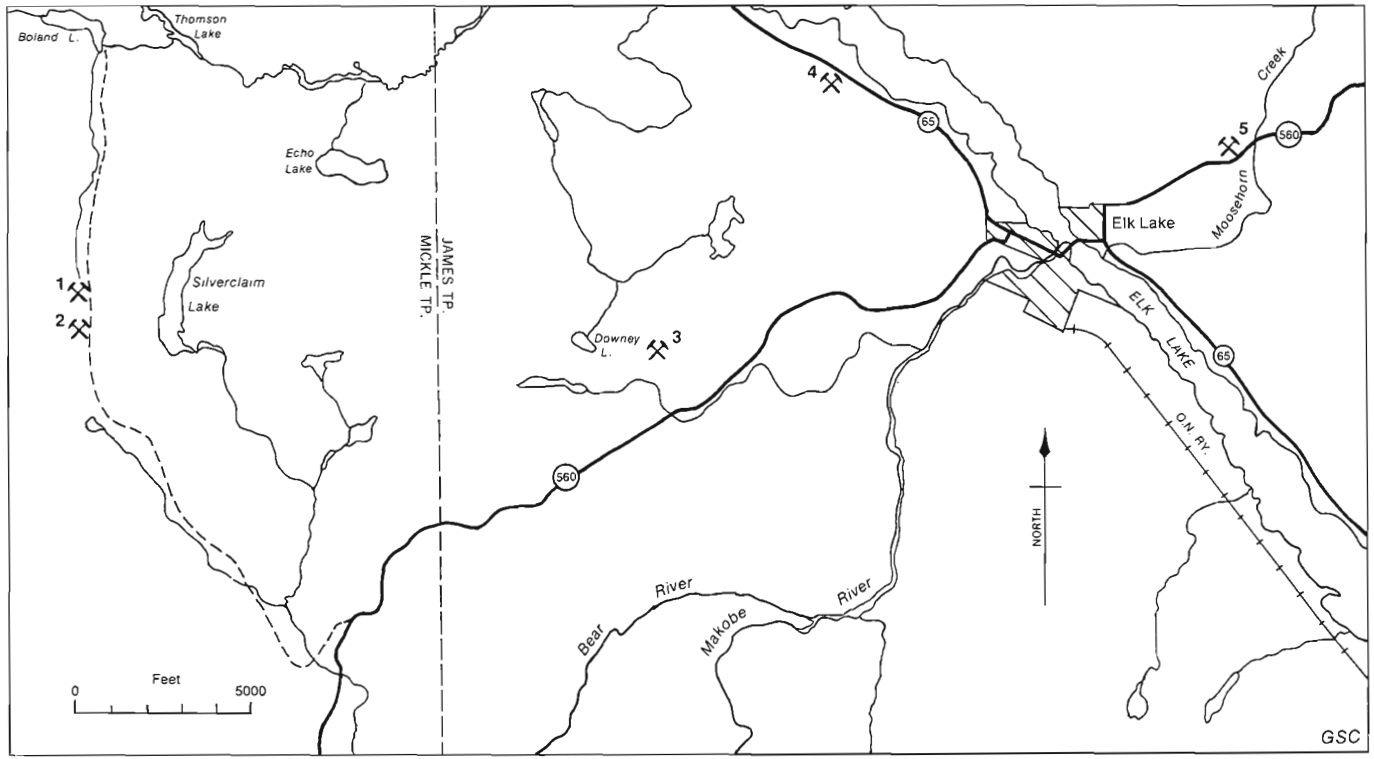
Road log from Elk Lake village:

Mile 0 — Junction highways 65 and 560 at bridge over Elk Lake narrows (Mile 40.3, page 66); proceed north onto Highway 560.

0.95 — Trail (on left) to Moose Horn Mine (Main shaft) opposite diabase rock exposure on right (south) side of highway. The mine is in a wooded area, 200 feet north of the highway.

Refs.: 38 p. 126; 117 p. 30-31; 207 p. 360; 217 p. 119, 154

Maps (T): 41 P/9 Elk Lake
(G): 2151 Mickle and James Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)



1. Otisse-Currie Mine 2. Welsh Mine 3. Bermead Mine 4. Mother-Lode Mine 5. Moose Horn Mine

Map 5. Elk Lake area.

Mother-Lode Mine

Nuggets of native silver weighing over 50 pounds were extracted from a weathered calcite vein by the owner of this claim, Herbert Gates, in 1908. The nuggets, totalling several hundred pounds in weight, were obtained from a test pit, 15 feet deep, at the top of a hill overlooking Elk Lake. In other veins subsequently found on the property, native silver was associated with argentite, cobalt minerals, chalcopyrite and specularite in calcite.

In 1908, the property was sold to the Mother-Lode Mining Company Limited which drove an adit 365 feet into the ridge below the discovery vein. A 100-foot shaft was put down near the portal of the adit and there are two trenches on the claim. Exploration of the deposit ceased in 1911.

The deposit is along a ridge on the west side of Elk Lake and northwest of Elk Lake village; it is 200 yards southwest of Highway 65 at a point 1.2 miles from its junction with Highway 560 at Elk Lake (Mile 40.8, page 66).

Refs.: 44 p. 133; 63 p. 53; 117 p. 33-34; 217 p. 479

Maps (T): 41 P/9 Elk Lake
(G): 2151 Mickle and James Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Bermead (Downey) Mine

Native silver, chalcopyrite, nickeline, cobalt minerals, bornite and specularite have been reported from calcite veins cutting aplite and diabase at this property originally staked by Larry Downey. In 1908, 30 or 40 bags of silver are were extracted from the deposit. Between 1909 and 1911, the Tee Arr Mining Company sank some shafts on the east side of a diabase hill, and in 1914, Larry Downey removed 10 tons of high-grade ore from an open cut, this being the first shipment from the Elk Lake area since 1910. The workings consist of four shafts (the deepest being 170 feet and 70 feet), and several open cuts in a wooded area on the east side of a long ridge.

Access is by a trail, about $\frac{1}{2}$ mile long, leading north from Highway 560 at Mile 42.8 (see page 66).

Refs.: 117 p. 22-23; 181 p. 155; 217 p. 25, 637a

Maps (T): 41 P/9 Elk Lake
(G): 2151 Mickle and James Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Welsh (Otisse) Mine

Silver-bearing calcite veins cutting diabase were discovered on this property by the Otisse brothers. Nuggets of native silver were found in the calcite, and leaf silver in the host rock.

During the winter of 1908-1909, mining equipment, buildings and a camp were installed by the Otisse Mining Company which acquired the property in 1908. A shaft was put down to 160 feet, but in spite of the very rich surface showings, the deposit did not live up to early expectations and operations ceased in 1910. In 1963, Marjortrans Oil and Mines Limited, re-opened the mine and extracted some high-grade ore. In 1964, G.S. Welsh of Matachewan acquired the property and in 1968, Welsh Silver Mines Limited was formed to develop it. About 100 tons of ore was test-milled in 1969. Underground development is continuing.

Road log from Highway 560 at Mile 45.3 (see page 67):

Mile 0 Proceed north along single-lane road to Boland Lake.

2.8 Junction: road on left leads 200 feet to Welsh Mine. Road on right leads to Boland Lake; road log continues to Boland Lake.

3.05 Shaft (100 feet deep) on left (west side of road) was sunk by the Otisse-Currie Consolidated Silver Mines Limited in 1909.

Refs.: 38 p. 127; 44 p. 133-134; 117 p. 50, 51; 162 p. 119-120; 217 p. 379, 637a; 219 p. 735; 251 p. 339

Maps (T): 41 P/9 Elk Lake
(G): 2151 Mickle and James Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

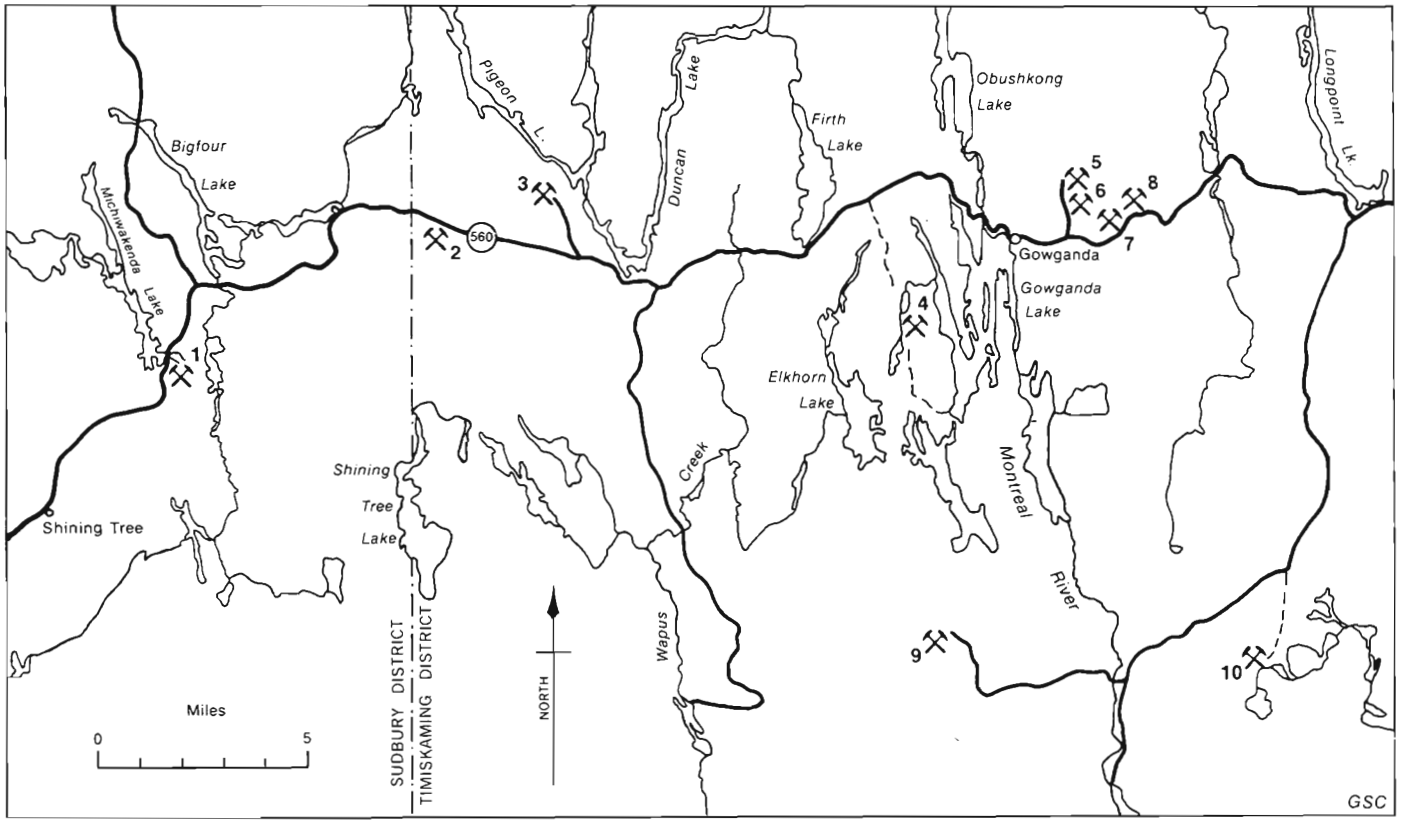
Kell Mine

Native silver occurred as scales with argentite and smaltite in calcite-quartz veins cutting diabase at this former silver-cobalt producer. Good specimens of millerite have been reported from a pit 200 feet south of the shaft. Other minerals that were found in the deposit include nickeline, magnetite, specularite and pyrrhotite.

The deposit was discovered and originally staked by Hugh Kell in 1909. He located an argentiferous calcite vein cutting diabase exposed on the east side of a ridge overlooking Shack Lake after having encountered loose fragments of the rock containing silver-bearing veins elsewhere on the ridge. The deposit was worked in 1919-1920 by J.G. Smith, a former governor of Vermont; development consisted of an inclined shaft sunk to 104 feet, an adit, and some open-cuts. A 1584-pound shipment of ore made in 1920 from an open-cut 700 feet north of the shaft yielded 1621 ounces of silver and 254 pounds of cobalt, the only production recorded from the mine. Subsequently, investigations of the deposit were made by Silver Chest Mines Limited in 1947, and by Ourgold Mining Company Limited in 1966.

Access to the mine is via a $2\frac{1}{2}$-mile trail that leads south from the Beauty Lake Road at a point $9\frac{1}{2}$ miles south of its junction with Highway 560 at Mile 55.3 (see page 67). This turn-off is 1.1 and 1.6 miles respectively south of the two turn-offs to Beauty Lake.

Refs.: 25 p. 4, 58-60; 122 p. 44-46; 170 p. 372



1. Ronda Mine
2. Matona Mine
3. Tyranite Mine
4. Mann Mine
5. Siscoe Mines
6. Walsh Mine
7. Morrison Mine
8. Coleroy Mine
9. Hudson Bay Mine
10. Kell Mine

Map 6. Gowganda area.

Maps (T): 41 P/10 Gowganda
(G): 2208 Leith, Charters, and Corkill townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Hudson Bay (Rustex) Mine

This mine comprises two original properties: the Hudson Bay Mine and the adjoining Silverado Mine. The discovery of silver ore was made in 1908 by Dan O'Gorman on property later acquired by the Timiskaming and Hudson Bay Mining Company which sank 3 shafts during its operations from 1910 to 1913. On the claim to the northeast, Silverado Mining Company Limited sank a shaft to a depth of 100 feet in 1920. Subsequently, the mines were operated jointly by various companies, production having been recorded by Pioneer Prospectors Consolidated Mines Limited (1929), Silverado-Gowganda Mines, Limited (1936), Silver Valley Mines Limited (1937-1938), and Rustex Mining Corporation (1964-1966). Total production amounted to 565 pounds of cobalt and 80,186 ounces of silver.

The ore consisted of native silver associated with argentite, smaltite, skutterudite, loellingite, safflorite, nickeline, galena, chalcopyrite, and cobaltite in calcite veins cutting diabase. The mine consists of four shafts, the deepest being 225 feet; it is located south of Hangingstone Lake.

Road log from Highway 560 at Mile 55.3 (see page 67):

Mile 0	Junction at Mile 55.3; proceed onto Beauty Lake Road.
7.9	Junction; proceed along road on right.
8.4	Turn-off (left) to Beauty Lake; continue straight ahead.
9.5	Turn-off (left) to Kell Mine; continue straight ahead.
14.4	Junction; continue straight ahead.
14.7	Bridge over Montreal River.
20.0	Hudson Bay (Rustex) Mine Shaft No. 4 on right; to reach other workings continue straight ahead.
20.15	Shaft No. 3 on left. This was the main production shaft.
20.2	Shaft No. 2 on left.
20.35	Shaft No. 1 on left.

Refs.: 25 p. 57-58; 119 p. 31-32, 37-39; 170 p. 388-389; 187 p. 109; 203 p. 70; 219 p. 668

Maps (T): 41 P/7 Smoothwater Lake
41 P/10 Gowganda

Maps (G): 2208 Leith, Charters, and Corkill Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Coleroy (Collins) Mine

This silver-cobalt-nickel deposit on the southwestern shore of Leroy Lake (dump is visible from Highway 560 at Mile 62.7) was originally explored by P. Howard Collins of Gowganda from 1918 to 1922; one shaft near the shore of the lake was sunk to a depth of about 300 feet and another, 120 yards north of it, to about 50 feet. Exploration was continued from 1925 to 1927 by Coleroy Gowganda Mines Limited and the main exploration shaft was deepened to 680 feet. No ore was produced.

The mineralization at the Coleroy Mine consisted of native silver, argentite, cobalt and nickel minerals, with chalcopyrite and pyrite in calcite-quartz veins cutting diabase. Maucherite (temiskamite), a bronze massive mineral with a somewhat radiating structure, associated with nickeline has been reported; smaltite, cobaltite, and breithauptite were associated with it.

The first discovery of native silver in the Gowganda area was made early in 1908 on the Leroy claims to the southwest of Leroy Lake and on claims to the northwest of Miller Lake. The Leroy deposit was developed by the Leroy Lake Syndicate which sank three shafts to depths of 100, 45 and 35 feet in 1909. There was no production.

Access to Coleroy Mine is by a trail, approximately 350 yards long, leading north from Highway 560 at Mile 62.8 (see page 67).

Refs.: 16 p. 1, 20; 25 p. 44-46; 39 p. 118; 170 p. 401; 186 p. 152; 188 p. 124; 191 p. 156; 192 p. 168; 203 p. 76-77

Maps (T): 41 P/10 Gowganda
(G): P374 Nichol Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Morrison Mine

A mass of silver weighing over 50 pounds was recovered from this property in the early days. The deposit was originally explored in 1909 by trenching conducted by Major Morrison of Ottawa. Shaft-sinking in the following year disclosed a calcite vein containing native bismuth and a rich streak of native silver. The veins occurred in diabase.

Underground development of the deposit was conducted by various companies, notably by Tonapah Canadian Mines Limited (1925-1927) which explored the deposit to a depth of 480 feet. In 1929, Morrison Mines Limited renewed exploration and brought the mine into production in 1930 continuing until 1936. Production was resumed from 1952 until 1954 by New Morrison Mines Limited. Total production was about 719,000 ounces of silver and 22,000 pounds of cobalt.

Epidote and dark green blade-like masses of amphibole (probably actinolite) associated with calcite in diabase were found on the dumps. Erythrite, stromeyerite, and pyrite were also noted. Minerals, other than ore minerals, reported from the deposit include: pearceite intergrown with stromeyerite, axinite as purple prismatic aggregates (2 to 3 centimetres in diameter), and andradite garnet grains in quartz.

The main shaft (575 feet deep) is on the north side of Highway 560 at Mile 63.7 (see page 67). Access is by a single-lane road, about 100 yards long. The headframe has been removed and, in the summer of 1972, the dumps were being levelled.

Refs.: 39 p. 119; 90 p. 249; 130 p. 24, 35; 144 p. 206, 208-209; 170 p. 404-405; 174 p. 158-159; 192 p. 183; 219 p. 766

Maps (T): 41 P/10 Gowganda
(G): P374 Nichol Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Walsh (Tonapah) Mine

Native bismuth, nickeline, chalcopyrite and hematite were associated with the silver-cobalt ore minerals in calcite veins cutting diabase at this former producer. Original exploration of the deposit was performed by Walsh Mines Limited beginning in 1913 from a shaft sunk to a depth of 480 feet. Tonapah Canadian Mines Company brought the mine into production in 1924 continuing to 1927. Minor production was recorded in 1940. A total of close to half a million ounces of silver and about 3,500 pounds of cobalt was removed from the deposit. In 1967, the property was leased by Siscoe Metals of Ontario Limited and underground workings were explored from the No. 6 shaft of the Miller Lake O'Brien Mine.

The mine is located on the south shore of Miller Lake and is reached by a road 0.55 mile long leading north from Highway 560 at Mile 64.7 (see page 67).

Refs.: 25 p. 3; 130 p. 27, 35; 170 p. 408-409

Maps (T): 41 P/10 Gowganda
(G): P374 Nicol Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Siscoe Mines

Nearly all the production of silver from the Elk Lake-Gowganda area was obtained from mines on the northwest side of Miller Lake, many of them operated in recent years by

Siscoe Metals of Ontario Limited (name changed to United Siscoe Mines Limited); cobalt and nickel were also won. To the end of 1972, the mines produced a total of 25,501,489 ounces of silver from 1,147,863 tons of ore milled.

The promising, rich surface showings discovered near Miller Lake in 1908 fulfilled, within a few years, miners' early optimistic expectations, production being sustained annually from 1910 to 1972 when the known ore was mined out and operations ceased. The largest producers were the Miller Lake O'Brien Mine, the Capitol Mine and the Castle Mine, in that order. Ore was processed at the Miller Lake O'Brien Mine's 400-ton per day mill. The common ore minerals in the deposits were native silver, argentite, smaltite, skutterudite, loellingite, safflorite, cobaltite, nickeline, and native bismuth; they occurred in calcite veins.

Descriptions of the mines at Miller Lake owned or leased by United Siscoe Mines Limited follow the road log. The settlement of O'Brien served the mining community.

Road log from Highway 560 at Mile 65.3 (see page 67):

Mile 0	At junction, proceed onto road to O'Brien.
1.35	Turn-off (right) to Miller Lake O'Brien Mine.
1.65	Bonsall Mine on left; Millerett Mine on right.
1.95	Castle Mine.
2.6	Capitol Mine.

Miller Lake O'Brien Mine

This mine was the longest continuous producer of silver in Ontario. Production began in 1910 by Miller Lake O'Brien Mines Limited, two years after the discovery by Messrs. Cartwright and LeHeup of rich surface showings that were regarded as the most promising veins revealed in the district to that time; the deposit was then known as the Gates claim. Mining operations commenced in 1909 by the Miller Lake Mining Company, and continued from 1910 to 1939 by Miller Lake O'Brien Mines Limited, from 1940 to 1944 by various concerns under lease, and since 1945 by Siscoe Metals of Ontario Limited (name changed in 1971 to United Siscoe Mines Limited). The mine was serviced by several shafts with extensive underground workings reaching a depth of 1,620 feet. Production from 1910 to 1966 amounted to approximately 38 million ounces of silver, 78,500 pounds of cobalt, 73,000 pounds of copper and 13,000 pounds of nickel.

The ore minerals occurred in calcite veins cutting diabase. Vugs containing polybasite-pearceite associated with proustite, xanthoconite, acanthite, stephanite and pyrargyrite have been reported from the veins. Chalcopyrite, galena, pyrite and sphalerite have also been reported.

The road log to the mine is given on page 66.

Refs.: 16 p. 1; 25 p. 27-32; 63 p. 11, 46; 130 p. 35; 144 p. 208; 170 p. 402-403; 217 p. 447; 254 p. 344

Maps (T): 41 P/10 Gowganda
(G): P374 Nicol Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Bonsall Mine

Although some very rich ore was removed from this mine during early mining operations, it did not become one of the great producers of the area. The ore minerals occurred in quartz-calcite veins cutting diabase; orange barite has been reported from the veins. In early exploration of the showings, highly crystallized native silver was found in a weathered calcite vein.

The deposit was discovered in 1908 by Percy Bonsall. In the following year, Messrs. Sifton and O'Brien sank a shaft, installed a plant, and removed some very rich ore. Subsequent operations resulting in production of silver were conducted by Bonsall Mines, Limited in 1910 and in 1920, and by Siscoe Metals of Ontario Limited between 1966 and 1969.

The mine consists of several shafts, the deepest being 515 feet. The total ore mined amounted to about 256,000 ounces of silver, the bulk of it recovered in 1967 and 1968.

Refs.: 16 p. 12-13; 25 p. 25-27; 39 p. 117; 90 p. 249; 159 p. 163; 160 p. 152; 161 p. 119; 162 p. 116; 163 p. 9, 11; 170 p. 374-375; 188 p. 123; 189 p. 57; 217 p. 447

Maps (T): 41 P/10 Gowganda
(G): P518 Haultain Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Millerett Mine

Phenomenally rich ore was encountered at this deposit originally staked in 1908 as the Blackburn claim. One vein measuring 2 inches wide and 150 feet long yielded about 500,000 ounces of silver. Ore assaying over 10,000 ounces of silver per ton was reported. In spite of the spectacularly rich ore recovered during early mining operations, production was short-lived and amounted to 611,822 ounces of silver and 5,000 pounds of cobalt.

Most of the production was obtained from a vein in conglomerate, the remainder coming from veins cutting diabase. One vein in conglomerate exposed by an open-cut contained sheets and nuggets (reported to be several inches long) of native silver associated with smaltite.

The mine was operated by Millerett Silver Mining Company from 1909 to 1912 using an adit and several shafts; the total production was obtained from 1910 to 1912, the first year's output accounting for over half the total. The mine was the district's largest producer at the time. From 1913 to 1939 the deposit was owned by Miller Lake O'Brien Mines Limited and, since 1945, by Siscoe Metals of Ontario Limited.

Refs.: 16 p. 16; 19 p. 182-183; 25 p. 3; 33 p. 111; 130 p. 35; 170 p. 382-383

Maps (T): 41 P/10 Gowganda
(G): P518 Haultain Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Castle (Castle-Trethewey) Mine

The silver-cobalt-bearing veins at this mine occur in diabase and in greenstone; axinite, epidote and specularite have been reported from the veins as well as an unusual porcelain-like green gangue (a mixture of calcite and amphibole) containing native silver with skutterudite and safflorite in dendritic form. During early mining operations, loose fragments of native silver measuring up to 15 inches across were recovered from an oxidized high-grade vein, and leaf silver was also found.

Original exploration of the deposit was undertaken by Castle Mining Company Limited in 1917. Production by Castle-Trethewey Mines Limited was continuous from 1920 until 1931 totalling nearly $6\frac{1}{2}$ million ounces of silver and about 300,000 pounds of cobalt. The property was subsequently acquired by McIntyre Porcupine Mines Limited in 1959, and by Siscoe Metals of Ontario Limited in 1967.

Refs.: 23 p. 30-31; 25 p. 26-27, 33-38; 130 p. 31; 170 p. 378-379; 185 p. 129; 203 p. 75

Maps (T): 41 P/10 Gowganda
(G): P518 Haultain Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Capitol Mine

The discovery vein on this property, formerly known as the Kilpatrick claim, was exposed in the early days by trenching over a distance of 700 feet, and at the time

(1908) was the longest vein known in the Gowganda area; it carried massive smaltite and nickeline with only a little silver and was associated with conglomerate. Subsequent discoveries were rich in silver, including one ore shoot that produced over 800,000 ounces of silver.

The Kilpatrick vein was staked in 1908. A shaft to a depth of 819 feet was put down by Capitol Silver Mines Limited during exploration in 1924-1925. Castle-Trethewey Mines Limited operated the mine from 1949 until 1959 when it was acquired by McIntyre Porcupine Mines Limited which continued mining operations until 1966. Siscoe Metals of Ontario Limited leased the property in 1967 and undertook a program of exploration and development. The underground workings extend to a depth of 1,425 feet and are connected to the main production shaft at the company's Miller Lake O'Brien Mine which also serviced the Capitol Mine. Production from 1951 to 1966 amounted to about 10,800,000 ounces of silver, 209,000 pounds of cobalt, and 18,000 pounds of nickel.

Refs.: 16 p. 16; 25 p. 32-33; 130 p. 24, 26, 33; 157 p. 130-131; 161 p. 119; 170 p. 376-377

Maps (T): 41 P/10 Gowganda

(G): P518 Haultain Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Mann (Manridge) Mine

This is the only mine in the Gowganda area from which crystals of native silver have been reported; octahedra and plates of silver forming a wedge averaging $\frac{1}{2}$ inch wide were found protruding from a 3-inch-wide decomposed calcite-quartz vein over a length of about 20 feet. The vein was exposed along the face of a low diabase ridge where it was discovered by Robert Mann in August, 1908; trenching revealed that it extended for several hundred feet with numerous concentrations of native silver. Reports of the discoveries of this and of other phenomenally rich veins led to a prospecting rush to the area west of Gowganda Lake; production was obtained from a few of the deposits, but the ore shoots, being small and near the surface, were mined out within a few years.

At the Mann Mine, loose slabs and nuggets of native silver leached from the weathered near-surface veins were recovered during early mining operations. Skutterudite, smaltite, argentite, safflorite, loellingite and cobaltite were associated with the silver. Crystals of native bismuth in calcite have been reported from the adjoining Boyd-Gordon claim which was acquired by Mann Mines in 1912 and worked in conjunction with the Mann deposit.

Development of the deposit was undertaken in 1909 by Mann Mines Limited; several shafts were sunk (the deepest to 200 feet), and production was recorded from 1912 until 1914 when operations ceased. Ore was processed at the Millerett mill. One ore shipment averaged 2,000 ounces of silver per ton and contained $2.00 per ton in gold. In

1952, Siscoe Metals of Ontario Limited leased the property and milled ore from the dumps. From 1968 until 1970, the same company conducted underground development of the former main shaft, constructed a new headframe and mine buildings, and mined some ore which was treated at its mill in O'Brien. The mine's total production of about 119,000 ounces of silver (most of it obtained between 1912 and 1914) was the highest of any silver mine west of Gowganda Lake at the time.

Road log from Highway 560 at Mile 72.2 (see page 68):

Mile 0 Proceed south along road to Milner Lake.

3.4 Junction; proceed onto road on right.

3.5 Mann Mine.

Refs.: 16 p. 16; 19 p. 185-186; 25 p. 51-53; 33 p. 101, 102-103, 109-110; 38 p. 95; 39 p. 118; 42 p. 124; 53 p. 120; 120 p. 101; 161 p. 120; 162 p. 116-117, 118; 170 p. 394-395; 182 p. 128; 251 p. 198

Maps (T): 41 P/10 Gowganda

(G): P475 Milner Township, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

1955-3 Gowganda silver area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Tyranite Mine

NATIVE GOLD, PYRITE, MAGNETITE, CHALCOPYRITE, CHLORITE

In veins occupying fractures at contact of granodiorite and greenstone

The Tyranite Mine is a former gold producer. During mining operations, some coarse native gold was obtained from the quartz-carbonate veins containing pyrite crystals and grains. The pyrite contained gold. Magnetite, chalcopyrite, and chlorite were associated with the pyrite.

The gold-bearing veins were discovered by L. O. Hedlund late in 1930 when prospectors directed their attention to the district following the discovery of rich gold-bearing veins at the Ashley deposit near Matachewan. The district had been prospected for silver following the prospecting rush in the Gowganda area, but the gold prospects were overlooked in spite of discoveries in 1911 of auriferous veins in the Shiningtree area to the west. By 1931, most of the favourable ground east of Shiningtree was staked for gold. Surface exploration of the Hedlund property was conducted by various concerns in 1931. Tyranite Mines Limited was formed in 1935 to develop the orebody. A three-compartment shaft was put down and a mill erected on the site. The underground workings reached a depth of 1150 feet. Production from 1939 until 1942, when the mine was closed due to wartime labour shortage, amounted to about one million dollars worth of gold.

Access to the mine is via a rough single-lane road, 1 3/4 miles long, that leads northwest from Highway 560 at Mile 80.6 (see page 68).

Refs.: 66 p. 25-26, 49-52; 220 p. 641; 227 p. 258; 231 p. 206; 232 p. 183

Maps (T): 41 P/11 Shining Tree
(G): 41b Tyrrell-Knight area, districts of Timiskaming and Sudbury (Ont. Ministry Natur. Resour., 1 inch to 3/4 mile)

2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Matona Mine

NATIVE GOLD, PYRITE

In sheared volcanic rocks

Native gold is associated with finely disseminated pyrite in quartz-carbonate veins in the sheared rock.

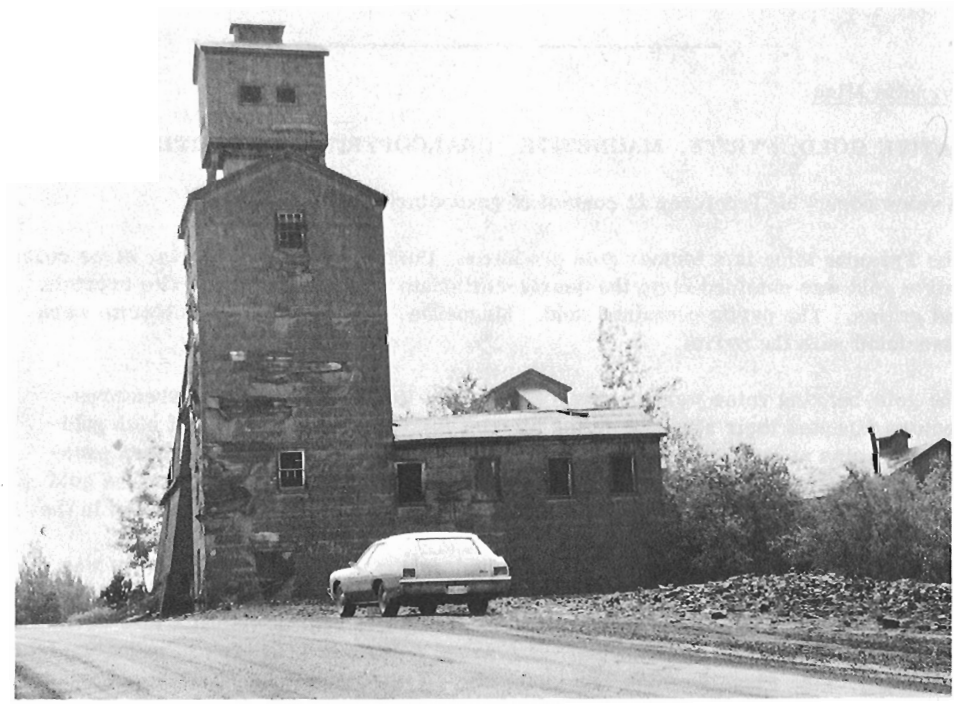


Plate XI. Ronda Mine, Mile 94.3 on Highway 560. (G.S.C. photo 161457)

The deposit was explored in the 1930's by Matona Gold Mines Limited. A shaft was sunk to a depth of 231 feet opening levels at 125 feet and 215 feet. Development ceased in 1937 and there was no production.

The mine is on the east side of Hydro Creek and south of Highway 560. Access is by a trail, 650 yards long, leading south from Highway 560 at Mile 84.0.

Refs.: 177 p. 178-179; 226 p. 104; 228 p. 176

Maps (T): 41 P/11 Shining Tree
(G): 41b Tyrrell-Knight area, districts of Timiskaming and Sudbury (Ont. Ministry Natur. Resour., 1 inch to 3/4 mile)

2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Ronda (Wasapika-Ribble) Mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SPHALERITE, EPIDOTE

In veins cutting chlorite schist

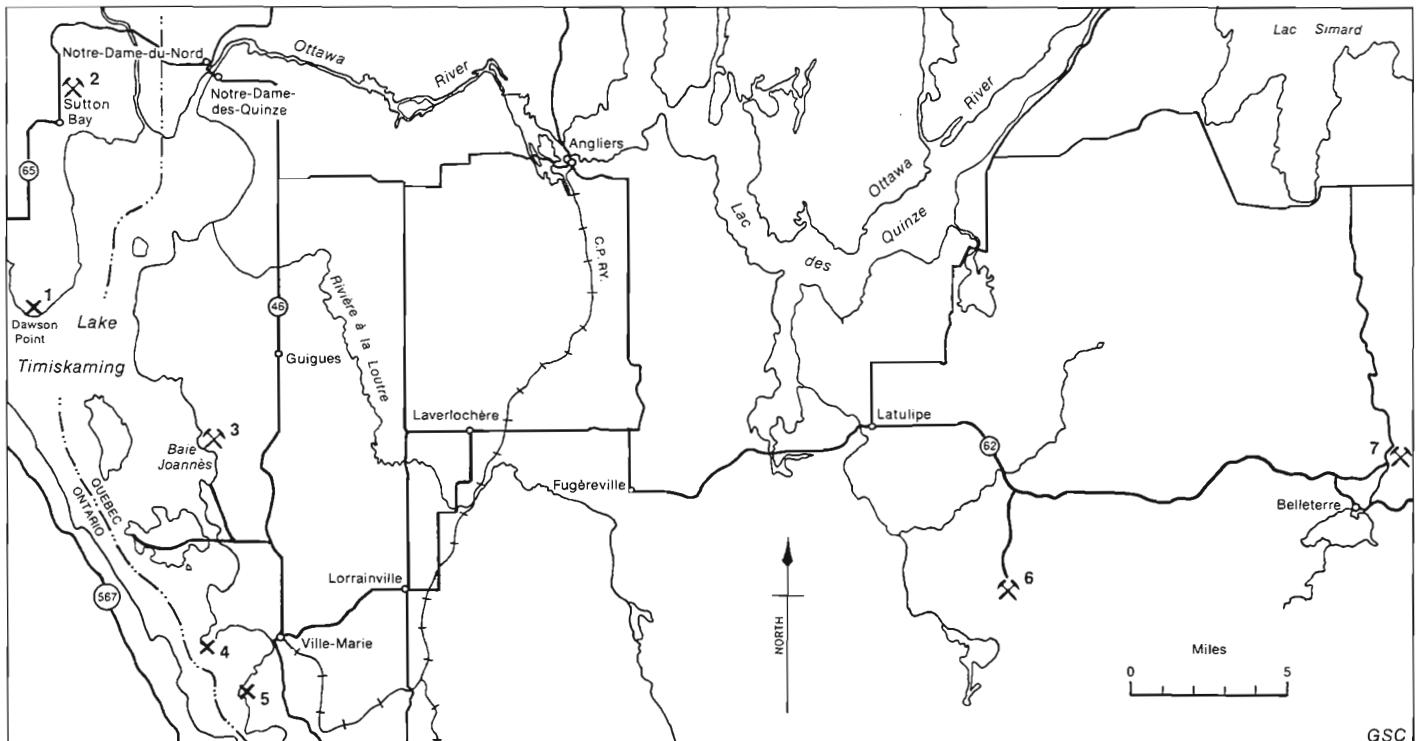
Native gold was associated with small amounts of pyrite, chalcopyrite, and sphalerite in quartz at this former gold mine. The gold was a pale colour due to its high silver content and was localized in fractures in the quartz. Tiny prismatic aggregates of epidote were noted in quartz specimens found on the mine dumps.

Gold was discovered in the West Shiningtree Lake area in 1911, at the Ronda deposit in 1912. In the next year, about 300 prospectors camped at Wasapika Lake, numerous claims were staked, and many of the veins underwent development; camps were built, and mining equipment installed, but the rich pockets of high-grade ore were few and irregularly distributed and very little gold was produced. The most promising of the discoveries was the one known as the Ribble vein that became the Ronda Mine. It was discovered by two prospectors who were grubstaked by A. Ribble. Development was undertaken by Wasapika Consolidated Mines Limited in 1916 and continued until 1923. Activity was renewed in 1934 by Neville Canadian Gold Mines Limited followed by Bramor Mining (Ontario) Limited in 1935. Ronda Gold Mines Limited conducted operations from 1936 until 1939 when the mine closed. The underground workings were reached by two shafts sunk to depths of 325 feet and 700 feet respectively. A mill operated on the site and some ore was treated in 1939.

The mine is located on Highway 560 at Mile 94.3 (see page 68); the headframe, some old buildings, and a rock-dump mark the site.

Refs.: 54 p. 83-84, 92-94; 85 p. 30, 45-46; 99 p. 150; 176 p. 143-144; 205 p. 193-194; 220 p. 641; 222 p. 593; 229 p. 234; 231 p. 239

Maps (T): 41 P/11 Shining Tree
(G): 29a West Shiningtree gold area, district of Sudbury (Ont. Ministry Natur. Resour., 40 chains to 1 inch)



1. Dawson Point occurrence
2. Langis Mine
3. Wright Mine
4. Pointe au Vin granite occurrence
5. Cedar Point grainte occurrence
6. Lorraine Mine
7. Belleterre Mine

Map 7. New Liskeard — Belleterre area

Maps (G): 2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

This completes the description of occurrences in the Elk Lake - Gowganda - Shiningtree area.

Dawson Point Occurrence

Fossils

In sandstone, dolomitic limestone

Silurian fossils including corals, bryozoans, brachiopods and trilobites occur in rock exposures along the shore of Lake Timiskaming at Dawson (Wabi) Point. The rocks are exposed at the end of the road and along the escarpment on the east side of the point. The peninsula that terminates at Dawson Point is underlain by limestone and shale capped by resistant dolomitic limestone, all of Silurian age. The rock formation forms precipitous cliffs along the eastern shore of the peninsula.

Road log from Highway 11B at Mile 15.5 (see page 17):

Mile 0 Junction Highway 11B and Highway 65E; proceed east onto Highway 65E.

1.0 Junction; turn right onto gravel road.

1.5 Junction at cemetery; turn left.

5.4 End of road at Dawson Point.

Ref.: 87 p. 4, 34-36, 38-39

Maps (T): 31 M/5E Cobalt
(G): 2066 Casey and Harris townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Langis (Casey) Mine

The minerals comprising the orebody at this former silver-cobalt producer are essentially the same as those occurring in the Cobalt mines (see page 17). A new mineral, langisite, was first described from this deposit; it was found in association with safflorite, maucherite, parkerite, cobalt pentlandite, and with bismuth and cobalt sulphides. Nickeline, arsenopyrite, pyrite, erythrite and annabergite, and specimens of Cobalt conglomerate are common on the dumps.

The deposit was discovered in 1906 by David Bucknell who happened to notice cobalt bloom (erythrite) on an outcrop. Development of the deposit was undertaken in the same year by Casey Cobalt Silver Mining Company Limited and production began in 1908. The company's operations were interrupted in 1917 due to a fire in the plant, and finally ceased in 1919. Small-scale operations were carried on by various individuals in the 1940's.

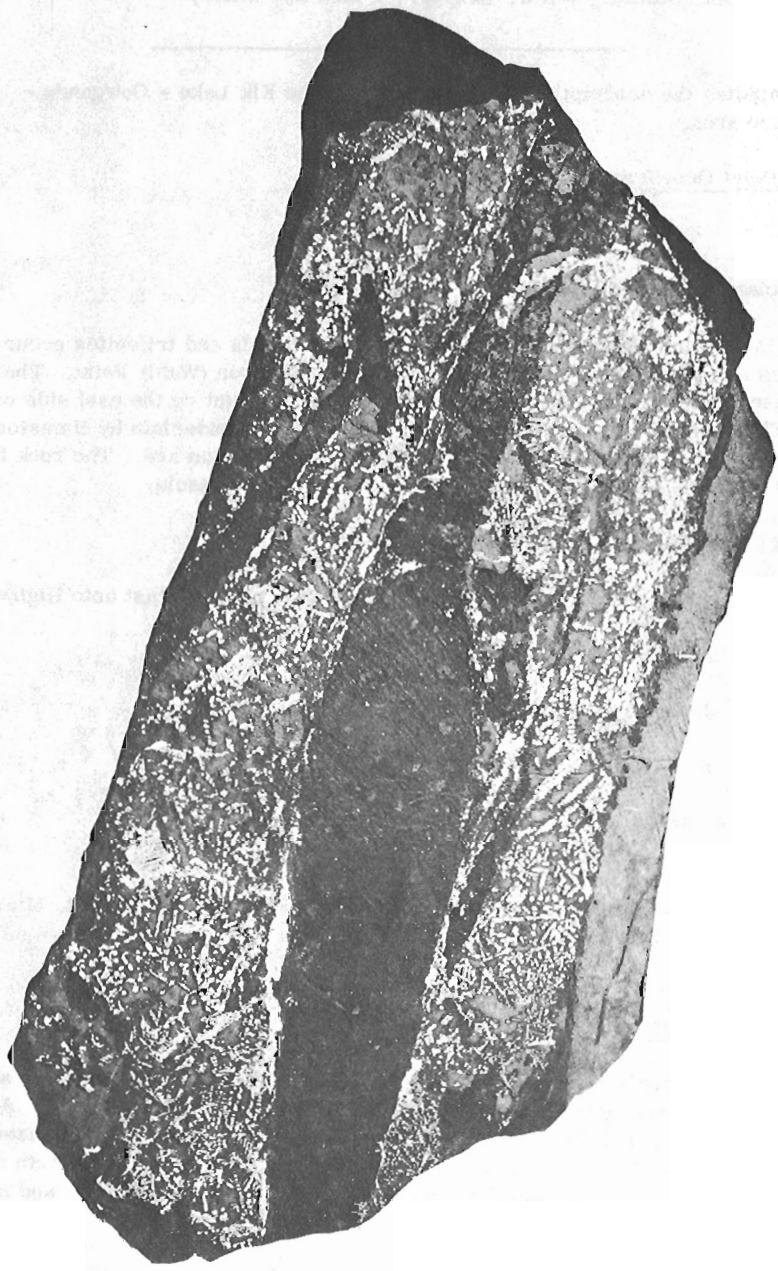


Plate XII.

Dendritic native silver in massive cobalt-nickel arsenides, Langis Mine. Slab is 9½ inches long and 4 inches wide. (GSC photo 202304A)

Mining was resumed in 1956 by Langis Silver and Cobalt Mining Company Limited with operations continuing until the summer of 1968. The total production during this period amounted to 7,134,280 ounces of silver, over a quarter million ounces of cobalt, and some nickel and copper; the output from previous operations was about 2,800,000 ounces of silver. The headframe, shaft and some mine buildings were destroyed by a fire late in 1968. The mine was serviced by a number of shafts, the deepest being 488 feet below the surface.

The mine is on the west side of Casey Mountain which rises about 250 feet above the surrounding lowland and is composed of Huronian rocks (conglomerate, arkose, greywacke) topped by the erosional remnants of a diabase sill that intruded the existing rocks in Proterozoic time.

Road log from Highway 11B at Mile 15.5 (see page 17):

Mile 0 Junction Highway 65E and Highway 11B; proceed east onto Highway 65E.

1.0 Turn-off to Dawson Point; continue along highway.

2.9 Road-cuts at bend expose dolomitic limestone containing coral fossils of Silurian age.

3.8 Road-cuts expose buff dolomitic limestone containing cavities lined with tiny crystals of colourless to white calcite.

5.7 Dolomitic limestone with abundant shell fossils is exposed by road-cuts at the bend in the highway. The rock is of Silurian age.

6.7 Junction gravel road leading up the escarpment that extends south to Dawson Point. The escarpment rises abruptly from the clay-covered plain that was traversed by Highway 65E from New Liskeard. The varved (or bedded) clay was deposited by glacial lake Ojibway-Barlow that existed at the close of Pleistocene time flooding the area from present Lake Timiskaming northward to Lake Abitibi. The clay is believed to have been deposited over a span of about 3,600 years; it furnishes the farmlands of the district with rich, fertile soil.

The road log continues along Highway 65E to the Ontario/Quebec border.

7.7 Junction road on right to Langis Mine; the mine is 0.4 mile from this junction.

The road log continues along Highway 65E which parallels the west side of Casey Mountain.

9.0 Road-cuts on both sides of the highway expose Ordovician limestone (at the south end of the cuts) and red hornblende syenite (north end of cuts) that intruded the older Precambrian rocks in Archean time. The syenite is exposed conspicuously on the west side of Casey Mountain to Mile 9.6. The limestone contains cavities lined with colourless to white calcite crystals that fluoresce bright pink under ultraviolet rays ("short" rays more effective than "long"). Barite as colourless, pink or white tiny

Plate XIII. Paulson Bay at north end of Lake Timiskaming. The farming land in the foreground was, about 10,000 years ago, the bed of glacial Lake Ojibway-Barlow; when the glaciers retreated, the lake disappeared leaving behind stratified clay deposits that form the Great Clay Belt of northern Ontario and Quebec. (G.S.C. photo 161454)

Mile 9.0 (cont'd) platy aggregates, some forming hemispheres, is associated with the calcite. Barite also occurs as orange veins in the limestone bordering the calcite; marcasite is found with it.

At about this point the highway begins a circular course around the northern end of Casey Mountain.

10.6 Road-cut on right exposes Nipissing diabase that forms a resistant cap on Casey Mountain.

12.1 Bridge over Blanche River which was so-named because of its milky appearance due to the suspension of fine clay that forms the bed and banks of the river.

13.7 Ontario/Quebec border.

Refs.: 87 p. 4-6, 46, 145; 145 p. 101; 142 p. 153; 161 p. 111, 112; 170 p. 320-321; 195 p. 2-3, 16, 23, 65-69; 251 p. 186

Maps (T): 31 M/12E New Liskeard
(G): 2066 Casey and Harris townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Descriptions of localities between the Ontario/Quebec border and Belleterre, Quebec are given below; access is via Highway 46 and Highway 62.

Wright Mine

GALENA, SPHALERITE, PYRITE, CALCITE

In brecciated zone in Cobalt conglomerate

The deposit is believed to be the first mineral deposit found and reported on in northern Canada and, although there are few signs of it at the site, it is described here because of its historical interest. Argentiferous galena occurred with sphalerite and some pyrite and quartz in coarse white calcite that cemented fragments of conglomerate forming a breccia. The silver content of the galena ranged from 18 to 24 ounces per ton; the pyrite carried traces of gold. The rock containing the ore-bearing breccia was conglomerate with a porphyritic texture.

The first report of lead ore at this locality on the eastern shore of Lake Timiskaming was made by the Sieur de Troyes in 1686 when he led a detachment of 100 French explorers on a military expedition to James Bay. The deposit had been, however, known to the Indians of the district and possibly to the officers of the Compagnie du Nord trading company which had established in 1668 a trading post 18 miles from the mine. At Mattawa, de Troyes engaged an Indian by the name of Coignac to guide him to the deposit which he did on May 24, 1686; de Troyes recorded the event in his diary: "On the twenty-second, it rained part of the day but this did not prevent me from leaving after mass accompanied by three canoes to visit a mine located six leagues from the house; I had ordered Sieur de ste helenne, whom I had left behind so that he could finish taking care of his business, to meet me the following day with the rest of the detachment and to remain in the northern trail of the lake to facilitate this meeting. Two leagues from the house I saw three indian cabins. I traded with the Indians and obtained a canoe with a capacity of four which I used for the rest of the trip and for my return to Québec. I camped there on an island because time did not permit me to go any further.

"On the twenty-third, after Mass, we walked to find this mine, guided by a man named Coignac. During our search we came upon an indian cabin whose inhabitants had killed a large moose the evening before; this gave the opportunity to camp nearby so that Coignac might find the mine more easily. He searched without success for the rest of the day. During that time two lieutenants left the house to rejoin us with all our people. However, bad weather separated them; one took to the south, one to the north, others to the islands, the final result being that very few people joined me.

"On the twenty-fourth, there lasted for the entire day a fairly strong wind accompanied by rain, but Coignac was now certain of the mine's location and he assured me that it was very near. I paddled while he steered the canoe, and we left, despite the weather, convinced that we could find the mine. Indeed, we did find it. The mine is located to the east and west, on the western shore of the lake; there is a rock shaped like a half-circle measuring fifty feet on the shore; it is ten feet above the

Figure 2. Part of Jean Baptiste Louis Franquelin's map of Canada: "Carte de l'Amerique septentrionnalle ... contenant les pays de Canada ou Nouvelle France ... " produced in 1688. At this early date, the lead deposit now known as the Wright Mine, was already a landmark since "Ance de la Mine" (the location of the mine) is indicated on the map below "LAC TEMISCAMING". (Public Archives of Canada, National Map Collection C 54156).

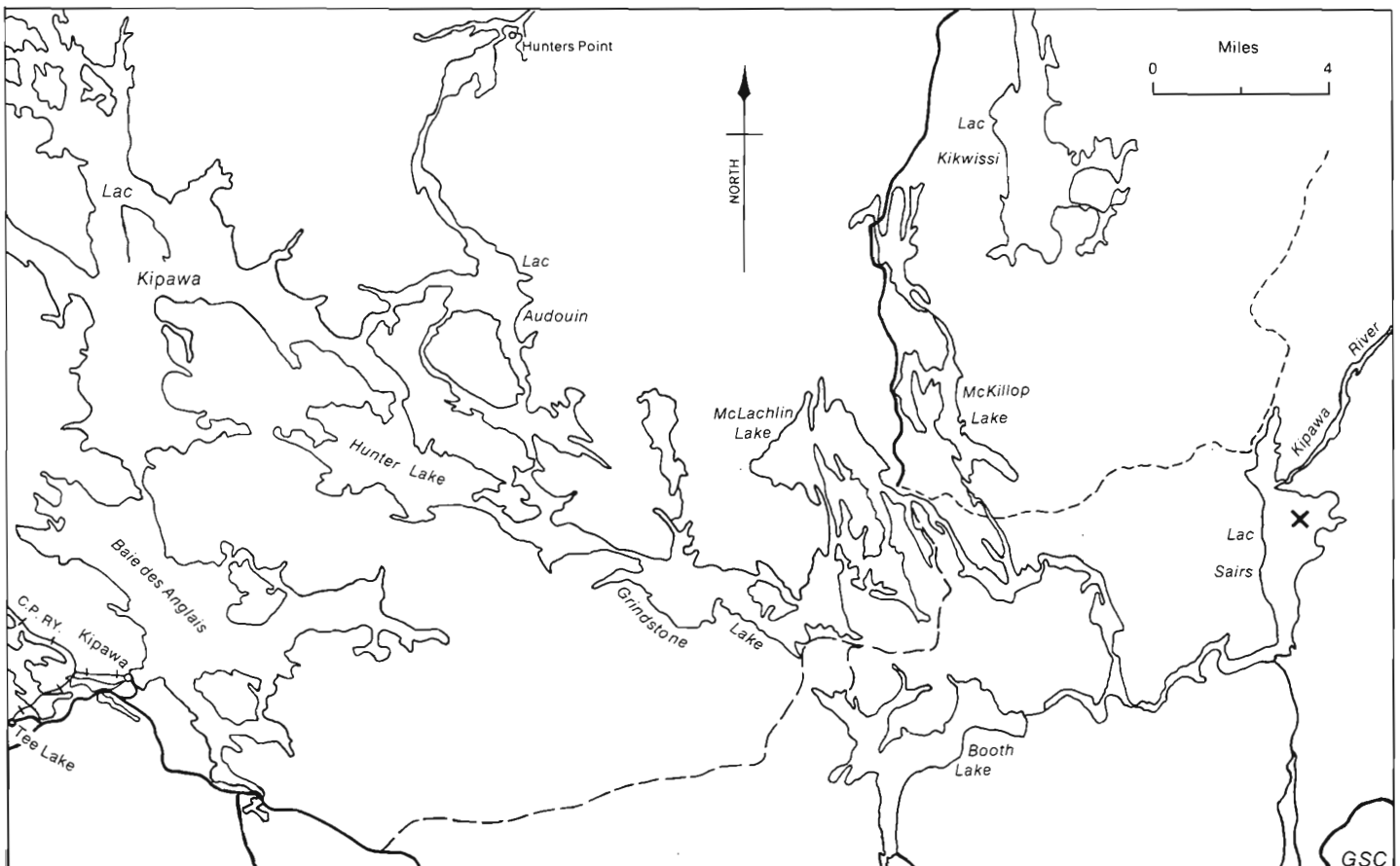
water level and has a depth of 100 feet, and since there is no soil on it, it loses itself under a mountain of rocks. With great difficulty, we took some small pieces and returned to camp" (Ref.: 27 p. 45-46).

Two months later Le Chevalier de Tonty was despatched by M. de Denonville to investigate the occurrence; he collected specimens of a yellow metallic mineral and reported the deposit to contain lead or tin minerals, but it was deemed by M.M. Raudot to be too distant from Montreal for profitable exploitation at that time (1708).

The deposit was re-discovered in about 1850 when E.V. Wright of Ottawa, who held timber rights in the area, happened to dislodge with his boot a chip of the lead-bearing ore. In 1877, he submitted specimens of the ore to the Geological Survey of Canada for assay and in 1877-1878 he and Messrs J.M. Courier and Eustis sank a shaft to a depth of 100 feet, installed a concentrator, and shipped about 10 tons which sank to the bottom of the Ottawa River when the barge smashed in the rapids at Deux Rivières. His two young sons, M.P. Wright and N.C. Wright accompanied and assisted their father, and with the knowledge gained, later made the first discoveries of silver-bearing veins in the Kerr Lake area, at the Drummond and Kerr Lake mines respectively.

Subsequent operations at the Wright Mine were conducted in 1885 by George Goodwin and G.P. Brophy who installed a 5-ton stamp mill that later burned down; no shipments were made. Further underground development was done by Mattawa Mining and Smelting Company of New York in 1890-1891, and a plant was installed. A few years later, Robert Chapin of the Ingersoll Rock Drill Company, New York, deepened the shaft to 250 feet, erected a 50-ton mill and the first air compressor in the district, and shipped concentrates. The shaft was continued to a depth of 300 feet by Petroleum Oil Trust of London in 1895 and a shipment of lead concentrates was made to Swansea, Wales. British Columbia Lead Company was also involved in operations before the mine was closed in 1902. Between then and 1907, the property was acquired by the LaRose Mining Company interests which dewatered the mine in 1915 and, in the following year, continued the shaft downward to 350 feet. The property then remained idle until 1925 when the Alpha Mining Syndicate (name changed from the LaRose Mining Company) dewatered the mine and did some surface work and diamond drilling; at this time, the underground workings were investigated by H.C. Cooke of the Geological Survey of Canada. The ore was found to consist almost entirely of argentiferous galena at the surface and at the 50-foot level; below that the galena decreased with depth and there was a corresponding downward increase in the proportion of sphalerite to the 179-foot level below which both sulphides became less abundant. When the mine was sampled in 1916, the average grade of ore at the 50-foot level was 1.72 ounces of silver and 9.62 per cent lead. Another investigation of the deposit was made in the 1947-1948 by Villa Lead Mining Corporation Limited. In 1952, Cobalt Badger Silver Mines Limited dewatered the shaft and explored the deposit by underground diamond drilling; this investigation indicated an estimated ore reserve of 100,000 tons to a depth of 400 feet averaging 5 per cent lead, 1.8 per cent zinc, and 1.5 ounces of silver per ton. The property was acquired in about 1968 by two Cobalt prospectors, Ted Brown and Ed McCullough who optioned it in 1971 to SOQUEM. The mine consists of a shaft, 350 feet deep, with levels at 50, 100, 179, 230 and 330 feet.

The deposit outcrops at the extreme northern tip of the peninsula forming the north side of Joannès Bay (Anse à la Mine) on the eastern shore of Lake Timiskaming. The shaft, now inaccessible, is 20 feet inland. The exposure on the shore measures



Map 8. Lac Sairs amazonite occurrence.

31 feet by 65 feet; a cliff exposing Cobalt conglomerate is 200 feet south of the deposit. There are no roads leading to the deposit. A 4-mile road leading west from Highway 46 at a point $6\frac{1}{2}$ miles south of the church at Guigues reaches the south side of Joannès Bay from which access is by boat, a distance of $1\frac{1}{2}$ miles. Alternatively, the locality is about 7 miles by water from Haileybury and 9 miles from Ville-Marie.

Refs.: 5 p. 147-149; 27 p. 43-46; 32 p. 23-24; 36 p. 20-27; 57 p. 28-30; 124 p. 665-667; 127 p. 130-132; 206 p. 46; 213 p. 38-39; 250 p. 13

Maps (T): 31 M/6W Ville-Marie
(G): 387A Ville-Marie sheet (west half), Témiscamingue County, Quebec (G.S.C., 1 inch to 1 mile)

Ville-Marie Granite Occurrences

GRANITE

Pink to red granite occurs in an area extending from Témiscaming to Rollet, and includes the Ville-Marie area. The granite is medium- to coarse-textured, rose to dark red in colour, and is composed of microcline, quartz, biotite, and some hornblende. Granite was formerly quarried near the shore of Lake Timiskaming at Pointe au Vin, 2 miles west of Ville-Marie; the stone was used for the manufacture of monuments. Similar rock outcrops at Cedar Point, about 2 miles southwest of Ville-Marie.

Refs.: 28 p. 75; 134 p. 9-11

Maps (T): 31 M/6W Ville-Marie
(G): 387A Ville-Marie sheet (west half) Témiscamingue County, Quebec (G.S.C., 1 inch to 1 mile)

Lac Sairs Amazonite Occurrence

AMAZONITE

In pegmatite

Apple-green to emerald green amazonite occurs in a pegmatite dyke exposed on an island at the north end of lac Sairs. It is used as a gem and an ornamental stone. The deposit has been stripped near the top of a knoll on the south side of the island, the largest of three islands at the north end of the lake about a mile southeast of the mouth of the Kipawa River.

The property belongs to Joseph Haberer of St. Catharines, Ontario. Access from Kipawa is via a 50-mile canoe route or by air, a distance of 27 miles. Kipawa is 53 miles south of Ville-Marie.

Map (T): 31 L/16W Lac Sairs.

Laverlochère Granite Occurrence

HORNBLENDE GRANITE

A greenish granite outcrops along hills and ridges east of Laverlochère; blocks of it were formerly quarried for use as a monument stone. The green colour is due to alteration of some of the feldspar. The granite is composed of equally distributed greenish feldspar, rose-coloured feldspar, colourless quartz and dark green hornblende; it is referred to as "four-colour" granite. It takes a high polish.

Pink granite is exposed by road-cuts along Highway 62 from Fugèreville to and beyond Latulipe. Epidote occurs as crystalline aggregates forming crusts along surfaces of the granite.

Refs.: 28 p. 75; 134 p. 11-12

Maps (T): 31 M/6E,W Ville-Marie
(G): 387A Ville-Marie sheet (west half), Témiscamingue County, Quebec (G.S.C., 1 inch to 1 mile)

388A Ville-Marie sheet (east half), Témiscamingue County, Quebec (G.S.C., 1 inch to 1 mile)

Lorraine Mine

CHALCOPYRITE, PYRRHOTITE, PENTLANDITE, PYRITE, SPHALERITE, GALENA, ROZENITE, GOETHITE, GYPSUM, POSNJAKITE, BROCHANTITE

At contact of gabbro and andesite

The ore at this former copper-nickel producer consisted of chalcopyrite, pyrrhotite, and pentlandite with minor amounts of pyrite, sphalerite, and galena. Black amphibole, calcite, quartz, and chlorite were associated with the metallic minerals which occurred in massive form and as disseminations. Secondary minerals have formed coatings or encrustations on specimens on the rock dumps; included are earthy white rozenite, rusty brown goethite, white transparent gypsum (as "micro" rosettes), greenish blue powdery posnjakite, and bright green brochantite. Dark grey porphyry with white feldspar phenocrysts was found on the dumps.

The deposit, discovered in 1961 by O'Brien Rivard, was originally explored by Mespi Mines Limited. In 1963, Lorraine Mining Company Limited commenced development of the deposit. A mill was constructed on the site and a shaft was put down to 1,089 feet. Production from 1965 until 1968 amounted to about 14 million pounds of copper and nearly 6 million pounds of nickel. The concentrates were treated at the Noranda smelter.

The mine is located west of Belleterre. Access is by a road, 3.1 miles long, leading south from Highway 62 at a point 6.2 miles east of the highway bridge at Latulipe. The turn-off is 12.5 miles west of Belleterre. There is a water-filled pit, some rock dumps, and a building on the site.

Refs.: 101 p. 10-12; 241 p. 251; 245 p. 217; 246 p. 229

Maps (T): 31 M/7W Belleterre
(G): 1615 East half of Gaboury township, Témiscamingue County (Quebec Dept. Natur. Resour., 1 inch to 1,000 feet)

389A Guillet Lake sheet (west half), Témiscamingue County, Quebec (G.S.C., 1 inch to 1 mile)

Belleterre Mine

NATIVE GOLD, PYRITE, PYRRHOTITE, SPHALERITE, GALENA, CHALCOPYRITE

In quartz veins cutting volcanic rocks

Native gold occurred in white, greyish and bluish quartz at this former gold mine. Pyrite, pyrrhotite, sphalerite, galena, and chalcopyrite were present in the quartz and in the host rocks. The rock dumps furnish specimens of the sulphides and of a dark grey, fine-grained porphyry.

Plate XIV. Open pit at Lorraine Mine. (G.S.C. photo 161455)

Promising gold-bearing veins were discovered in the Belleterre area including this deposit in 1933 and most of the development work was done on the Belleterre Mine. An exploration shaft was sunk on the deposit in 1935 by McIntyre Porcupine Mines Limited. The mine became a producer in 1936, Belleterre Mines Limited (later became Belleterre Quebec Mines Limited) being the operator. Production continued except for an interruption of a few months in 1937-1938 until 1959 when the mine was closed. Gold valued at almost 27 million dollars was produced. The mine was serviced by several shafts of which the deepest is 2,250 feet.

The foundations of dismantled mine buildings mark the mine site. There are a few rock dumps in the vicinity of the shafts.

Road log from Belleterre village:

Mile 0 — Proceed east along Highway 62 from the intersection of the street leading to the church.

0.2 — Junction; turn left.

1.8 — Junction; turn right.

2.1 — Shaft No. 2 on right. The road continues to other workings.

Refs.: 2 p. 32-43, 55; 74 p. 1, 28-30; 236 p. 28; 237 p. 24

Maps (T): 31 M/7E Belleterre
(G): 807 Beleterre area, Témiscamingue County (Que. Dept. Natur. Resour., 1 inch to 1,000 feet)

390A Guillet Lake sheet (east half), Témiscamingue County, Quebec (G.S.C., 1 inch to 1 mile)

The main road log from Cobalt to Timmins that began on page 3 is resumed.

Mile 0 — Junction Highway 11 and Highway 11B (turn-off to Cobalt); proceed north along Highway 11.

2.0 — Diabase displaying well-developed jointing is exposed along the ridges bordering the highway, and in road-cuts to Mile 5.6.

5.9 — Junction Highway 558 to Haileybury.

7.6, 9.0 — Limestone exposed by road-cuts contains crinoids, and cavities lined with "micro" crystals of calcite.

10.2 — Junction Highway 65.

11.7 — Junction Highway 11B to New Liskeard.

Mile 17.2 Quarry on east (right) side of road. Paleozoic limestone was formerly quarried here. Coral fossils are abundant in the limestone, some replaced by transparent "micro" crystals of calcite and of quartz. Massive and botryoidal white chalcedony and white chalk-like quartz also occur in the limestone. Similar rock is exposed by road-cuts on Highway 11 at Mile 16.7 and Mile 18.4.

19.1 Junction Highway 569.

28.2 Earlton, at junction Highway 571.

36.6 Junction road to Kap-Kig-Iwan Provincial Park.

42.4 Road-cuts expose pink and grey granitic rocks; the exposures continue to Mile 48.8.

49.0 Junction Highway 112. Granitic rocks of Archean age are exposed at intervals along Highway 11 over a distance of approximately 9 miles. Grey granitic porphyry with pink feldspar phenocrysts was noted at Mile 50.6, and pink syenite (very coarse in places) between Mile 52.5 and 54.4. Dark igneous rocks are exposed between Mile 55.1 and 60.6. Epidote commonly occurs as a coating or crust on the rock surfaces.

60.8 Junction Highway 66 to Matachewan.

The Matachewan Area

The Matachewan district was prospected as early as 1909, but since the diabase rock favourable to the occurrence of silver ores sought by prospectors, was not encountered in the area, the attention of prospectors shifted elsewhere and the gold deposits were overlooked. Within a few years after the discovery of gold (in 1909) in the Porcupine district to the north, numerous claims were staked in the vicinity of Matachewan and in areas to the west. The earliest development work was done by Mr. H. Minard on claims near the forks of the Montreal River (just south of Matachewan village), but the results were not encouraging and work was discontinued.

Important discoveries of gold were, however, made in 1916 by Jake Davidson and in 1917 by Sam Otisse on claims that later became the Young-Davidson Mine and the Matachewan Consolidated Mine respectively. These promising discoveries attracted a rush of prospectors to the district and numerous claims were staked. The properties did not become important producers until the 1930's when the price of gold was increased. Between 1934 and 1957, a total of nearly one million ounces of gold and about 165,000 ounces of silver were obtained from the area's two gold producers: the Young-Davidson Mine and the Matachewan Consolidated Mine.

Active mining in the area ceased in 1964 with the closing of the Ryan Lake Mine, a former copper-gold-silver producer. Other deposits in the Matachewan area have been exploited in the past for asbestos, barite, and iron. The attractive rock referred to as Matachewan or Bannockburn porphyry occurs in the area.

Refs.: 22 p. 215; 35 p. 1; 114 p. 1-2, 23-24

Maps (T): 41 P Gogama
42 A Timmins
(G): 2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Road log to mines, occurrences in Matachewan area (Descriptions of the occurrences follow the road log):

Mile 0 Junction highways 66 and 11; proceed onto Highway 66 (west).

Plate XV. Diabase porphyry exposed by a road-cut on Highway 66 West at Mile 7.1. (G.S.C. photo 161451)

Mile 4.8 Road-cut on right exposes pink granite of Archean age.

7.1 Road-cuts expose Matachewan diabase porphyry and pink hornblende-biotite-granite, the latter containing irregular patches of epidote (commonly $\frac{1}{4}$ to $\frac{1}{2}$ inch across), and grains of titanite. The epidote-bearing granite makes an attractive ornamental stone. The porphyry is composed of a charcoal grey matrix enclosing rectangular and rounded blotches (measuring up to 1 inch in diameter) of light olive green feldspar that has altered almost completely to mica. The rock takes a good polish and can be used for ornamental purposes.

7.5 to 9.3 Granitic gneiss and hornblende granite are exposed by an intermittent series of road-cuts.

12.0 Bridge over Englehart River.

19.95 Syenite cut by a quartz vein is exposed on the right (north) side of the highway.

20.0 Trail on right leading to a pit in a wooded area on the north side of the highway. The pit exposes a quartz vein containing pyrite and black tourmaline. The vein cuts red syenite. The occurrence was investigated for gold several years ago.

21.2 Red syenite is exposed by a series of road-cuts.

21.9 Road-cut on right exposes conglomerate.

25.0 Junction Highway 65 to Elk Lake.

27.9 Matachewan, at bridge over Montreal River. The site of the former trading post operated by the Hudson's Bay Company – Fort Matachewan – is located on the east side of the Montreal River, about 4 miles north of this bridge.

Highway 66 becomes Highway 566 at Matachewan.

28.7 Cobalt conglomerate is exposed along the highway at intervals to Mile 29.0.

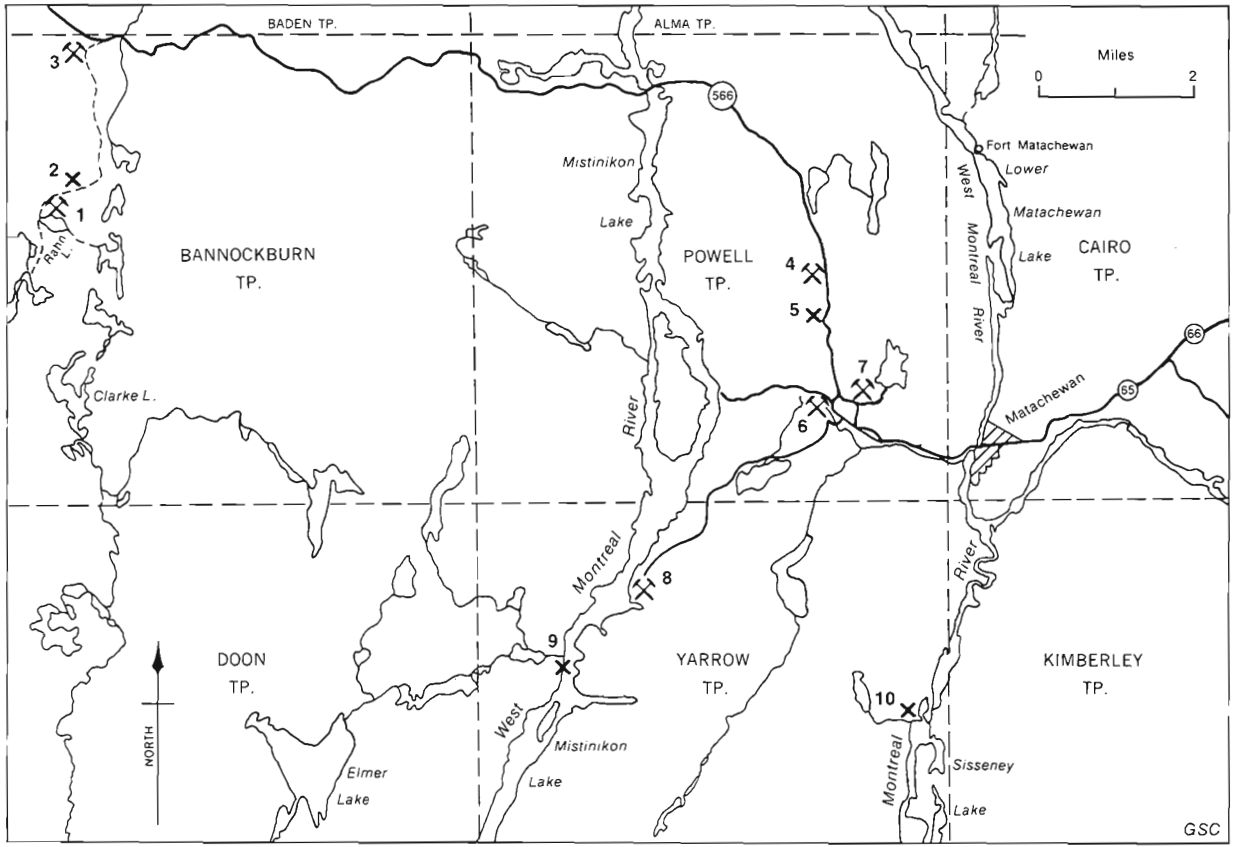
29.7 Junction (on left) Mistinikon Lake Road. This is the turn-off to the Young-Davidson Mine, the Matarrow Mine, and the Yarrow barite occurrence.

29.9 Turn-off (right) to the Matachewan Consolidated Mine.

30.9 Junction single-lane road (on left) to Ethel copper occurrence.

31.9 Junction single-lane road to Ryan Lake.

32.0 Ryan Lake Mine on left.



1. Rahn Lake Mine
2. Bannockburn porphyry occurrence
3. Ashley Mine
4. Ryan Lake Mine
5. Ethel copper occurrence
6. Young-Davidson Mine
7. Matachewan Consolidated Mine
8. Mattarrow Mine
9. Yarrow barite occurrence
10. Yarrow iron occurence

Map 9. Matachewan area.

Mile 35.8 Bridge over Mistinikon Lake narrows.

38.9 Beaudin Lake on right.

40.8 Powell Lake on right.

44.0 Junction: Highway 566 ends at this junction. Road on left (Rahn Lake road) leads to Ashley Mine, Matachewan porphyry occurrence, and to Rahn Lake asbestos mine.

Maps (T): 41 P Gogama
42 A Timmins
(G): P264 Flavelle Sharp area, district of Timiskaming (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

2078 Holmes-Burt area, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

2110 Powell and Cairo Townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Yarrow Iron Occurrence

HEMATITE, SPECULARITE

In quartz

Hematite occurs as radiating columnar aggregates forming botryoidal masses in quartz lenses enclosed by Cobalt conglomerate and quartzite. Specular hematite is also present.

The deposit was staked about 60 years ago and was known as the LaBrosse claims. It has been exposed by pits about $\frac{1}{4}$ mile northwest of Sisseney (Nest) Lake and about 4 miles south of Matachewan.

The property belongs to Mr. William Legace of Matachewan.

Refs.: 22 p. 238; 171 p. 478-479

Maps (T): 41 P/15 Matachewan
(G): 1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)
2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Young-Davidson Mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, MOLYBDENITE, SPECULARITE, TOURMALINE, MAGNETITE, BARITE

In red syenite porphyry

Native gold occurred as grains in quartz veinlets occupying fine fractures in syenite porphyry, and in pyrite disseminations in the porphyry at this former gold producer. The deposit also contained chalcopyrite, galena, molybdenite, scheelite, specularite, tourmaline, magnetite and barite. The syenite on the property varies from grey to brown and red, but the ore was associated only with the red syenite. Magnetite, pyrite, apatite, titanite and zircon are found as accessory minerals in the syenite. A rock composed of green mica, quartz, and a carbonate has been reported from the deposit.

The deposit was discovered in 1916 by prospector, Jake Davidson after he had found some gold-bearing rock on Davidson Creek. The discovery consisted of sparsely mineralized quartz in rusty carbonatized greenstone containing green mica. It was originally investigated by trenching in 1917. Porcupine Goldfields Development and Finance Company Limited, a British company formed to develop gold mines in the Porcupine district, conducted a program of development in 1923-1924; a shaft was sunk to 200 feet and a mining plant was installed, but operations were discontinued due to the low-grade ore. A few years later, the deposit became the property of Young-Davidson Mines Limited which entered into an agreement with Hollinger Consolidated Gold Mines Limited to develop the orebody. Development commenced in 1933 and production in 1934. A mill was erected on the site. Until the end of 1955 when operations ceased, the mine produced nearly half a million ounces of gold and about 132,000 ounces of silver.

The mine was serviced by a shaft from which the underground workings reached a depth of 1,075 feet; ore was also mined from an open pit. The foundations of mine buildings and some small rock dumps remain on the site.

The mine is on the north side of the Mistinikon Lake Road at a point 0.4 mile west of Highway 66 at Mile 29.7 (see page 99).

Refs.: 22 p. 232-234; 35 p. 42-43, 49; 47 p. 31-36; 114 p. 23, 39-43, 53; 133 p. 633-637; 190 p. 39; 191 p. 132; 226 p. 74, 182; 234 p. 271

Maps (T): 41 P/15 Matachewan
(G): 2110 Powell and Cairo townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to ½ mile)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Mattarrow Mine

GALENA, SPHALERITE, PYRITE, PYRRHOTITE

In iron-formation

Galena and sphalerite occur in carbonate veins and as tiny veinlets in an iron-formation that contains pyrite and pyrrhotite.

The deposit was investigated by diamond drilling between 1948 and 1950 by Matarrow Lead Mines Limited, and became a producer in 1952 under the direction of Matachewan Consolidated Mines Limited. When operations ceased in 1953, the mine had produced nearly 2½ million pounds of lead, almost a million pounds of zinc, and some silver. The deposit was mined from a shaft, 347 feet deep.

The mine is located on the east side of Mistinikon Lake; access is by way of a 4-mile road leading south from the Mistinikon Lake Road at a point 0.2 mile west of its junction with Highway 66 at Mile 29.7 (see page 99).

Ref.: 172 p. 373-374

Maps (T): 41 P/15 Matachewan
(G): 2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Yarrow Barite Occurrence

BARITE, HEMATITE, CHALCOPYRITE

In veins cutting greywacke

The barite is associated with small amounts of quartz and calcite, and contains traces of specular hematite and chalcopyrite. It is white to grey, or tinted purplish due to the presence of fine particles of hematite. The barite is finely granular and some of it is banded.

Barite veins were originally discovered in the bed of Yarrow Creek on the western shore of Mistinikon Lake; more important veins were later located along the shoreline about 600 yards south of the mouth of the creek. The deposit was exposed by trenching and stripping, and a shaft was put down by Ontario Barium Company Limited between 1917 and 1920. In 1933, H.D. Glendinning removed ½ ton of ore for testing.

The occurrence is on the western shore of Mistinikon Lake south of the Mattarrow Mine. Access is by boat from the Mattarrow Mine, a distance of 1½ miles.

Refs.: 22 p. 238; 68 p. 21-24

Maps (T): 41 P/15 Matachewan
(G): 2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

1793 Matachewan, Timiskaming district,(Ontario (G.S.C., 1 inch to 1 mile)

Matachewan Consolidated Mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, TOURMALINE, SCHEELITE, HEMATITE, BARITE, EPIDOTE, AMPHIBOLE, CALCITE, MICA

In syenite porphyry and in schist

Native gold, at this deposit, was associated with quartz and pyrite in light grey schist and in grey syenite porphyry, the highest grade ore occurring in the schist. Minor amounts of chalcopyrite, tourmaline, and scheelite have been reported from the deposit. Crystals of pyrite, averaging about $\frac{1}{4}$ inch in diameter, are common in specimens on the rock dump. Also noted were specular hematite with barite (colourless, transparent platy aggregates) and calcite in syenite, and epidote associated with a fibrous deep green amphibole. The white massive calcite fluoresces bright pink when exposed to ultraviolet rays. Green mica occurs in grey to brownish carbonate schist.

The gold deposit was discovered in 1917 by Sam Otisse who with his brother explored it by trenching in the same year. The property was sold in 1918 to Colorado Ontario Development Company which continued the exploration, subsequently outlining a number of orebodies. The company was reorganized and became Matachewan Gold Mines Limited in 1919, and Matachewan Canadian Gold Limited in 1923. A shaft was sunk to 190 feet. In 1933, Matachewan Consolidated Mines Limited acquired the property and brought it into production in 1934. The mine was closed in 1953 having yielded 370,427 ounces of gold and 133,710 ounces of silver.

The mine consisted of one shaft sunk to a depth of 2452 feet, and two shallow shafts. The mill and other buildings have been dismantled. There is a large rock dump on the property.

Access is by a road leading 0.3 mile east from Highway 566 at Mile 29.9 (see page 99).

Refs.: 22 p. 234-235; 35 p. 42-43, 49-52; 47 p. 36-42; 114 p. 23, 32-36; 226 p. 104, 223; 234 p. 162

Maps (T): 41 P/15 Matachewan
(G): 2110 Powell and Cairo townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Ethel Copper Occurrence

CHALCOPYRITE, PYRITE, MALACHITE, GALENA, SPHALERITE, QUARTZ CRYSTALS, CHLORITE, GOETHITE, MICA

In quartz veins cutting arkose and syenite porphyry

Chalcopyrite and pyrite occur in massive quartz that has been exposed by pits and trenches. Malachite is commonly found as a coating on the sulphide-bearing quartz.

Galena and sphalerite have been reported from the deposit. "Micro" crystals of quartz were noted in cavities in massive quartz. Other minerals found in the quartz are chlorite, goethite, and light green mica.

The deposit is exposed on the south side of a bluff, 0.2 mile (via a single-lane road) west of Highway 566 at Mile 30.9 (see page 99). It was explored by Ethel Copper Mines Limited between 1955 and 1957, and by Stancop Mines Limited in 1964; the latter company mined a few tons of ore and recovered some copper, gold and silver.

Refs.: 114 p. 46-47; 172 p. 368-369

Maps (T): 41 P/15 Matachewan
(G): 2110 Powell and Cairo townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Ryan Lake Mine

CHALCOPYRITE, MOLYBDENITE, PYRITE, PYRRHOTITE, BORNITE, HEMATITE, COVELLITE, MALACHITE, AMPHIBOLE, CALCITE, GYPSUM, ZEOLITE, TALC

In sheared serpentinized peridotite and in syenite porphyry

Chalcopyrite and molybdenite were the ore minerals at this former molybdenum-copper-silver-gold producer. The molybdenite occurred as flakes and films in quartz veins and lenses and in the sheared rocks. Massive pyrite, pyrrhotite and bornite, and platy specular hematite, and covellite occur with the ore minerals on the rock dumps. Minerals that have formed encrustations on specimens include bright green botryoidal and platy malachite, white fibrous to hair-like amphibole, colourless rhombohedral crystals of calcite, and snow-white granular gypsum. Vugs lined with "micro" crystals of colourless quartz, of colourless calcite, of chalcopyrite, pink feldspar, and a white fibrous zeolite have been reported to occur in massive quartz. Light to medium green fibrous talc occurs in quartz. White massive calcite found on the dumps fluoreses dark pink when exposed to "long" ultraviolet rays. Specimens of an attractive reddish pink syenite were found on the property.

The deposit was developed by open-cuts and by a shaft, 459 feet deep. Investigation was initiated by Ryan Lake Mines Limited in 1947. A concentrating mill was put into operation in 1950 and the concentrates were shipped to the Noranda smelter. The original operator was subsequently renamed New Ryan Lake Mines Limited (in 1951) and Min-Ore Mines Limited in 1955. Between 1960 and 1964, Pax International Mines Limited operated the deposit recovering copper and molybdenite from tailings of former operations. Total production from the deposit amounted to nearly 5 million pounds of copper, and approximately 11,000 pounds of molybdenum, 36,000 ounces of silver, and 1,300 ounces of gold.

The mine is on the west side of Highway 566 at Mile 32.0 (see page 99).

Refs.: 114 p. 37-38; 172 p. 369; 210 p. 87-98

Maps (T): 41 P/15 Matachewan
(G): 2110 Powell and Cairo townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Ashley Mine

NATIVE GOLD, PYRITE, ALTAITE, SPHALERITE, CHALCOPYRITE, GALENA, HEMATITE, KRENNERITE

In quartz veins cutting volcanic rocks

Native gold occurred as fine particles closely associated with pyrite and altaite in fractures in quartz. Coarse crystals of sphalerite, massive chalcopyrite, finely granular galena, and specular hematite were also reported from the vein. Krennerite was sparingly associated with altaite.

The gold-bearing vein outcropped in low ground on the west side of a knoll where Bert Ashley found it in October, 1930 and staked it for Mining Corporation of Canada. It was the first important gold discovery in Bannockburn Township and vicinity, and the only one that became a producer. In the winter of 1930-1931, when diamond drilling indicated favourable ore, Ashley Gold Mining Corporation Limited was formed to develop it. Mining and milling equipment was rushed to the site and production began in 1932, the earliest date of production in the Matachewan district. Ore was hoisted through an inclined shaft from which underground workings extended to a depth of 750 feet. When the mine closed in 1936 due to ore exhaustion, gold valued at $1,624,012.08 had been mined.

To reach the mine, turn left onto road leading southwest to Rahn Lake from the junction at the end of Highway 566 (16 miles west of Matachewan) for a distance of 0.2 mile to a trail on the right (west) side of the road. The trail leads a short distance to the mine (see road log to Rahn Lake Mine, page 108).

Refs.: 154 p. 1, 13-17; 177 p. 100; 226 p. 18-19

Maps (T): 42 A/W Radisson Lake
(G): 41a Bannockburn gold area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to 3/4 mile)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Bannockburn (Matachewan) Porphyry Occurrence

PORPHYRY

In dyke that intruded volcanic rock

The porphyry is a striking ornamental rock composed of a fine-grained dark grey to almost black matrix enclosing white to reddish and greenish white phenocrysts of plagioclase feldspar measuring up to an inch long but averaging about $\frac{1}{2}$ inch long. The feldspar commonly displays a zoned or banded texture. In places, the dark background has a greenish tint due to the presence of amphibole and of epidote. The rock takes a good polish and is used for ornamental purposes.

The feldspar porphyry dyke is reported to measure 20 feet wide by at least 200 feet long and it trends in a north-south direction. It has been exposed by blasting at the side of a small knoll.

A partly overgrown trail, about 100 yards long, leads to the occurrence from the Rahn Lake road at a point 2 miles from its junction at the end of Highway 566 (see road log to Rahn Lake asbestos mine, page 108).

Plate XVI. Bannockburn porphyry exposed at the side of a knoll in Bannockburn Township. (G.S.C. photo 161449)

Ref.: 154 p. 8-9

Maps (T): 41 P/15 Matachewan
(G): 41a Bannockburn gold area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to 3/4 mile)

1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

Rahn Lake Mine

CHRYSOTILE, SERPENTINE, MAGNETITE, PYRITE, PYRRHOTITE, ARAGONITE, CALCITE

In peridotite

This deposit was formerly worked for asbestos. Light green cross-fibre asbestos occurs in veins averaging $\frac{1}{2}$ inch wide. The veins cut olive-green to nearly black massive serpentine that contains small grains of magnetite. Patches of pyrite and pyrrhotite were noted in calcite. Crusts of columnar and foliated calcite, and coatings of dull greyish white aragonite occur on serpentine.

The deposit was discovered sometime before 1910 by George Rahn of Erie, Pennsylvania. In 1922, Empire Asbestos Company Limited, explored it by an inclined shaft. From 1934 until 1939, asbestos was mined by Rahn Lake Mines Corporation. The asbestos was originally milled at a pilot mill on the property, and later at the company's mill at Elk Lake. The production shaft was 140 feet deep; another shaft was sunk to a depth of 55 feet.

The mine is located near Rahn Lake. There is a small rock dump and some fallen buildings on the site.

Road log from Highway 566 at Mile 44.0 (see page 101):

Mile 0	Junction at end of Highway 566; turn left (southwest) onto road to Rahn Lake.
0.2	Turn-off (right) to Ashley Mine; continue straight ahead.
2.0	Trail on right (at dip in road) leads to Bannockburn porphyry occurrence. Road log continues straight ahead.
2.8	Junction road to Rahn Lake; turn left.
2.9	Rahn Lake Mine on left.

Refs.: 35 p. 39-40; 154 p. 11, 12; 211 p. 49-50

Maps (T): 41 P/15 Matachewan
(G): 41a Bannockburn gold area, district of Timiskaming, Ontario (Ont. Ministry Natur. Resour., 1 inch to 3/4 mile)

Maps (G): 1793 Matachewan, Timiskaming district, Ontario (G.S.C., 1 inch to 1 mile)

This completes the description of occurrences in the Matachewan area; the main road log along Highway 11 is resumed.

Mile 60.8 Junction Highway 66 (west) to Matachewan.

61.1 Junction Highway 66 (east) to Kirkland Lake; the occurrences from Kirkland Lake to Val d'Or are described in Geological Survey of Canada

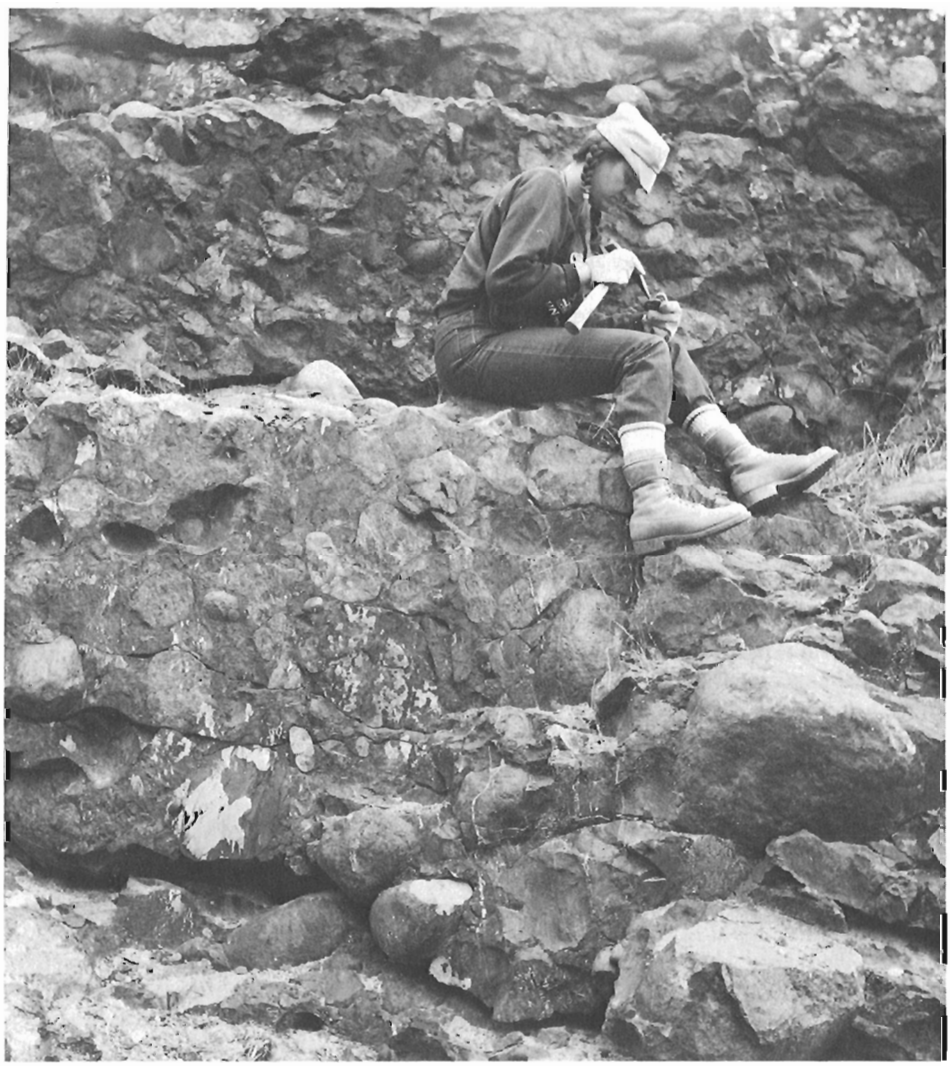


Plate XVII. Cobalt conglomerate exposed by a road-cut on Highway 11 (Mile 61.5) at Kenogami Lake. (G.S.C. photo 161450)

Mile 61.1 (cont'd) Paper 73-30: Rocks and Minerals for the collector: Kirkland Lake-Noranda-Val d'Or, Ontario and Quebec.

61.5 Road-cuts expose very coarse Cobalt conglomerate containing boulders measuring up to 2 feet in diameter. The rock is of Proterozoic (Huronian) age and the boulders it encloses are representative of the various rock types that existed in the district prior to its formation. The same rock with smaller boulders is exposed at Mile 62.9.

61.6 Bridge over Blanche River at Kenogami Lake.

63.8 Dark volcanic rocks of Archean age are exposed at intervals by road-cuts for the next 16 miles.

68.9 Junction road to Sesekinika Lake.

69.1 Historic plaque on right marks the southern boundary of the Arctic Watershed; streams on the north side flow into Hudson Bay, those to the south into the Great Lakes – St. Lawrence River system.

69.9 Junction Highway 570.

72.2 Cobalt conglomerate is exposed by a road-cut.

75.4 Junction road to Bourkes.

Bourkes Mine

NATIVE GOLD, PYRITE, PETZITE, CHALCOPYRITE, GALENA, MOLYBDENITE, EPIDOTE

In quartz-carbonate veins and lenses in sheared volcanic rocks

Rich concentrations of native gold in quartz were encountered during mining operations at this old gold mine. Pyrite and, less commonly, chalcopyrite, galena, and molybdenite were associated with the gold. Petzite, a grey metallic mineral, has been reported to occur with the native gold. Pyrite, as granular masses and as crystals averaging $\frac{1}{4}$ inch in diameter, and epidote associated with colourless quartz and with white calcite are common on the rock dumps.

The deposit was found in the fall of 1916 by Oscar Anderson. While engaged in clearing his homestead, he uncovered a vein containing a yellow metal which a prospector, J. Burns, identified as gold. The vein occurred in a rusty-weathered quartz-schist band in greenstone at the bend in the Whiteclay River. Stripping revealed several showings of native gold in the decomposed veins. Initial development and mining were conducted by Bourkes Mines Limited between 1917 and 1920; a shaft was put down to 400 feet on the main vein, and a small shipment of ore was made to the McIntyre mill in Timmins. Small amounts of ore were subsequently mined by Bourkes Syndicate (1936, 1937) and by Mesabi Gold Mines Limited (1938). Davidor Gold Mines Limited operated a test mill to process some of the ore in 1946-1947.

Road log from Highway 11 at Mile 75.4:

Mile 0 Junction; turn right (east onto road to Bourkes).

0.9 Bridge over Whiteclay River.

1.0 Junction; turn left (north) onto single-lane road paralleling railway tracks.

1.3 Bourkes Mine in clearing.

Refs.: 21 p. 249-250; 115 p. 17-18; 214 p. 53-55; 224 p. 500

Maps (T): 42 A/8E Ramore
(G): 2215 Benoit and Maisonville townships, Timiskaming district, (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

Mile 80.4 Junction road to Wavell.

81.4 Mount Kempis on left, a prominent topographical feature that rises about 350 feet above the surrounding area. Its elevation is 1363 feet above sea level and it is underlain by black pillowed variolitic basalt. The lowland from which it rises is a former lake-bottom occupied by Lake Ojibway-Barlow that existed at the close of Pleistocene time; sediments left by the lake form an extensive clay belt that includes the region from Timmins to Val d'Or.

86.9 Junction Highway 572.

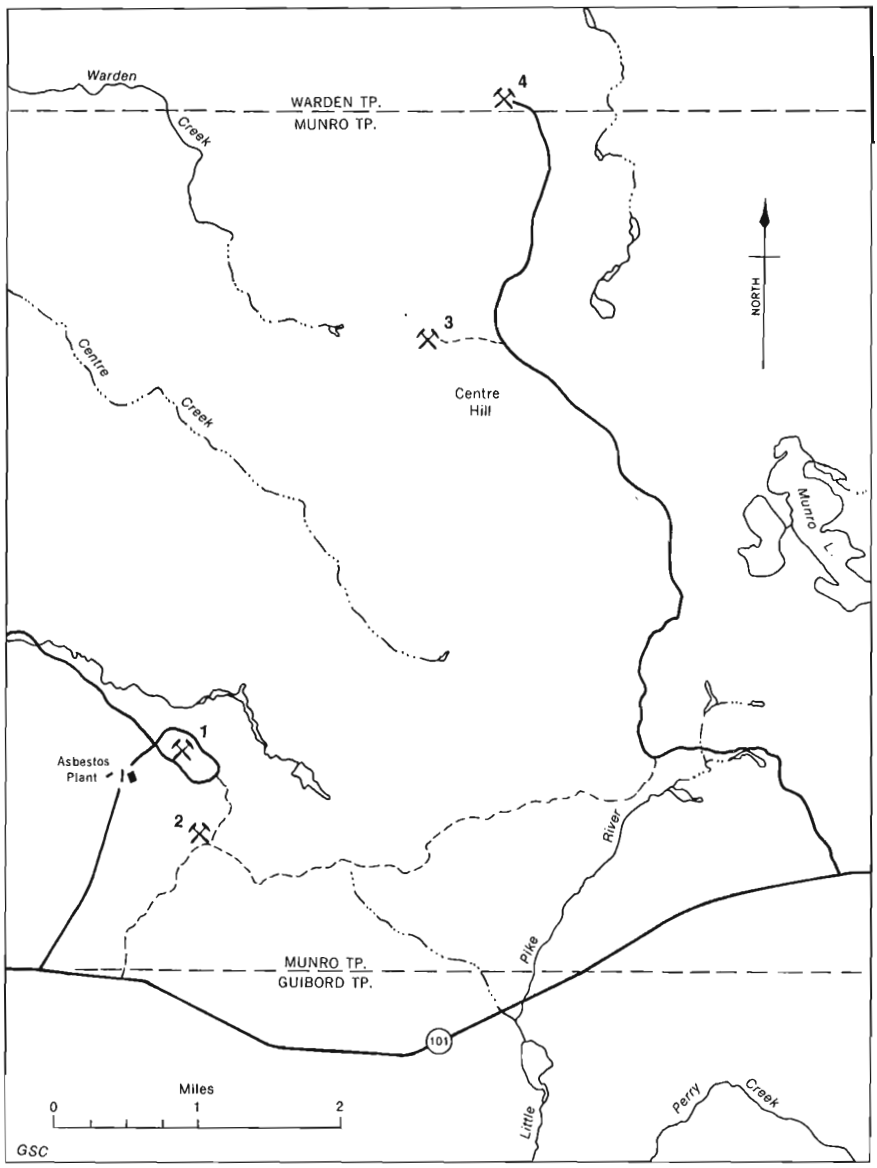
Ross Mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, TENNANTITE, NATIVE SILVER, NATIVE COPPER, PEARCEITE, PROUSTITE, ARGENTITE, MALACHITE, AZURITE, CUPRITE, RHODOCROSITE, MARIPOSITE

In quartz and quartz-carbonate veins cutting volcanic rocks and syenite

The Ross Mine produces gold and silver. The native gold occurs as particles (visible under magnification) in fractures in bluish quartz and in white quartz-dolomite veins; it is pale in colour due to a high silver content. Pyrite is common and carries values in gold. Chalcopyrite, sphalerite, and galena occur less commonly. Tennantite, native silver, native copper, pearceite, prousite, argentite, malachite, azurite, cuprite, rhodocrosite and mariposite have been reported from the deposit.

The mine has been producing gold and silver since 1936, and the ore is expected to be exhausted in 1973. It is located on the former Ross farm where the outcrops received the attention of prospectors for some time following the discoveries of gold-bearing rocks in adjacent townships, but it was only after Frank Tremblay sampled the outcrops in 1933 that the occurrence of gold on the property became known. A program of



1. Munro Mine
2. Croesus Mine
3. Centre Hill Mine
4. Hedman Mine

Map 10. Matheson area.

surface and underground exploration was started in 1933 by Hollinger Consolidated Gold Mines Limited (name changed in 1968 to Hollinger Mines Limited) followed by production in 1936.

The mine is serviced by a shaft, 3,000 feet deep; the mill has a capacity of 440 tons per day. From 1936 to 1968, the mine produced approximately 600,000 ounces of gold and 1,150,000 ounces of silver.

The mine is located in the community of Holtyre, $5\frac{1}{2}$ miles from Highway 11 at Mile 86.9.

Refs.: 51 p. 76; 92 p. 64-69; 93 p. 570-579; 129 p. 17-23; 149 p. 33, 34, 39-44; 251 p. 151

Maps (T): 42 A/8W Ramore
(G): 1955-5 Township of Hislop, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Kelore Mine

NATIVE GOLD, PYRITE

In shear zone at contact of syenite and volcanic rocks

This property was formerly explored by underground methods for gold but there has been no production. Development consists of a shaft sunk to a depth of 475 feet. The exploration was initiated in 1939 by Kelrowe Gold Mines Limited and was continued at subsequent intervals by Kelwren Gold Mines Limited, and by Kelore Gold Mines Limited. The syenite in the deposit is coarse-textured, pink to purplish in colour, and in places is porphyritic.

Access is by a partly overgrown single-lane road, 0.6 mile long, leading west from Highway 572 at a point 1.8 miles north of Holtyre, and 7.3 miles from the junction of Highway 572 with Highway 11.

Refs.: 51 p. 75; 148 p. 51-52; 149 p. 45-47

Maps (T): 42 A/8W Ramore
(G): 1955-5 Township of Hislop, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Mile 97.9 Historic plaque on right commemorates the fire of July, 1916 that devastated the region between Ramore and Iroquois Falls claiming 223 lives.

98.8 Matheson, at junction Highway 101 East which provides access to the Munro Mine, Croesus Mine, Hedman Mine and Centre Hill Mine; their descriptions follow.

Mile 102.7 Junction Highway 101 West. The road log occurrences along Highway 101 West to Timmins is given on page 120.

Munro Mine

CHRYSOTILE, SERPENTINE, PICROLITE, MAGNETITE, CALCITE, CLINOZOISITE, AMPHIBOLE, EPIDOTE, ORTHOCLASE, CHLORITE, PYRITE, CHALCOPYRITE

In basic to ultrabasic rocks

Yellowish green chrysotile asbestos (cross-fibre) was formerly mined from this deposit. It occurs in veins measuring up to 1 inch wide in fractures in light to medium and dark green massive serpentine. Light green picrolite is also present. Magnetite, as disseminated grains and granular masses, is common in the serpentine. White calcite occurs in massive, columnar, platy and granular forms; it fluoresces pink when exposed to ultraviolet rays. Radiating prismatic aggregates of light greyish to brownish green clinozoisite occurs in white massive quartz that contains dark green layers of chlorite. Amphibole was noted as silky white hair-like aggregates and as greenish grey curved foliated masses, the latter containing "micro" crystals of yellowish green epidote. Pink orthoclase is associated with quartz. Pyrite and chalcopyrite were also identified in specimens found on the dumps as were the minerals described above.

This occurrence was first reported in 1915 by P.E. Hopkins, Ontario Bureau of Mines. It was brought to the attention of Canadian Johns-Manville Company Limited in 1948 by Alex Heffren of Swastika, a former employee at their Jeffrey Mine in Asbestos, Quebec. The company examined the deposit, acquired the claims, and undertook development in 1949. From 1950 until 1959, production was obtained from an open pit, and from 1954 until 1964, from a shaft that reached a depth of 1,204 feet. A mill operated at the site.

The mine is reached by a road, 1.4 miles long, leading north from Highway 101 East at a point 9.7 miles east of its intersection with Highway 11 at Matheson (see road log to Croesus Mine, page 115). It belongs to Canadian Johns-Manville Company Limited.

Refs.: 75 p. 28, 31-34; 84 p. 176, 181; 168 p. 2, 36-37; 211 p. 40

Maps (T): 42 A/9W Matheson
(G): 1951-5 Township of Munro, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Croesus Mine

NATIVE GOLD, PYRITE, ARSENOPYRITE

In quartz vein cutting diabase and lava

When the gold-bearing quartz outcrop on this property was discovered, its richness was so spectacular that the owners bolted down the entire surface with sheets of solid

steel $\frac{1}{2}$ inch thick to protect it from high-graders. Specimens of coarse, dark yellow native gold in white quartz obtained from the vein were regarded as the richest gold-bearing quartz specimens found anywhere in the world. In the sinking of the first 60 feet of the shaft, a rich pocket was encountered, and from it gold valued at $47,000.00 (for 2,274 ounces) was recovered from 765 pounds of quartz, the price of gold at that time being $20.67 per ounce. Some of these very rich specimens were purchased by the Ontario Bureau of Mines for exhibition purposes; five specimens weighing a total of 85 pounds contained 480.7 ounces of gold and were valued at $10,000.00. A coloured photograph of one of the specimens that appears in the frontispiece of the 26th annual report of the Ontario Bureau of Mines has been described as follows: "Lumps of pure gold studded the quartz like raisins in a Christmas pudding; not merely here and there, but evenly distributed through the mass and, as nearly as one could judge, taking up more than one-third of the whole" (Ref.: 224 p. 516).

An egg-shaped nugget measuring 2 inches by $1\frac{1}{4}$ inches was found during early mining operations, and coarse, sheet-like concentrations of gold have been reported. Pyrite and needle-like crystals of arsenopyrite were associated with the gold. The gold-bearing vein measured 200 feet long with a width varying from a few inches to a few feet.

Although numerous claims for gold were staked in Munro Township in 1907 by prospectors who had just made gold discoveries in the Abitibi district, no promising veins were located, and the township was soon discredited. Interest was revived following the gold discoveries in the Porcupine district in 1909. When prospecting was resumed, a remarkably rich gold showing was found in the spring of 1914 by a prospector named Welsh. Although he had staked a claim, a survey later established that the rich vein was found in the adjoining Dobie-Leyson claim, only 15 feet from the Welsh boundary. The two claims were acquired by the Dominion Reduction Company Limited of Cobalt, and Croesus Gold Mines Limited was subsequently incorporated to work the deposit. Mining operations were conducted from 1915 until 1918 but were interrupted in 1916 when the Great Fire of 1916 swept the area and destroyed the camp and mine buildings. A shaft, 400 feet deep, was used to hoist the ore. Between 1932 and 1935 Munro-Croesus Mines Limited obtained a small production from the mine dumps and from ore mined from the old underground workings. Total production amounted to 14,854 ounces of gold and 1,423 ounces of silver.

Road log from Highway 11 at Matheson:

Mile 0	Junction Highway 11 and Highway 101 East; proceed onto Highway 101 East.
0.4	Junction Highway 626; continue along Highway 101 East.
9.4	Junction Highway 572 to Holtyre; road log continues along Highway 101 East.
9.7	Junction; road on left leads to the Munro Mine. To reach Croesus Mine, continue on Highway 101 East.
10.3	Trail on left leads 1.25 miles to the Croesus Mine which may also be reached by following a trail, 900 yards long, leading south from the south-eastern end of the Munro asbestos pit.

Refs.: 37 p. 61-62; 51 p. 81; 84 p. 181-182; 102 p. 1, 53-54, 55-56; 168 p. 2, 48-51; 183 p. 81; 184 p. 93, 94; 223 p. 575; 224 p. 516

Maps (T): 42 A/9E, W Matheson
(G): 1951-5 Township of Munro, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Hedman Mine

CHRYSOTILE, SERPENTINE, MAGNETITE, CHLORITE, MICA, CALCITE

In serpentinized peridotite

Light green chrysotile asbestos occurs in veinlets measuring about 1/8 inch wide in medium to dark green massive serpentine that weathers white. Some ribbon-fibre asbestos is also present in the deposit. Chlorite, mica (light brown), and white calcite are associated with the serpentine. Sulphide minerals have been reported.

Development of this deposit began in 1956 by Hedman Mines Limited. Mining was from an open pit and the ore was treated at the company's pilot mill in Matheson from 1962 until 1969. A new crushing plant was installed in Matheson and operated in 1969.

Road log from Matheson:

Mile 0	Junction highways 11 and 101 East; proceed onto Highway 101 East.
9.7	Turn-off to Munro Mine; continue along Highway 101.
10.3	Turn-off to Croesus Mine; continue east along Highway 101.
15.7	Junction road on left to Centre Hill Mine; turn left (north).
20.9	Junction; turn right. (Road on left leads to the Centre Hill Mine.)
21.7	Fork; bear right.
23.0	Hedman Mine.

Refs.: 168 p. 41; 211 p. 50-51; 251 p. 148-149

Maps (T): 42 A/9E Matheson
(G): 1951-5 Township of Munro, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Centre Hill Mine

CHALCOPYRITE, PYRRHOTITE, SPHALERITE, PYRITE, SIDEROTIL, BROCHANTITE

In rhyolitic rocks

The sulphide minerals occur as intimate mixtures forming masses in the rock. Siderotil occurs as a white coating on rusty weathered specimens on the dumps. Green brochantite occurs with white calcite crusts on the ore-bearing rock found on the dumps.

The mine, a former copper producer, was initially worked from a shaft, 970 feet deep. Development commenced in 1952 by Centre Hill Mines Limited which was later (1965) re-named Munro Copper Mines Limited. A mill was erected on the site and concentrates were shipped in 1967-1968. From 1968 until 1972, the mine and mill were operated by Harrison Drilling and Exploration Company Limited. In 1970, the shaft was deepened to 1,272 feet.

Access is by a road, $\frac{1}{2}$ mile long, leading west from the Hedman Mine road at Mile 20.9 (see page 116).

Refs.: 120 p. 118; 172 p. 124-125

Maps (T): 42 A/9E Matheson
(G): 1951-5 Township of Munro, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

The Timmins (Porcupine) Area

The Porcupine camp, formerly one of the great gold-producing areas in the world, became the province's leading gold producer within two years after it came into production in 1910, and has sustained its dominant position although the output has declined steadily in recent years. Its yield for 1913 nearly equalled the entire production (to 1912) from all Ontario mines from the time gold production was first obtained in 1866 from the Madoc area. In the following year (1914), the Porcupine camp consisting of eight producing mines took the lead in Canada's gold production exceeding that of British Columbia and of the Yukon, the previous forerunners. Production peaked in 1941 when close to $1\frac{1}{2}$ million ounces of gold was won. To the end of 1969, the Porcupine camp yielded a total of 52,534,462 ounces of gold, a production surpassed only by the Witwatersrand mines in South Africa. Of the 29 mines that produced in the camp since the inception of milling in 1910, four were operating in 1972.

Outcrops of spectacularly rich gold-bearing quartz were discovered by prospectors in the Porcupine Lake area in 1909. News of the discoveries sparked the greatest rush for gold in the province since the wild staking that had taken place in the Lake of the Woods gold fields 15 years earlier. The discovery of the promising new gold field came at a time when Ontario recorded its lowest gold production since 1894, when the Cobalt silver camp was already established and the Elk Lake-Gowganda area had been thoroughly prospected, and when the optimistic hopes accompanying the early (1906) Larder Lake gold discoveries proved to be dishearteningly disappointing with the realization that most of the properties, having been indiscriminately staked, became the victims of wildcat promotional schemes discrediting the district for many years.

Although the occurrence of promising auriferous quartz veins in the Porcupine area had been reported by Ontario Bureau of Mines geologists E.M. Burwash in 1896 and W.A. Parks in 1899, prospectors who had obtained mining licences prior to 1909 abandoned their work due to low values obtained from the quartz veins. Visible gold

Plate XVIII. Alexander (Sandy) McIntyre at Red Lake in 1926. Twenty-one years earlier, he left Scotland to come to northern Ontario where he joined the construction crew on the Timiskaming and Northern Ontario Railway during the Cobalt boom. He soon became a prospector and took part in the staking rush in the Larder Lake, Swastika, Bourkes, Gowganda, Porcupine, Kirkland Lake, and Red Lake camps. The claims he staked formed the nucleus of two great gold producers – the McIntyre Mine and the Teck-Hughes Mine. (Public Archives of Ontario picutre collection S11807)

was, however, found in quartz and in schist on the east shore of Porcupine Lake in 1908 by H.F. Hunter, and in Whitney Township in June, 1909 by George Bannerman. But the most spectacular of the early discoveries was made by John S. Wilson of Massey Station in the fall of 1909 on a property that became the Dome Mine; the sensational showing of native gold occurred in a dome-like outcrop of quartz which, in places, measured over 100 feet wide. Similarly rich showings that were discovered a short time later by Benjamin Hollinger, Alexander McIntyre, and John Miller developed into the Hollinger, McIntyre and Acme (later became part of the Hollinger Mine) mines. Due to these rich finds, the district drew a stampede of experienced prospectors from other mining areas and the camp was heralded as another Cobalt. Within a few weeks, all the immediate area was claimed and staking continued through the winter. By the end of 1910, most of the discoveries that later reached the production stage had been made, but those that subsequently became the greatest producers were among the earliest discoveries.

Development rapidly followed the discoveries. Initial shaft-sinking commenced in the winter of 1909-1910 under less than ideal conditions. Supplies and equipment were rushed in via winter roads from the nearest railway centre at Kelso; until the railway was built in 1911, the summer route was an arduous combination of clay-bed roads and of waterways by way of Frederick House River, Night Hawk Lake and Porcupine Lake. Initial communication between Matheson and Porcupine was established by a telephone line strung on trees, and there was a twice weekly mail service. By the summer of 1910, 500 men were employed in the mines. The townsites of South Porcupine, Timmins, and Schumacher quickly sprang into existence as a result of the mining boom which suffered a severe set-back in July, 1911 when a disastrous fire destroyed the mills of the Dome Mine and the Hollinger Mine, wiped out the town of South Porcupine and parts of the surrounding area, and took 71 lives.

The gold-bearing quartz veins occur in Archean volcanics and sediments that have been intruded by various types of porphyries. Carbonate (calcite or dolomite) veins also carry native gold. Pyrite, as crystals and in massive form, and minor amounts of chalcopyrite, pyrite, galena, and pyrrhotite are commonly associated with the deposits.

The Timmins area was the scene of a modern day prospecting rush in 1964 following the disclosure of a discovery by Texas Gulf Sulphur of a colossal zinc-copper-silver orebody that later became Canada's largest producer of silver and zinc, the Kidd Creek Mine. The region also contains deposits of copper, copper-zinc, nickel, asbestos and magnesite, some of which were exploited many years ago and are no longer accessible.

Tours of the surface plants of the operating mines may be arranged during the summer months through the Timmins-Porcupine Chamber of Commerce.

Refs.: 14 p. 57-62; 17 p. 6-9, 22-24; 20 p. 3; 31 p. 361-366; 62 p. 9-10; 64 p. 6; 65 p. 8; 69 p. 561-562; 70 p. 306-308; 73 p. 53-56; 80 p. 1, 5; 88 p. 811-812; 116 p. 5-7; 206 p. 92-108; 219 p. 34; 233 p. 5, 100, 101-102

Maps (T): 42 A Timmins
(G): 2205 Timmins-Kirkland Lake, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Plate XIX. Timiskaming conglomerate exposed by a road-cut on Highway 101 (West) at Mile 16.1. The dark angular pebbles are composed of bright green chrome-mica. (G.S.C. photo 161453A)

Road log to mines, occurrences in Timmins area (Descriptions of the mines and occurrences follow the road log):

Mile 0 Junction highways 101 West and 11; proceed onto Highway 101 West.

1.2 Road-cut on right exposes Matachewan diabase porphyry. The rock is similar to the porphyry in the road-cut at Mile 7.1 on Highway 66 West (see page 99).

Mile 15.7 Junction Highway 67 to Kettle Lakes Provincial Park and to Alexo Mine.

16.1 Road-cut on right exposes Timiskaming conglomerate, quartzite and arkose. Conspicuous angular blotches of bright green mica occur with boulders and pebbles of rhyolite, tuff, feldspar porphyry, quartzite, chert, and quartz in a dark grey matrix. Pebbles of serpentine have been reported to occur in the conglomerate (Ref.: 123 p. 236).

19.3 Junction Highway 803 to Night Hawk Peninsular Mine, and to Goldhawk Mine and Gold Island Mine.

19.6 Bridge over Frederick House River.

23.5 Junction Highway 610.

24.4 Ecstall Mining Limited zinc concentrator on right; this is Ontario's only zinc refinery.

26.6 Pamour Mine on right.

28.6 Junction road on right to Hallnor Mine and Broulan Reef Mine.

29.7 Porcupine, at railway crossing.

30.2 Porcupine, at junction Haileybury Crescent leading to Porcupine Lake Mine.

30.4 Bridge over Porcupine River.

32.3 South Porcupine, at turn-off to business district and to Langmuir Mine.

33.2 Junction road on left leading to mines along the Back Road (see page 140).

35.8 Junction (on right) Carium Road to Coniaurum Mine.

36.5 Schumacher, at junction McIntyre Road leading to McIntyre Mine.

36.9 Timmins-Porcupine Chamber of Commerce on right. Arrangements for tours to operating mines should be made here.

37.2 Timmins, at junction Highway 655 leading to Kidd Creek Mine. The Hollinger Mine is on the south side of the highway opposite this junction.

37.95 Intersection Pine Street. This is the turn-off to the mines along the Back Road (see page 140) and to mines along Papakomeka Road (see pages 149-152).

38.5 Junction Highway 629.

43.9 Junction Highway 576. The Genex Mine, Canadian Jamieson Mine, and Kam-Kotia Mine are accessible via Highway 576.

Mile 53.1 Junction Highway 144.

62.1 Granitic rocks are exposed by a series of road-cuts to Mile 63.0.

63.7 Junction Little Star Lake Road.

75.7 Turn-off (left) to Card Lake antimony occurrence.

81.8 Turn-off (left) to Reeves Mine.

Alexo Mine

PYRRHOTITE, PENTLANDITE, HEAZLEWOODITE, PYRITE, CHALCOPYRITE, SERPENTINE, AMPHIBOLE, MAGNETITE, CHROMITE, HEXAHYDRITE, GOETHITE

In serpentinized peridotite at contact of andesite

Pyrrhotite and pentlandite were the chief ore minerals at this former nickel-copper mine. Minor amounts of heazlewoodite, pyrite, and chalcopyrite were associated with these minerals forming disseminations and masses in dark green to almost black massive serpentine. Dark green picrolite, light green chrysotile asbestos, and light to medium green radiating aggregates of amphibole (actinolite) were noted in specimens found on the rock dumps. Magnetite is common in the serpentine and has formed pseudomorphs after olivine. Chromite has been reported. Coatings of dull white powdery hexahydrite and of rusty brown goethite occur on weathered specimens on the dumps.

The deposit was discovered in 1908 by Alexander Kelso, an early pioneer in the district, who prospected the area after reading the Provincial Surveyor's report in which magnetic disturbances were noted in the area. The deposit was found beneath gossan that contained greenish-white nickel bloom. Assays indicated high nickel values and the deposit was regarded as the most significant nickel find in Ontario since the Sudbury discoveries 25 years earlier. Initial shipment of nickel ore was made in 1912 by E.F. Pullen. In 1913, the Alexo Mining Company Limited was formed and production was continued by that company until 1919. The ore was treated at the Mond Nickel Company smelter at Coniston; it assayed about $4\frac{1}{2}$ per cent nickel and 0.6 per cent copper. In 1943 and 1944, mining operations were reinstated by Harlin Nickel Mines Limited and some nickel and copper were produced.

The mine consists of a shaft, 310 feet deep, and some open cuts at the base of an andesite ridge. There is a small dump at the site.

Road log from Highway 101 at Mile 15.7 (see page 121):

Mile 0 Junction Highway 67 and Highway 101; proceed north onto Highway 67.

1.9 Turn-off (right) to Kettle Lakes Provincial Park.

The numerous lakes in the park are kettle lakes – depressions in an outwash plain that was left by melting glaciers in Pleistocene time. The

Mile 1.9 (cont'd) depressions range in size from potholes to lakes a mile long, many having steep banks. They are characterized by clear greenish blue waters. The outwash plain is composed of sand, gravel and boulders, and extends southward from Frederick House Lake to the east side of Night Hawk Lake; it overlies thick deposits of varved clay deposited by Lake Ojibway-Barlow that flooded the region between Lake Abitibi and Lake Timiskaming at the close of Pleistocene time. Frederick House Lake and Night Hawk Lake are remnants of that ancient lake.

5.8 Junction Highway 610; continue along Highway 67.

11.1 Junction single-lane road; turn right.

11.7 Fork; bear right.

11.8 Alexo Mine.

Refs.: 4 p. 258-265; 64 p. 42; 106 p. 4, 16-19; 172 p. 116-117; 177 p. 222-223; 209 p. 34-38

Maps (T): 42 A/10W Porquis Junction
(G): P308 Clergue Township, district of Cochrane (Ont. Ministry Natur Resour., 1 inch to $\frac{1}{4}$ mile)

Night Hawk Peninsular Mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, CHLORITE, FUCHSITE, TOURMALINE, BARITE, MOLYBDENITE, BISMUTH

In quartz veins in volcanic rocks

Native gold occurred in quartz stringers in carbonatized brecciated zones in volcanic rocks; pyrite, arsenopyrite, and chlorite were associated with the gold. Bright green mica (probably fuchsite) and black tourmaline were noted in quartz on the dumps. Barite, molybdenite, and native bismuth have been reported from the deposit.

The property was staked by Charles Auer in 1907 following the discovery of gold-bearing quartz on Gold Island. A quartz vein carrying visible gold was found on the shore of Night Hawk Lake (on Night Hawk Peninsular property) after the lake was lowered by another prospector, the Reverend Father Paradis, in the autumn of 1909 when he lowered the level of Frederick House River to facilitate prospecting his claim. The lowering was done by making a cutting into the clay bank of Frederick House River at High Falls, about 20 miles north of Night Hawk Lake. As a result, the river carved a deep gorge into the clay, the 46-foot falls disappeared, the south half of Frederick House Lake was drained and the level of Night Hawk Lake was lowered 3 feet, and the transportation of supplies by way of Frederick House River to the newly discovered Porcupine gold field was curtailed. To prevent further deterioration of the water system, a dam was built across the Frederick House River at Connaught.

Initial development of the Night Hawk Lake property by means of a shaft sunk to a depth of 90 feet was conducted by Porcupine-Night Hawk Mining Company in 1917. Production was obtained from 1924 until 1927 by Night Hawk Peninsular Mines Limited, and in 1940 and 1944 by Porcupine Peninsular Gold Mines Limited for a total yield of 27,416 ounces of gold and 5,746 ounces of silver. The underground workings extend to a depth of 1,025 feet.

The mine is located on the shore of a peninsula at the northern end of Night Hawk Lake.

Road log from Highway 101 at Mile 19.3 (see page 121):

Mile 0 Junction highways 101 and 803; proceed onto Highway 803.

3.0 Junction single-lane road to Gold Island; continue along main road.

4.2 End of road at Night Hawk Peninsular Mine.

Refs.: 51 p. 53-54; 86 p. 31-33; 102 p. 42-43; 110 p. 44-46; 219 p. 505; 220 p. 92-93

Maps (T): 42 A/7W Watabeag River
(G): 2222 Night Hawk Lake area, Cochrane district (Ont. Ministry Natur Resour., 1 inch to $\frac{1}{2}$ mile)

Goldhawk Mine, Gold Island Mine

NATIVE GOLD, PYRITE, FUCHSITE, TOURMALINE, AXINITE

In quartz and quartz-carbonate veins

Native gold occurred with cubes of pyrite in quartz veins cutting red aplite and carbonatized volcanic rocks at these two old mines. Green chrome mica (fuchsite) and black tourmaline specimens occur in the dumps. Mauve to almost white axinite has been reported to occur in quartz carbonate specimens on the old dump at the Goldhawk Mine.

The Goldhawk deposit occurs on the eastern tip of the south end of the peninsula at the north end of Night Hawk Lake, and the Gold Island Mine is on an adjacent island known as Gold Island. Visible gold in quartz was staked on Gold Island in 1907 by Victor Manson and Harry Benella; it is believed to be the first bona fide gold discovery in the Porcupine area and the first property to be worked. The owners sank a shaft to a depth of 50 feet and erected a mill (which later burned) in 1907-1908. The deposit on the shore of the peninsula was investigated by a 180-foot shaft put down by Hollinger Consolidated Gold Mines Limited in 1934-1935. Fifty-three ounces of gold were recovered from it in 1947 by Goldhawk Porcupine Mines Limited which sank a new shaft to a depth of 641 feet.

Access to the Goldhawk Mine is by a single-lane road, one mile long, that leaves Highway 803 at a point 3 miles south of its junction with Highway 101 (see road log to Night Hawk Peninsular Mine, page 124). The road ends at this mine, and Gold Island, where the Gold Island Mine is located, is about 1,000 feet to the northeast.

Refs.: 51 p. 51-52; 106 p. 20-21; 110 p. 41-42, 64; 219 p. 410; 221 p. 531

Maps (T): 42 A/10W Porquis Junction
(G): 2222 Night Hawk Lake area, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to ½ mile)

Pamour Mine

NATIVE GOLD, PYRITE, PYRRHOTITE, SPHALERITE, ARSENOPYRITE, CHALCOPYRITE, GALENA, SYLVANITE, TOURMALINE

In quartz veins cutting greywacke, basalt and conglomerate

Coarse visible gold was found in 1911 on this property which includes the following original claims: LaPalme, Three Nations, and Porcupine Grande. Auriferous pyrite and small amounts of pyrrhotite, sphalerite, arsenopyrite, chalcopyrite, galena, sylvanite, and black tourmaline are associated with the gold.

This mine is one of the few remaining gold producers in the Porcupine area. Initial development was performed in 1911 by LaPalme Porcupine Mines Limited, and in 1912-1914 by Three Nations Gold Mining Company Limited. It was brought into production in 1936 by Pamour Porcupine Mines Limited, the current operator. To the end of 1970, the mine has produced a little over 2 million ounces of gold and ¼ million ounces of silver. The mine is serviced by two surface shafts and an internal shaft to a maximum depth of 3,145 feet.

The mine and mill are located on Highway 101 at Mile 26.6 (see page 121). Visits to producing mines in the Timmins area may be arranged through the Timmins-Porcupine Chamber of Commerce.

Refs.: 18 p. 247, 248; 51 p. 119-120; 120 p. 14-15; 135 p. 125; 150 p. 558-565; 251 p. 258-259

Maps (T): 42 A/11E Pamour
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

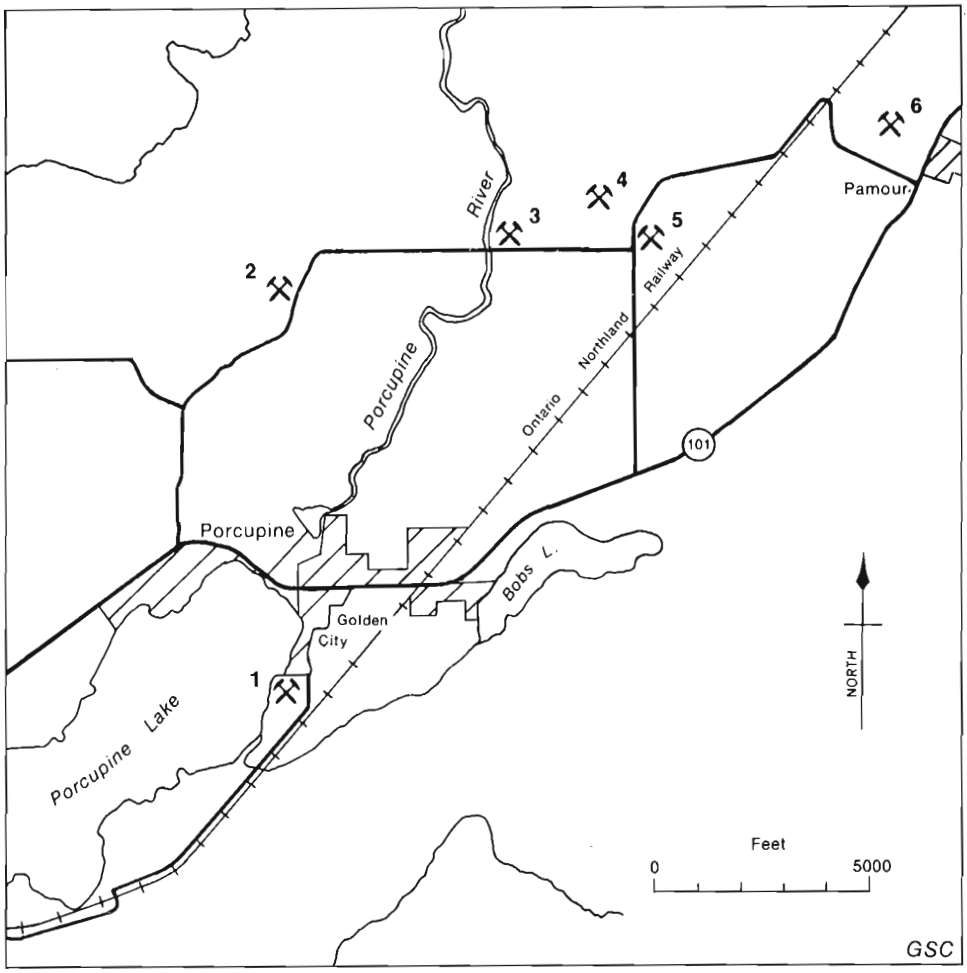
Broulan Reef Mine

NATIVE GOLD, PYRTIE, PYRRHOTITE, GALENA, CHALCOPYRITE

In quartz-carbonate veins cutting slate and greywacke

The ore at this former producer consisted of native gold, pyrite, and minor amounts of pyrrhotite, galena, and chalcopyrite.

The deposit was discovered in the winter of 1934-1935 during an extensive program of diamond drilling in the region following the discovery of large orebodies at the Pamour Mine in 1932. It was operated from 1936 until 1950 by Broulan Porcupine Mines



1. Porcupine Lake Mine
2. Reef Mine
3. Bonetal Mine
4. Hallnor Mine
5. Broulan Reef Mine
6. Pamour Mine

Map 11. Porcupine Lake area.

Limited, and from 1951 until 1953, when the mine was closed, by Broulan Reef Mines Limited. Production from 1939 to 1953 resulted in a recovery of 243,757 ounces of gold and 26,647 ounces of silver from 1,146,059 tons of ore milled. The mine was serviced by a shaft sunk to a depth of 675 feet.

The mine is one mile north of Highway 101 at Mile 28.6 (see road log to Hallnor Mine).

Refs.: 3 p. 554; 51 p. 114-115

Maps (T): 42 A/11E Pamour
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Hallnor Mine

NATIVE GOLD, PYRITE, SPHALERITE, PYRRHOTITE

In quartz-calcite veins in basalt and argillite

The highest grade of ore at this former producer occurred in the quartz-calcite veins carrying native gold and some sulphide minerals. Ore was also obtained from a zone of altered sericitic rock mineralized with finely disseminated pyrite and pyrrhotite.

This is another deposit that was revealed by diamond drilling as a result of the exploration of the area stimulated by the discovery of new orebodies at the Pamour Mine in 1932. Noranda Mines Limited found the deposit in 1936. The mine was operated from 1936 until 1971 by Hallnor Mines Limited yielding 1,580,695 ounces of gold and 113,190 ounces of silver for a value of almost 58 million dollars. The mine and equipment were sold to Pamour Porcupine Mines Limited in 1971. Operations were conducted from a 3,470-foot shaft with a winze to 3,720 feet and an internal shaft to 5,060 feet.

Road log from Highway 101 at Mile 28.6 (see page 121):

Mile 0 Junction; proceed north.

1.0 Broulan Reef Mine on right, at junction. To reach Hallnor Mine, continue straight ahead.

1.2 Junction; turn left.

1.3 Hallnor Mine on right.

Refs.: 7 p. 547; 51 p. 115-116; 251 p. 147, 259

Maps (T): 42 A/11E Pamour
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Bonetal Mine

The ore zone at this former producer is the western extension of the Hallnor ore deposit.

Original underground development began in 1938 and was carried out from the 361-foot and 561-foot levels of the Hallnor Mine. Production was obtained from 1941 to 1951 from a shaft, 571 feet deep. Bonetal Gold Mines Limited operated the mine and recovered 51,510 ounces of gold and 4,180 ounces of silver. The ore was treated at the Broulan Reef mill.

The mine is on the north side of the road leading west from the Broulan Reef Mine at a point 0.5 mile from that mine (see page 127).

Ref.: 51 p. 112-113

Maps (T): 42 A/11E Pamour
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Reef Mine

NATIVE GOLD, PYRITE

In quartz veins in basalt and rhyolite

Gold was first recovered from this former producer in 1915 and in 1917. The operator at that time was Porcupine Gold Reef Mining Company Limited. Further production was obtained from 1947 to 1951 by Porcupine Reef Gold Mines Limited, and from 1951 to 1965 by Broulan Reef Mines Limited for a total yield of nearly $\frac{1}{2}$ million ounces of gold and about 39,000 ounces of silver.

The underground workings extend to a depth of 2,673 feet. In the summer of 1972, the buildings were being dismantled and there were a few small dumps on the property.

Road log from Highway 101 at Mile 28.6 (see page 121):

Mile 0 — Junction; proceed north along road to Broulan Reef Mine, Hallnor Mine.

1.0 — Broulan Reef Mine on right, at junction; turn left.

1.5 — Bonetal Mine on right.

2.4 — Reef Mine on right, at junction.

Ref.: 51 p. 121-122

Maps (T): 42 A/11E Pamour
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile

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Porcupine Lake Mine

NATIVE GOLD, PYRITE

In quartz and in sericitic carbonate schist

This deposit was discovered by H. F. Hunter in 1908, one year before the prospecting rush in the Porcupine district; visible gold was noted by Hunter in sugary quartz and in rusty weathered schist exposed along the east shore of Porcupine Lake. Exploration of the deposit was done by diamond drilling beneath the ice in the winter of 1911-1912 by the Porcupine Lake Gold Mines Limited. Encouraging results led the company to install a mill and to develop the deposit by an inclined shaft sunk to a depth of 280 feet. The work was discontinued at the outbreak of World War I in 1914. Operations were resumed in 1935 by the Porcupine Lake Gold Mining Company Limited which obtained 1,369 ounces of gold and 86 ounces of silver in its operations between 1937 and 1944. One mineralized zone measuring 155 feet long and 4 feet wide at the 280-foot level contained 0.4 ounces of gold per ton.

The mine is located on the steep shore of Porcupine Lake. The remnants of the mill and some rock dumps mark the site.

Road log from Highway 101 at Porcupine (Mile 30.2, see page 121):

Mile 0 From Highway 101, proceed south onto Haileybury Crescent.

0.3 Junction gravel road; turn right.

0.45 Porcupine Lake Mine on right.

Refs.: 18 p. 246; 24 p. 84; 51 p. 120-121; 221 p. 500, 565

Maps (T): 42 A/6E Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Langmuir Mine

PYRRHOTITE, MILLERITE, CHALCOPYRITE, PYRITE

In peridotite

This mine is currently (1973) being prepared for production. The ore consists of disseminated pyrrhotite and millerite with minor chalcopyrite and pyrite. The ore reserves estimated at 1½ million tons averages 1.87 per cent nickel.

Development of the orebody was undertaken jointly by the International Nickel Company of Canada Limited and Noranda Mines Limited in 1970. A shaft has been sunk to a depth of 1,485 feet and production is planned for 1973.

Plate XX. Coniaurum Mine. Miners are examining a rich vein at the 700-foot level. (Public Archives of Canada photo PA-17521)

Enquiries regarding visits to the property should be directed to the Timmins-Porcupine Chamber of Commerce.

Road log from Highway 101 at Mile 32.3 (see page 121):

Mile 0	South Porcupine; proceed south onto Main Street to business section.
0.5	Turn left onto Golden Avenue.
0.6	Turn right onto Evans Street.
1.0	Turn left onto Charles Avenue.
1.1	Turn right onto Tisdale Street.
7.7	Bridge over Redstone River.
16.0	Langmuir Mine.

Refs.: 14 p. 87, 89; 120 p. 91; 251 p. 246; 254 p. 252

Maps (T): 42 A/6E Timmins
(G): 2206 Langmuir and Blackstock townships, Timiskaming district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{2}$ mile)

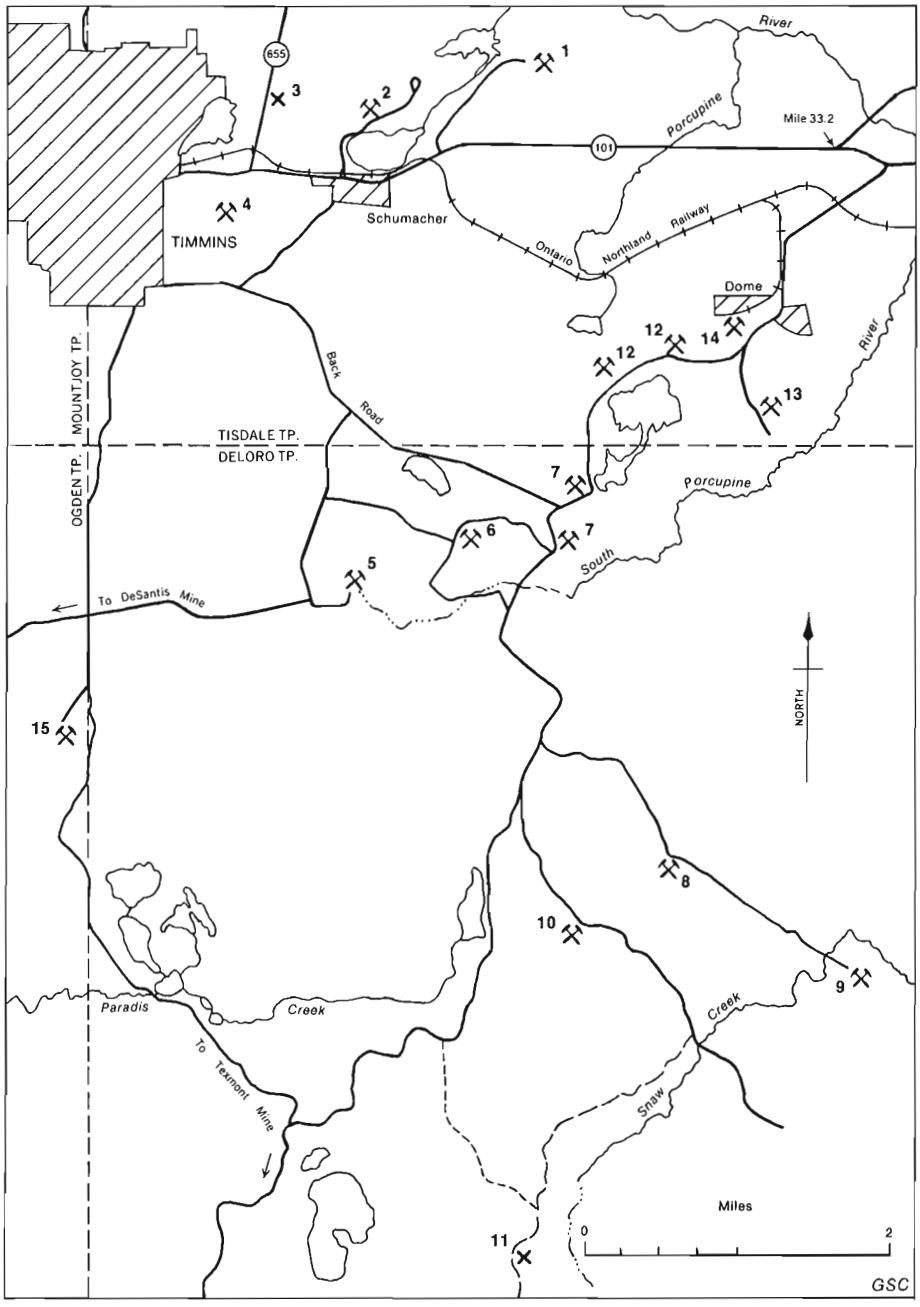
Coniaurum (Rea) Mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, MARCASITE, TOURMALINE, CHLORITE, NATIVE COPPER

In quartz-carbonate veins occupying fractures in basalt and in quartz-feldspar porphyry

This mine includes the original Rea and Armstrong-Booth claims where remarkably rich surface showings were found in the early days of the camp. On the Armstrong-Booth claim (south of the present workings), a rocker was at one time used to recover gold from the decomposed surface veins. The deposit consisted of veins containing visible gold associated with pyrite (as nodules, grains and cubes), chalcopyrite, marcasite, tourmaline, and chlorite. Native copper has been reported. Some of the quartz was a dark bluish colour due to the inclusion of tourmaline.

Initial development and mining of the deposit was conducted between 1910 and 1916 by Rea Consolidated Gold Mines Limited, and from 1916 to 1918 by Newray Mines Limited. Some gold was produced, but the values decreased below the 200-foot level. Mining was from a shaft, 400 feet deep. In 1922, Coniaurum Mines Limited undertook development by sinking a new shaft from which production was obtained continuously from 1928 until 1960, and in 1961. The main shaft provided access to underground workings to a depth of 5,500 feet below the surface. Precious metals recovered from the deposit since 1913 amounted to 1,109,574 ounces of gold and 196,522 ounces of silver. The property belongs to Westfield Minerals Limited.



1. Coniaurum Mine
2. McIntyre Mine
3. Clinozoisite occurrence
4. Hollinger Mine
5. Delnite Mine
6. Aunor Mine
7. Ankerite Mine
8. Faymar Mine
9. Slade-Forbes Mine
10. Bowman Mine
11. Canadian Magnesite property
12. Paymaster Mine
13. Preston Mine
14. Dome Mine
15. Kenilworth Mine

Map 12. Timmins area.

Access is by the Carium Road, 0.9 mile long, leading north from Highway 101 at Mile 35.8 (see page 121).

Refs.: 17 p. 30; 18 p. 239, 241; 24 p. 52, 70-71; 30 p. 153-158; 40 p. 103; 51 p. 92-93; 184 p. 105; 220 p. 131, 464, 496; 221 p. 757

Maps (T): 42 A/6W Timmins
(G): 2075 Tisdale township, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

McIntyre Mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, TETRAHEDRITE, ARSENOPYRITE, HESSITE, ALBITE, ANKERITE, SIDERITE, SCHEELITE, TOURMALINE, CHLORITE, HEMATITE, MAGNETITE, BORNITE, TENNANTITE, NATIVE SILVER, MOLYBDENITE, GYPSUM, ANHYDRITE

In lava and in porphyry

This mine ranks second to the Hollinger Mine in the production of gold in the Porcupine camp since mining began in the district. It has been a continuous producer since 1912, and to the end of 1972, the total recovery of precious metals amounted to about 10¼ million ounces of gold and 2 3/4 million ounces of silver from 33,407,672 tons of ore milled, and valued at $354,188,000. Production of copper began in 1963; to the end of 1972, some 88 million pounds valued at $51,950,000 had been won. Scheelite was recovered in 1941-1942, and in 1952, and was processed at the Hollinger mill. Ore reserves (December, 1972) were estimated at 531,000 tons of gold ore averaging 0.284 ounces of gold per ton, and 3,239,000 tons of copper ore averaging 0.66 per cent copper and 0.03 ounces of gold per ton. The current rate of production is 2,200 tons per day.

The gold occurs in the native state and associated with sulphides in quartz-carbonate veins occupying fractures in Keewatin lavas at the contact of quartz-feldspar porphyry and within the porphyry. Gold is also recovered from the copper orebody. In the veins, pyrite and pyrrhotite are commonly associated with the gold; other minerals reported from the ore-zone include chalcopyrite, sphalerite, tetrahedrite, arsenopyrite, hessite, albite, ankerite, siderite, scheelite (in early operations, large masses were found in the Jupiter claim) and chlorite. Tourmaline has been found in non-auriferous quartz veins.

The copper ore occurs in porphyry; the mineralization consists of chalcopyrite, pyrite, hematite, magnetite, bornite, tetrahedrite, tennantite, native silver (associated with bornite), molybdenite, gypsum, and anhydrite.

The McIntyre Mine comprises several properties around Pearl Lake that were staked in the early days of the camp, including the claim where the spectacularly rich gold-bearing quartz outcrop was discovered in the fall of 1909 by Alexander (Sandy) McIntyre

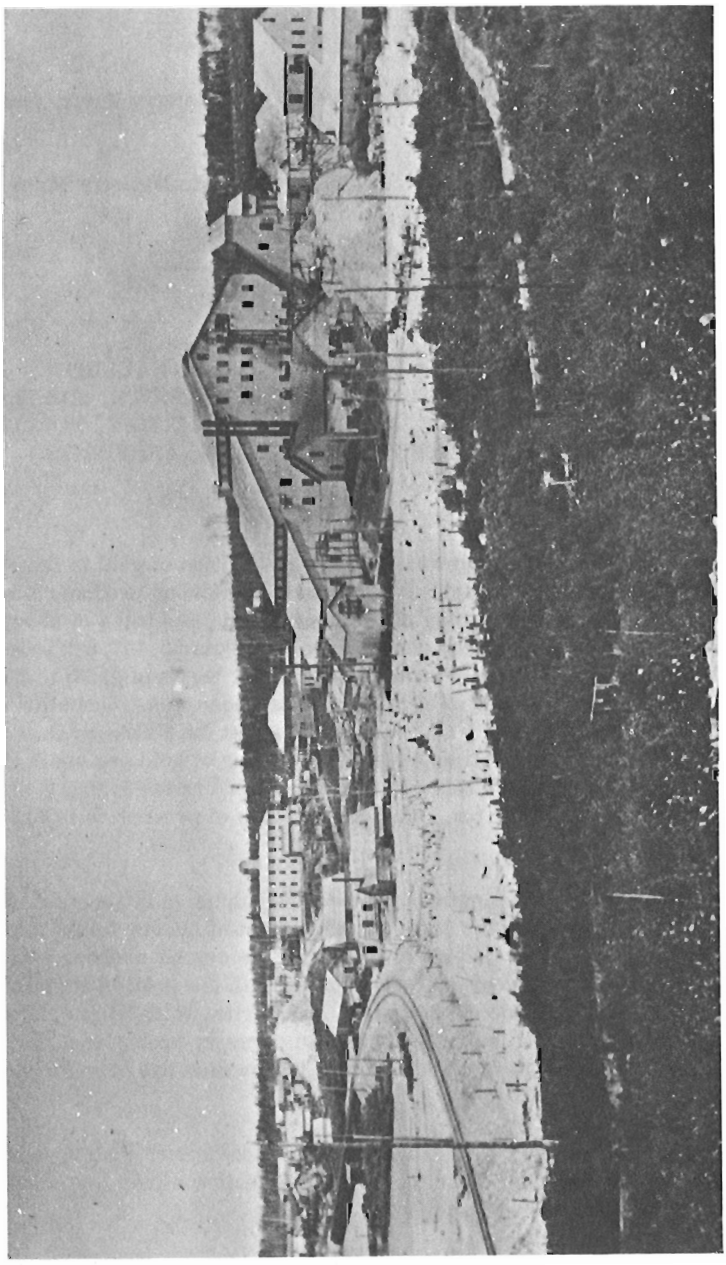


Plate XXI. McIntyre Mine, 1913. (Public Archives of Canada photo PA-30051)

who had earlier prospected several areas including Larder Lake, Bourkes, Gowganda, and Red Lake, and who later discovered gold-bearing veins at Kirkland Lake. His claim at Porcupine was acquired by McIntyre Porcupine Mines Limited in 1911. Initial underground development of the properties was undertaken in 1910 by Pearl Lake Gold Mines Limited, and in 1911 by Plenaurum Mines Limited, Jupiter Mines Limited, and McIntyre Porcupine Mines Limited. The spectacular surface showings persisted at depth and, as underground development progressed, the operators were rewarded with a succession of high-grade ore discoveries. Production began in February, 1912 at the original McIntyre property. On the Jupiter property, minute gold nuggets and fine gold were recovered in the early days by panning the ore. The copper ore-body was discovered in 1959 by A.T. Griffis, the company's geologist.

The deposit has been developed by 13 shafts of which 5 are currently used. The deepest workings are at 7,119 feet and 8,000 feet and are serviced by internal shafts; they are the deepest workings of any gold mine in the Porcupine camp.

The mine is located on the shore of Pearl Lake at Schumacher. It is operated by McIntyre Porcupine Mines Limited. Enquiries regarding visits to the surface plant should be directed to the Timmins-Porcupine Chamber of Commerce.

Refs.: 20 p. 30; 29 p. 119-122; 41 p. 156; 51 p. 101-102; 52 p. 66, 160; 56 p. 493-496; 67 p. 122-130; 206 p. 105-106; 219 p. 131, 426, 534; 251 p. 203-204; 254 p. 226-227

Maps (T): 42 A/6W Timmins
(G): 2075 Tisdale Township, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Hollinger Mine

NATIVE GOLD, PYRITE, PETZITE, HESSITE, COLORADOITE, ALTAITE, TETRADYMITE, TOURMALINE, CHLORITE, CHALCOPYRITE, PYRRHOTITE, SCHEELITE, SPHALERITE, GALENA, SERICITE, ARSENOPYRITE, ALBITE, AXINITE, CLINOZOISITE, EPIDOTE

In veins filling fractures in lava adjacent to porphyries that intruded the lava, and in the porphyries

The Hollinger Mine was one of the greatest gold producers on the continent. From 1910 until 1968, when operations ceased due to ore exhaustion, it produced 19,354,483 ounces of gold, 4,244,946 ounces of silver from 65,890,358 tons of ore milled for a value of 567,837,140 dollars. This amount is about twice the gold production recorded to the end of 1968 by the two other leading producers of the area, the McIntyre Mine and the Dome Mine. The mine also produced tungstic oxide (about $\frac{1}{2}$ million pounds) between 1940 and 1953.

Plate XXII. Benny Hollinger at Timmins in 1910. The six claims staked on October 1 1909 by this teen-aged prospector became the original property of the Hollinger Mine, Canada's greatest gold producer. (Public Archives of Ontario picture collection Acc. 3068, No. 17)

The ore consisted of visible gold associated principally with pyrite in veins of quartz, of quartz-ankerite, and of quartz-calcite, and in the adjacent rocks. Cubes and nodular masses (measuring 3/4 inch in diameter) of pyrite have been reported. Tellurides including petzite and, less commonly, hessite, coloradoite, altaite, and tetradymite occurred in quartz-ankerite veins. Other minerals that have been reported from the ore zone include: tourmaline, chlorite, chalcopyrite, and pyrrhotite in quartz veins; scheelite, sphalerite, galena, tourmaline, sericite, arsenopyrite, and pyrrhotite in quartz-ankerite veins; and tourmaline, albite, axinite, clinozoisite, epidote, sericite, and chlorite in quartz-calcite veins. Crystals of quartz and of sphalerite (measuring up to 2 inches in diameter) have been found lining vugs in quartz-albite gangue.

This mine comprised some of the richest and most promising surface showings discovered in 1909; some of them were responsible for the Porcupine gold rush, including the sensational discoveries by Benjamin Hollinger, Alex Gillies, Tom Middleton, and John (Jack) Miller who rushed to the area upon hearing about Wilson's discovery of the Dome deposit. These conspicuous showings near a centuries-old trail used by Indians and Hudson's Bay traders had, however, eluded earlier prospectors including Reuben D'Aigle, the native of New Brunswick who prospected in the Yukon for eight years before coming to the Porcupine district in 1906; he investigated some outcrops within a few hundred feet of the discoveries, but failed to record any claims. Development began immediately after the discoveries were made, and the original Hollinger property was the scene of most of the activity in the camp. Hollinger Gold Mines Limited was formed in June, 1910 to operate the claims; a mill was in operation in the same year, and the first shipment of ore averaged $200.00 per ton. As development progressed downward, a series of spectacular gold-bearing quartz veins as rich as the surface showings were revealed. At the 100-foot level, one high-grade quartz vein averaging 8 feet wide and developed over a 1300-foot length was reported to contain gold valued at 3 million dollars; equally sensational veins were encountered at the 200-foot level. When the fire of July, 1911 swept the area completely destroying the mill and other buildings, it uncovered outcrops containing quartz stringers with rich concentrations of native gold. In 1916, the company became Hollinger Consolidated Gold Mines Limited upon amalgamation of claims worked by Millerton Gold Mines Limited (the Miller-Middleton claims), Acme Gold Mines Limited (the original claims staked by John Miller), and Canadian Mining and Finance Company. The property of Schumacher Gold Mines Limited was acquired in 1922.

The mine was developed by numerous shafts and the deepest workings are at 5,450 feet. The mill had a capacity of 3500 to 4000 tons per day; when operations terminated, it was dismantled and parts were sent to the Ross Mine at Holtyre. Operations ceased at the mine on April 20, 1968, and at the mill on July 24, 1968. The property was leased in 1969 to McIntyre Porcupine Mines Limited which continues to mine some ore.

The mine is located in Timmins opposite the junction of highways 101 and 655. This is not a collecting locality, but is included for historical interest.

Refs.: 24 p. 3, 54-60; 51 p. 99-100; 52 p. 65, 66-67, 68, 160; 70 p. 308; 81 p. 102; 94 p. 106-114; 125 p. 111-117; 161 p. 16-17; 206 p. 94, 101-102; 219 p. 137, 150; 220 p. 227, 284, 464; 251 p. 151

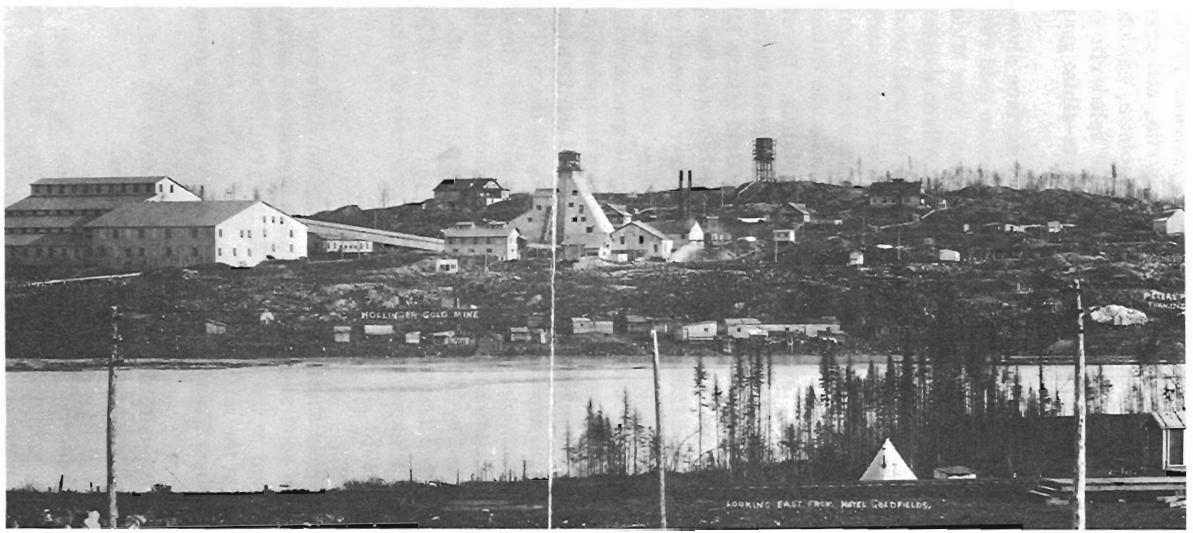


Plate XXIII. Hollinger Mine viewed from the west, circa 1912. Miller Lake (in foreground) has since been filled and is now the site of a municipal park. (Public Archives of Canada photo PA-29927)

Maps (T): 42 A/6W Timmins
(G): 2075 Tisdale Township, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Kidd Creek Mine

PYRITE, SPHALERITE, CHALCOPYRITE, GALENA, NATIVE SILVER, BORNITE, COVELLITE, FUCHSITE, SERPENTINE

In felsic tuff and breccia, in graphitic rocks

The Kidd Creek Mine is the world's leading producer of silver and zinc, and a substantial producer of cadmium, lead and copper. The ore is fine-grained and includes sphalerite – chalcopyrite – pyrite ore, massive chalcopyrite ore, sphalerite – galena – native silver ore, and siliceous chalcopyrite ore. Bornite, covellite, fuchsite, and serpentine occur in the deposit. Since production began in 1968 to the end of 1972, 21,137,000 tons of ore were milled yielding 73,800,200 ounces of silver, 3,366,800 tons of zinc concentrates, 1,130,700 tons of copper concentrates, about 400,000 tons of lead concentrates, and 9,449,000 pounds of cadmium. Ore reserves at the beginning of production were estimated at 62,500,000 tons with an average grade of 7.08 per cent zinc, 1.33 per cent copper, and 4.85 ounces of silver per ton.

The deposit was discovered by Texas Gulf Sulphur Company as a result of an airborne electromagnetic survey followed by a ground magnetic survey and diamond-drilling. Announcement in April 1964 of the discovery of the immense base metal deposit in the Timmins area generated the greatest staking rush in the district since the discovery of gold 55 years earlier. Staking by helicopter was done by claim-stakers rushed into the area from distant points in Ontario, Manitoba and Quebec. In the winter of 1964-1965, stripping of the overburden in preparation for open-pit operations at the Kidd Creek deposit was commenced. In 1965, Ecstall Mining Limited was formed to mine the deposit. Production began in November, 1966. The company plans to replace the open pit operation by underground methods; the sinking of a shaft was started in mid-1970 and at the end of 1971 reached a depth of 3,050 feet. The company operates a 10,000-ton per day concentrator in Hoyle.

The mine is located north of Timmins; enquiries regarding visits to the property should be directed to the Timmins-Porcupine Chamber of Commerce.

Road log from Timmins:

Mile 0 Junction Highway 655 and Highway 101; proceed north onto Highway 655.

0.5 Road-cut on right exposes veins of white massive quartz containing radiating prismatic aggregates of brownish grey to greyish yellow clinozoisite. Some green flaky chlorite is associated with the clinozoisite. The quartz veins occur in basalt.

Mile 15.9 Kidd Creek Mine.

Refs.: 14 p. 72-73; 48 p. 73-77; 58 p. 103, 107; 79 p. 190-191, 195-196; 116 p. 7; 120 p. 116-117; 157 p. 112-113; 158 p. 113; 159 p. 132-133; 172 p. 121-122; 242 p. 1, 11, 12; 243 p. 1; 247 p. 366; 251 p. 320; 253 p. 50, 54; 254 p. 331-332

Maps (T): 42 A/11W Pamour
(G): P486 Kidd Township, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Road log to mines along the Back Road (Descriptions of mines follow the road log):

Mile 0 Timmins at intersection Pine Street and Algonquin Boulevard East (Highway 101); proceed south along Pine Street.

0.7 Intersection Moneta Avenue; turn left.

1.4 Junction Vipond Road. A road-cut on the Vipond Road, 0.2 mile from this junction, exposes "Chicken Feed" lava, a dark greenish grey rock streaked with white to light grey angular or lath shaped fragments. The rock contains tiny pyrite cubes and is Keewatin in age. It also occurs at the McIntyre and Hollinger mines (Refs.: 52 p. 12, 16; 67 p. 124).

2.6 Junction, road on right to Aunor Mine, Delnite Mine.

3.2 McDonald Lake on right.

4.0 Junction, and Ankerite Mine on right; road leads south from junction beyond Ankerite Mine and to Faymar Mine, Slade-Forbes Mine, Bowman Mine.

4.5 Turn-off (left) to Paymaster Mine (No. 5 shaft).

4.9 Turn-off (left) to Paymaster Mine (No. 6 shaft).

6.4 Turn-off to Preston Mine on right.

6.9 Turn-off to Dome Mine on left.

7.3 Junction at South Porcupine; turn left.

7.6 Junction Highway 101 at Mile 33.2 (see page 121).

Aunor Mine

NATIVE GOLD, TOURMALINE, SCHEELITE, PYRITE, CHALCOPYRITE

In quartz-ankerite veins in sheared volcanic rocks

Fine visible gold occurs in brown to grey and milky quartz, and in the wall-rock. Brown tourmaline, scheelite, and small amounts of pyrite and chalcopyrite occur in the deposit.

The deposit was discovered and staked by two brothers, John A. and W.S. Mitchell, late in 1909 when most of the area in the vicinity of the Hollinger and Dome properties had already been claimed. After some surface work was done in 1910 by the Porcupine Consolidated Mining Company, the property was idle until 1935 when the Mitchells returned to the area encouraged by the successful developments at the nearby Buffalo Ankerite Mine, and formed Augite Porcupine Mines Limited to develop the deposit. A shaft was sunk to 1,026 feet and the company's operations ceased in 1938. In the following year, Aunor Gold Mines Limited acquired the property along with several adjoining claims and brought it into production in 1940. In 1964, two shafts of the Delnite Mine were purchased by the company. The Aunor main shaft is 3,082 feet deep and is connected to the deep levels of the Delnite Mine. The Aunor Mine produces gold and silver, and has produced some scheelite which was treated at the Hollinger mill. From January, 1938 to September 30, 1972, precious metals valued at $82,448,500 were milled from 6,882,096 tons of ore.

Enquiries regarding visits to this mine and to the Delnite Mine should be directed to the Timmins-Porcupine Chamber of Commerce.

Road log from Mile 2.6 on the Back Road (see page 140):

Mile 0 At junction on Back Road, proceed southwest.

0.6 Junction. Road on left leads 1 mile to the Aunor Mine; road straight ahead leads 0.9 mile to the Delnite Mine.

Refs.: 1 p. 129, 130; 15 p. 507-515; 51 p. 57-58; 52 p. 160; 120 p. 11-12; 251 p. 38; 254 p. 37-38

Maps (T): 42 A/6W Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Delnite Mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, TOURMALINE

In quartz-ankerite veins in carbonatized andesite

The gold occurred as visible gold and in association with pyrite and arsenopyrite. Brown tourmaline was a common constituent of the veins.

The deposit was staked in 1909 or 1910 by J.E. McMahon who also did some surface work on it. Development began with the sinking of a shaft in 1931-1932 by LaRoche Mines Limited, and was continued in 1934 by Delnite Mines Limited which produced

nearly 1 million ounces of gold and about 73,000 ounces of silver from 1937 until 1964 when operations ceased. The mine consists of three surface shafts and one internal shaft that reaches a depth of 5,395 feet. Two of the shafts were sold to Aunor Gold Mines Limited in 1964.

For access to the mine, see road log to Aunor Mine (page 141).

Refs.: 51 p. 61-62; 194 p. 504; 219 p. 702

Maps (T): 42 A6W Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Ankerite Mine

NATIVE GOLD, TOURMALINE, PYRITE

In quartz-carbonate veins occupying fractures in basalt and in porphyry; in dacite

Brown tourmaline was the most common constituent of the veins; native gold was generally associated with pyrite in the veins and in dacite.

This mine, a former producer, comprised the Dobie and Macdonald properties that were among the earliest staked in the Porcupine camp. Ore described as being remarkably spectacular was recovered from the Dobie claim in 1911 by the Dobie Mining Company. Development of the Macdonald claim was undertaken at about the same time by Maidens Macdonald. In spite of the promising developments of early operations, production was obtained only in 1926 after sporadic development operations had been conducted by a number of mining companies. The original Dobie property was brought into production by Ankerite Gold Mines Limited, the Macdonald property by March Gold Mines Limited with milling on both properties. From 1935 until 1953, when operations were terminated due to ore exhaustion, the properties were operated jointly by Buffalo Ankerite Gold Mines Limited.

The mine consists of several shafts. The production shaft is 3,996 feet deep with underground connection to the March shaft on two levels. The mill had a capacity of 400 tons per day. Total production amounted to slightly over one million ounces of gold and about 86,000 ounces of silver obtained from 5,270,000 tons of ore milled for a value of $35,483,916.

The road log to the mine is given on page 140.

Refs.: 17 p. 30; 51 p. 55-57; 100 p. 515-517; 220 p. 745

Maps (T): 42 A/6W Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Faymar Mine

NATIVE GOLD, PYRITE, EPIDOTE, PLAGIOCLASE, CHLORITE

In quartz veins at contact of basalt and porphyry

Native gold was associated with pyrite in quartz and in basalt and porphyry at this former gold-silver producer. On the rock dumps, specimens of yellowish green epidote with white massive quartz, orange-red plagioclase, dark green chlorite, and tiny cubes of pyrite are common. The epidote occurs as aggregates of microscopic prisms.

The mine was worked from 1938 until 1942 by Faymar Porcupine Gold Mines Limited which recovered about 22,000 ounces of gold and some silver. It was serviced by a shaft that reaches a depth of 1,110 feet. A mill operated on the site.

Road log from the Back Road at Mile 4.0 (see page 140):

Mile 0	Junction on Back Road; proceed south along road to Ankerite Mine continuing beyond residences and tailings.
1.6	Junction; continue straight ahead.
2.0	Junction; turn left onto single-lane road.
3.3	Faymar Mine.

Ref.: 51 p. 63-64

Maps (T): 42 A/6W Timmins
(G): P342 Deloro Township, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

Slade-Forbes Mine

CHRYSOTILE, SERPENTINE, TALC

In serpentinized dunite

Light green chrysotile asbestos (cross-fibre) occurs in veinlets up to 2 inches wide. Light to medium green massive serpentine, light green picrolite, and talc are associated with it.

Small amounts of asbestos were removed from the deposit by the Slade-Forbes Asbestos Company (1917), by Canadian Johns-Manville Company Limited (1943), by Bell Asbestos Company (1948-1949), by Teegana Mines Limited (1951), and by Van Packer Mines of Canada, Limited (1952). The deposit has been exposed by a pit, 40 feet square and 10 to 15 feet deep. A mill was operated at the site.

Access is by a single-lane road, 1.5 miles long, that continues from the Faymar Mine.

Ref.: 51 p. 12-13

Maps (T): 42 A/6E Timmins
(G): P342 Deloro Township, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

Bowman Mine

CHRYSOTILE, SERPENTINE

In serpentinite

Greyish green to green chrysotile asbestos (cross-fibre) occurs in veinlets up to $\frac{1}{2}$ inch wide in green massive serpentine.

The deposit was operated from a pit measuring 50 feet by 130 feet and 60 feet deep. Intermittent production of asbestos ore was obtained by Bowman Asbestos Mines (1923), Porcupine Asbestos Mining Syndicate (1924), Porcupine Asbestos Corporation Limited (1926), and Metro Asbestos Processors Limited (1956) for a total of about 7,200 tons. In the 1956 operations, most of the ore was treated at the mill at the Slade-Forbes Mine.

Road log from Back Road at Mile 4.0 (see page 140):

Mile 0 — From Back Road, proceed south along road leading to Ankerite Mine and continuing beyond residences and tailings.

2.0 — Junction road to Faymar Mine and to Slade-Forbes Mine; continue straight ahead.

2.6 — Junction; turn left onto single-lane road.

3.4 — Bowman Mine on right.

Refs.: 77 p. 12; 167 p. 103; 211 p. 42

Maps (T): 42 A/6W Timmins
(G): P342 Deloro Township, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

Canadian Magnesite Property

MAGNESITE, TALC, SERPENTINE, HEMATITE, MAGNETITE, STICHTITE, ANHYDRITE, SOAPSTONE

In serpentinite

Magnesite is associated with light green talc and green serpentine in carbonatized serpentinite. Some chrysotile asbestos and small amounts of hematite and magnetite

are present. Stichtite and anhydrite have also been found in the deposit (pers. comm., E.G. Bright) and greyish green soapstone that is suitable for carving.

The deposit was explored in 1964-1965 and in 1970-1972 by Canadian Magnesite Mines Limited. The work consisted of diamond drilling and surface stripping. The property is reached by continuing beyond the Bowman Mine for 1.2 miles to a junction; then follow road on right for 2.1 miles to the occurrence on the east (left) side of the road.

Ref.: 254 p. 65-66

Maps (T): 42 A/W Timmins
(G): P342 Deloro Township, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

Paymaster Mine

NATIVE GOLD, PYRITE, GALENA, SPHALERITE, PYRRHOTITE, CHALCOPYRITE, HEMATITE, SCHEELITE, TITANITE, EPIDOTE, AXINITE, TOURMALINE, TALC

In quartz-ankerite veins cutting greenstone, dacite and basalt

Native gold at this past producer was generally closely associated with pyrite; most of it was very fine although some coarse gold was also encountered. Sulphides including galena, sphalerite, pyrrhotite, and chalcopyrite were present in small amounts. Hematite, scheelite, titanite, epidote, and mauve axinite have been reported. The dumps furnish specimens of quartz containing feldspar, black tourmaline, chlorite, and talc, and specimens of grey, fine-grained feldspar porphyry and of black tourmaline breccia. Very fine flakes of specularite were noted in specimens of calcite.

The Paymaster property is a consolidation of the West Dome, West Dome Lake, Apex and Standard properties where gold was discovered in the early days of the Porcupine camp. One of these properties, the West Dome, was known as the Foster claim and was staked by Bert Hotchkiss a short time after Wilson made his famous discovery of the Dome showing; it was then regarded as one of the most remarkable showings of free gold in the district.

Development commenced in 1910 by Standard Gold Mines Limited and West Dome Mines Limited. Production from 1915 until 1930 was obtained by Consolidated West Dome Mines Limited and West Dome Lake Gold Mines Limited. In 1930, Paymaster Consolidated Mines Limited (name changed in 1964 to Porcupine Paymaster Limited) was formed as a result of the amalgamation of four properties, and the company continued mining and milling operations until the closure of the mine in 1966.

The mine was serviced by several shafts; the production shaft (No. 5) reaches workings to a depth of 6,157 feet, and No. 6 shaft is 482 feet deep. The mill had a capacity of 700 tons per day. Total production of precious metals from slightly over $5\frac{1}{2}$ million tons of ore milled was 1,192,206 ounces of gold and 325,088 ounces of silver valued at $42,146,614.

The main workings of the mine are located on the north side of the Back Road at Mile 4.5 and Mile 4.9; other shafts are located south of Simpson Lake.

Refs.: 17 p. 26; 18 p. 245; 20 p. 51-52; 51 p. 103-104; 112 p. 138-140; 113 p. 520-528; 206 p. 98; 219 p. 668; 244 p. 261

Maps (T): 42 A/6W Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

2075 Tisdale Township, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Preston Mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, GALENA, ARSENOPYRITE, TOURMALINE, SCHEELITE

In quartz veins and lenses of porphyry and in basalt

This deposit differed from the other Porcupine gold mines in that most of the gold recovered from earlier operations was obtained entirely from the porphyries; several varieties of feldspar porphyry ranging in colour from cream to grey and buff, from purplish to almost black were encountered in the mine. Pyrite, chalcopyrite, pyrrhotite and less commonly, sphalerite, galena, and arsenopyrite were associated with the gold. Abundant coarse gold was encountered in both early and more recent operations, particularly from the quartz-tourmaline veins which contained the high-grade ore. Tourmaline and scheelite were also present in the veins. Cubes of auriferous pyrite measuring up to 4 inches in diameter have been reported to occur in the basalt.

The claims staked in 1909 by a group of prospectors including John S. Wilson and Harry A. Preston formed the nucleus of this property. Initial exploration was undertaken in 1911 by Preston East Dome Mines Limited which was re-named Preston Mines Limited in 1960. The company subsequently (in 1930's) acquired other properties including the Porphyry Hill (Fogg claim), the Porcupine Pet (Bridge claim), and the New York Porcupine (Martin claim). Production was obtained from a shaft 2,388 feet deep from which an internal shaft extended to a depth of 4,178 feet. The mill operated at a capacity of 1,000 tons per day. Some gold was recovered from early operations, but the bulk of it was won between 1938 and 1968. Production amounted to a little over $1\frac{1}{2}$ million ounces of gold and about 177,000 ounces of silver valued at $57,223,000. Operations ceased in June, 1968.

The mine is located south of the Back Road at Mile 6.4 (see page 140).

Refs.: 26 p. 513, 516; 51 p. 66, 67, 104-107; 107 p. 143-149; 219 p. 702; 220 p. 745; 251 p. 271

Maps (T): 42 A/6E Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

2075 Tisdale Township, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to $\frac{1}{4}$ mile)

Dome Mine

NATIVE GOLD, PYRITE, PYRRHOTITE, SPHALERITE, GALENA, ARSENOPYRITE, SYLVANITE, ALTAITE, CALAVERITE, TOURMALINE, SCHEELITE, FUCHSITE

In quartz and ankerite veins in basalt and sediments (conglomerate, greywacke, slate), and in porphyry

The Dome Mine ranks third in the cumulative production of gold in the Porcupine camp, after that of the Hollinger Mine and the McIntyre Mine. Its production at the end of 1971 was about half that of the Hollinger Mine when its operations terminated in 1968. It has sustained an annual production of gold since 1910, and has produced a small amount of copper ore in 1968, and some scheelite ore in the 1940's.

The discovery of gold on this property was made on August 24, 1909 by John S. Wilson, leader of a group of prospectors including Harry A. Preston, Gilbert Rheault, John Campbell, George Burns, and Phil Macklenberg. The search that resulted in the discovery was stimulated by reports of George Bannerman's rich find made a few days earlier north of Porcupine Lake. On the Wilson discovery claim, very coarse, nugget-like gold was richly concentrated in patches in a large dome-like outcrop of milky quartz enclosed by schistose volcanic rock; it was regarded as the most sensational showing of native gold in the district and it generated the great Porcupine gold-rush of 1909-1910 attracting a throng of prospectors including Benny Hollinger, John Miller, Alex Gillies, and Sandy McIntyre whose discoveries became parts of the Hollinger Mine and of the McIntyre Mine. The gold from this dome was mined from a large open pit known as the "glory hole". Another phenomenal showing referred to as the Golden Stairway vein was bared by the fire of 1911 that ravaged the Porcupine mining camp in its infancy; the vein contained streaks of coarse gold, about $\frac{1}{4}$ inch thick, and was located about 50 yards from the discovery dome; it was described by one prospector as having "gold stuck in the quartz all over the place, like candle-drippings" (Ref. 79, p. 193). And a vein, considered by the mine engineers to be one of the most striking showings found in any gold camp, was discovered by trenching in the summer of 1911; this vein, 18 to 20 feet wide and exposed for 72 feet, contained eight pockets of native gold, the most spectacular one being an almost solid mass measuring $2\frac{1}{2}$ inches by 15 inches. In the early mining days, all the gold showings were plastered with black paint so that any high-grading could readily be detected.

At the Dome Mine, native gold, often coarse, is associated with pyrite and pyrrhotite in quartz-tourmaline and in ankerite veins, and in the host rocks. Small amounts of sphalerite, galena, arsenopyrite, the tellurides – sylvanite, altaite and calaverite – and scheelite occur in the deposit. Fuchsite is associated with white quartz in carbonate rock.

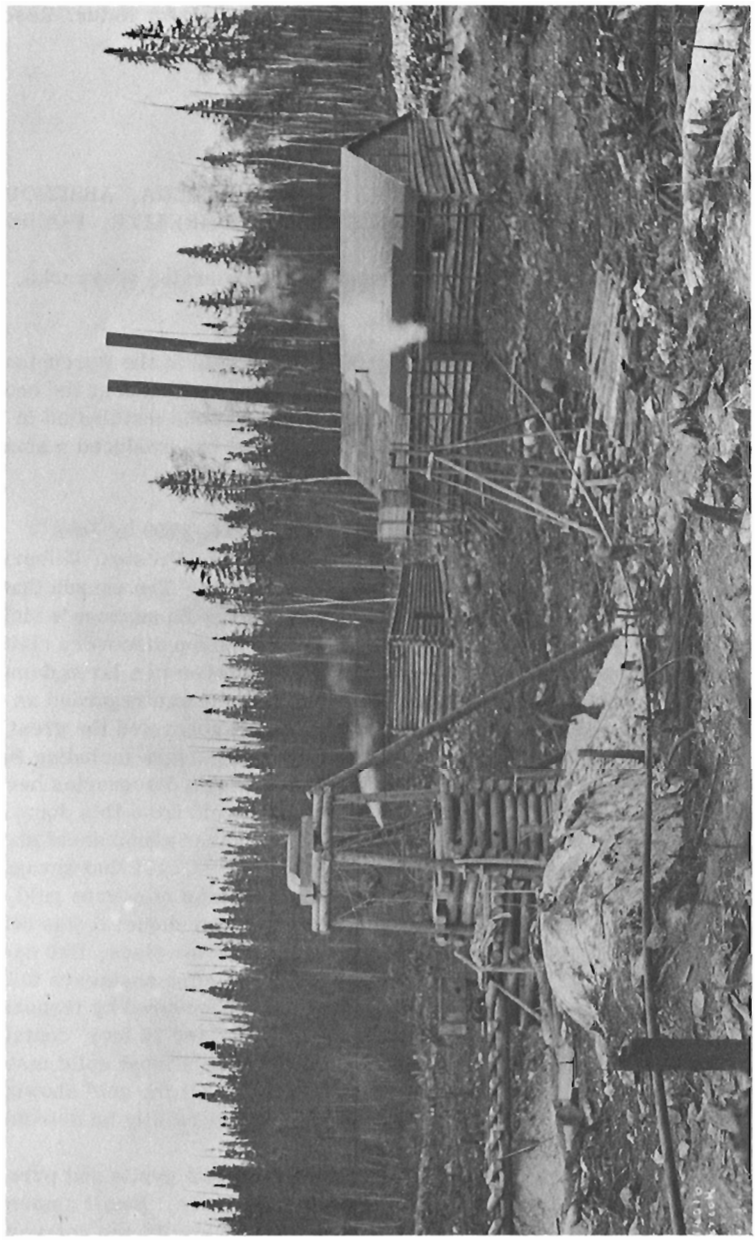


Plate XXIV. Dome Mine, 1910. (Public Archives of Canada photo PA-45237)

Mining of the deposit was undertaken early in 1910 by Dome Mines Company Limited (name changed in 1923 to Dome Mines, Limited). Open pit and, later, underground methods were used. The mine consists of several surface and internal shafts. The production shaft (No. 3) is 2,456 feet deep with internal shafts extending to depths of 4,000 and 5,260 feet. The mill treats about 1,850 tons of ore per day. Total production of precious metals to the end of 1972 amounted to about $9\frac{1}{2}$ million ounces of gold, and over $1\frac{1}{2}$ million ounces of silver from 33,291,614 tons of ore milled for a value of $313,223,686.

The mine is located on the north side of the Back Road at Mile 6.9 (see page 140). Enquiries regarding visits to the property should be directed to the Timmins-Porcupine Chamber of Commerce.

Refs.: 6 p. 683-684; 18 p. 241-242; 20 p. 48-51; 24 p. 54; 51 p. 96; 52 p. 66, 160; 83 p. 82-98; 120 p. 15-17; 206 p. 95-99; 219 p. 249; 220 p. 65, 606; 251 p. 113-114; 254 p. 113

Maps (T): 42 A/6E Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

2075 Tisdale Township, Cochrane district (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

DeSantis Mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, SCHEELITE, TOURMALINE

In quartz-carbonate veins, in schistose lava and carbonate rock

Native gold was associated with pyrite, chalcopyrite, and galena in a quartz-carbonate gangue and in the host rocks. Scheelite and tourmaline were also present.

The mine produced a small amount of gold and silver. Involved in the production were the DeSantis Gold Mining Company Limited (1933), DeSantis Porcupine Gold Mines Limited (1939-1942), and Kenilworth Mines Limited (1964). Initial development of the deposit was in 1914-1915 when it was known as the Langmuir property. The mine consists of two shafts sunk to depths of 215 feet and 1,244 feet.

Road log from Timmins:

Mile 0	Intersection Algonquin Boulevard (Highway 101) and Pine Street; proceed south onto Pine Street.
3.0	Junction; turn right.
3.3	Junction; proceed straight ahead along single-lane road.
5.4	DeSantis Mine.

Refs.: 51 p. 82-83; 71 p. 27-28

Maps (T): 42 A/6W Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Kenilworth (Naybob) Mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, GALENA, CHALCOPYRITE, SCHEELITE, TOURMALINE, MAGNESITE, FUCHSITE

In quartz vein in carbonatized schist

Native gold occurred with galena, pyrite, arsenopyrite, and chalcopyrite in quartz that also contained scheelite, ankerite, and black tourmaline. Specimens composed of white massive quartz containing masses of bright green mica (fuchsite) and massive buff-coloured magnesite are common in the dumps; the quartz-fuchsite rock is used locally as an ornamental stone.

Plate XXV. Kenilworth Mine. (G.S.C. photo 161452)

A total of about 50,000 ounces of gold and 5,000 ounces of silver were obtained from the deposit at various times between 1932 and 1964. Production was from a shaft, 1,347 feet deep. The mine was operated intermittently by Hayden Gold Mines Limited (between 1915 and 1933), Naybob Gold Mines Limited (1934-1942), and by Kenilworth Mines Limited (1962-1965). During its final period of production, the ore was treated at the Coniarium mill.

Road log from Timmins:

Mile 0 Intersection Algonquin Boulevard and Pine Street; proceed south along Pine Street.

3.0 Junction road to DeSantis Mine; continue straight ahead.

3.4 Junction; follow road on right.

3.8 Kenilworth Mine.

Refs.: 51 p. 85; 71 p. 27-28

Maps (T): 42 A/6W Timmins
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Texmont (Fatima) Mine

PYRRHOTITE, PENTLANDITE, PYRITE, MILLERITE, CHALCOPYRITE, HEAZLEWOODITE, VIOLARITE, GODLEVSKITE, BROCHANTITE, CHRYSOTILE, PICROLITE, DOLOMITE

In serpentinized peridotite

The ore at this nickel mine consists of pyrrhotite, pentlandite, pyrite, and millerite with minor amounts of chalcopyrite, heazlewoodite, and violarite. Godlevskite has been identified from a drill-core specimen; it was associated with pentlandite, millerite, and heazlewoodite. Brochantite was found as a greenish blue coating on specimens in the dump. Other minerals associated with the deposit are light yellowish green chrysotile asbestos, yellowish green picrolite, and white coarsely crystalline dolomite (fluoresces dark pink under "long" ultraviolet rays).

Outlining of the nickel orebody was undertaken in 1956 by Fatima Mining Company Limited (re-named Texmont Mines Limited in 1964) which commenced the underground development in 1959 with the sinking of a shaft to a depth of 790 feet. The property was leased in 1970 to Sheridan Geophysics Limited which brought the mine into production in June, 1971. The ore averages 1 per cent nickel.

Enquiries regarding visits to the property should be directed to the Timmins-Porcupine Chamber of Commerce.

Road log from Timmins:

Mile 0.0 Intersection Algonquin Boulevard (Highway 101) and Pine Street; proceed south along Pine Street.

3.0 Junction road to DeSantis Mine.

3.4 Junction road to Kenilworth Mine.

13.5 Junction road to Papakomeka Lake.

17.4 Boulders of coarse granite and granite porphyry are strewn along the road.

20.6 Junction; proceed along road on left.

27.6 Junction mine road; turn left.

27.9 Junction; follow road on left.

31.3 Textmont Mine.

Refs.: 14 p. 89-90; 132 p. 879; 172 p. 351-352; 235 p. 102; 251 p. 322

Maps (T): 42 A/3E Peterlong Lake
(G): 2205 Timmins-Kirkland Lake sheet, Cochrane, Sudbury and Timiskaming districts (Ont. Ministry Natur. Resour., 1 inch to 4 miles)

Genex (Mordey) Mine

CHALCOPYRITE, PYRITE, SPHALERITE

In rhyolite and andesite

Copper-zinc ore was formerly produced from this deposit. The sulphides occur as veinlets and lenses in the rhyolite and andesite and are associated with a cherty quartz matrix in brecciated lava. The sphalerite at this deposit is dark brown to black.

Sulphide mineralization was observed in Godfrey Township by Fred Steep while engaged in trapping. In 1926, following the successful developments of the Kam-Kotia base metal deposit, he and Philip Sheehan staked the outcrop. Subsequently, a program of surface diamond-drilling was carried out by several concerns. In 1966, Genex Mines Limited (re-named Irvington Mining Company Limited) sank a 277-foot shaft and briefly operated a mill treating 150 tons of ore daily. Operations were terminated at the end of 1966.

Access to the property is by a road, about 3 miles long, leading west from Highway 576 at a point 4.2 miles from its junction with Highway 101.

Refs.: 82 p. 43-47; 159 p. 108; 172 p. 119-120

Maps (T): 42 A/5 Dana Lake
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

1954-4 Township of Godfrey, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Canadian Jamieson Mine

PYRITE, CHALCOPYRITE, SPHALERITE, PYRRHOTITE, GALENA, COVELLITE, MALACHITE

In chlorite-carbonate schist

The mine formerly produced copper and zinc. The ore consisted of massive and disseminated sulphides: pyrite, chalcopyrite, sphalerite (dark brown), and pyrrhotite with a small amount of galena. Some of the pyrite occurred as fine cubes and nodules measuring about $\frac{1}{4}$ inch in diameter. Covellite and malachite have also been reported.

The deposit was originally staked in 1926. It was restaked in 1941 by George Jamieson, veteran prospector of the area, who in the next few years, performed some surface exploration of the deposit. In 1964, exploration and development were undertaken by Canadian Jamieson Mines Limited which produced copper and zinc concentrates from 1966 to 1971. A shaft, 760 feet deep, was used to hoist the ore.

Access is by a road, 0.3 mile long, leading west from Highway 576 at a point 8.2 miles from its junction with Highway 101.

Refs.: 14 p. 81-84; 50 p. 27-29; 82 p. 36-41; 120 p. 112-114; 172 p. 118-119

Maps (T): 42 A/2 Kamiskotia Lake
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

1954-4 Township of Godfrey, district of Cochrane, Ontario (Ont. Ministry Natur. Resour., 1 inch to 1,000 feet)

Kam-Kotia Mine

PYRITE, CHALCOPYRITE, SPHALERITE, PYRRHOTITE, MAGNETITE, COVELLITE

In sheared volcanic rocks

The mine produced copper and zinc, and some silver and gold. The ore consisted of massive sulphides that form lenses and stringers in the host rocks. Magnetite and covellite have been reported from the deposit.

The deposit was found beneath a heavy gossan cover and was originally staked by George Jamieson. From 1926 to 1928, Hollinger Consolidated Gold Mines Limited

conducted a program of preliminary development on this property and on additional claims acquired from C.H. Johanesen and A.W. MacDonald. In 1942, copper was produced for the Wartime Metal Corporation. The mine and mill were operated by Kam-Kotia Mines Limited from 1961 until the end of 1972 when the ore was exhausted. Original mining was from an open pit; beginning in 1965, ore was hoisted via a shaft, 1,974 feet deep. Production amounted to 143,351,665 pounds of copper, 156,000,000 pounds of zinc, 5,604 ounces of gold, and 663,136 ounces of silver for an approximate value of $83,549,000.

The adjacent Jameland Mine was also operated by the Kam-Kotia Mines Limited staff, its ore being treated at the Kam-Kotia mill. The deposit is similar to that at the Kam-Kotia Mine.

Road log from Highway 101 at Mile 43.9 (see page 121):

Mile 0 Junction highways 576 and 101; proceed onto Highway 576.

4.2 Turn-off (left) to Genex Mine.

6.9 Mount Jamieson (on right), the highest point in the Porcupine area. It is composed of rhyolite and rises from a sand- and gravel-covered plain to an elevation of 1,366 feet above sea level with a relief of about 400 feet.

8.2 Turn-off (left) to Canadian Jamieson Mine.

12.8 Kamiskotia Lake on left.

15.5 Kam-Kotia Mine.

Refs.: 14 p. 78-81; 50 p. 17-26; 120 p. 120-121; 172 p. 126-128; 179 p. 133, 134; 225 p. 117; 251 p. 174-175; 254 p. 180, 181

Maps (T): 42 A/12 Kamiskotia Lake
(G): P425 The Timmins area, district of Cochrane (Ont. Ministry Natur. Resour., 1 inch to 1 mile)

Card Lake Antimony Occurrence

BERTHIERITE, STIBNITE, NATIVE ANTIMONY, ULLMANNITE, TETRAHEDRITE-TENNANTITE, VALENTINITE, PYRITE, MARCASITE, PYRRHOTITE, ARSENOPYRITE, SCORODITE, ROMEITE

In sheared rhyolite

The occurrence is an antimony-arsenic deposit, berthierite and arsenopyrite being the principal antimony and arsenic minerals respectively. The metallic minerals occur as intimate intergrowths forming masses and disseminated grains; some of the minerals are distinguishable only by microscopic methods. Quartz is the principal gangue mineral. Secondary minerals having formed coatings and/or stains on the ore specimens include valentinite (white), romeite (yellow), and scorodite (green to brown).

Surface work was done on the outcrop in 1971 by Card Lake Copper Mines Limited.

Road log from Highway 101 at Mile 75.7 (see page 122):

Mile 0 Junction; proceed south.

1.3 Junction; follow road on left.

3.4 Junction; follow road on left.

4.2 Card Lake occurrence.

Refs.: 147 p. 1-11; 249 p. 3; 251 p. 71

Maps (T): 42 B/1 Foleyet
(G): 2230 Reeves and Sewell townships, Sudbury district (Ont. Ministry Natur. Resour., 1 inch to ½ mile)

Reeves Mine

CHRYSOTILE, PICROLITE, MAGNETITE, BRUCITE, PYROAURITE, ARAGONITE, DOLOMITE, TREMOLITE, TALC, PYRITE, CHALCOPYRITE, PYRRHOTITE, SOAPSTONE

In serpentinite

Light yellowish green chrysotile asbestos occurs in veinlets measuring up to 3 inches wide but averaging about ¼ inch wide. Light green to greenish yellow picrolite and yellowish green massive serpentine occur in the deposit. Magnetite is associated with the serpentines. Other minerals present are: brucite, as white to light green compact fibrous and flaky masses; pyroaurite, as light blue silky fibrous and foliated aggregates commonly associated with brucite or serpentine; aragonite, as colourless to white radiating prismatic aggregates associated with white sugary dolomite on serpentine; colourless to white tremolite; light green talc; and some pyrite, chalcopyrite, and pyrrhotite. Black soapstone occurs in the deposit (pers. comm., J.L. Jambor).

The deposit was originally staked by J.C. Bromley. In 1952 and 1953, Canadian Johns-Manville Company Limited explored the deposit by geophysical surveys and by diamond-drilling. Investigation, resumed in 1963 with the sinking of an exploration shaft, was followed by removal of overburden in preparation for open-pit mining. In 1966, Johns-Manville Mining and Trading Limited was incorporated to operate the mine, and production commenced in 1968.

Due to mining operations visitors are not admitted to the pit; open-pit viewing operations may be observed from a viewing platform at times when mining operations permit.

The mine and mill are located 0.8 mile south of Highway 101 at Mile 81.8 (see page 122).

Refs.: 77 p. 13; 128 p. 67-73; 211 p. 46-49

Maps (T): 42 B/1 Foleyet
(G): 2230 Reeves and Sewell townships, Sudbury district (Ont. Ministry Natur. Resour., 1 inch to ½ mile)

MINERAL, ROCK DISPLAYS

Cobalt Mining Museum,
Cobalt, Ontario.

Haileybury Campus (School of Mines),
Ontario College of Applied Arts and Technology,
Haileybury, Ontario.

Latchford Mining Museum,
Latchford, Ontario.

The H. H. Costain Mineral Collection,
McIntyre Community Building,
Schumacher, Ontario.

The Timmins-Porcupine Chamber of Commerce,
Highway 101,
Schumacher, Ontario.

Ontario Ministry of Natural Resources,
60 Wilson Street,
Timmins, Ontario.

ADDRESSES FOR MAPS, REPORTS

For geological maps and reports:

Publications Office,
Geological Survey of Canada,
* Department of Energy, Mines and Resources,
601 Booth Street,
Ottawa, Ontario, K1A 0E8.

Publications Office,
Ontario Ministry of Natural Resources,
Whitney Building,
Queen's Park,
Toronto, Ontario, M7A 1W4.

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615 Booth Street,
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For road maps and travel information:

The Canadian Government Travel Bureau,
Department of Industry, Trade and Commerce,
150 Kent Street,
Ottawa, Ontario, K1A 0H6.

Ministry of Industry and Tourism,
900 Bay Street,
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Toronto, Ontario, M7A 1S6.

Department of Tourism, Fish and Game,
Hôtel du Gouvernement,
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Vol. II: Ontario and Quebec. 252 p., 47 location maps; 9 photos, 1964. ($2.00)

Vol. III: New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland. 103 p., 13 location maps; 8 photos, 1964. ($1.50)

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68-51 — Rocks and Minerals for the Collector: Buckingham-Mont-Laurier-Grenville, Quebec; Hawkesbury-Ottawa, Ontario, by Ann P. Sabina, 1969, 107 p., figure, 8 location maps and 11 plates. ($2.00)

69-45 — A catalogue of Canadian Minerals, by R.J. Traill, 1970, 649 p. ($6.75)

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Paper 71-27 Rocks and Minerals for the Collector: LaRonge-Creighton, Saskatchewan; Flin Flon-Thompson, Manitoba, by Ann. P. Sabina, 1972, 100 p., figure, 12 location maps and 16 plates. ($2.00)

72-32 Rocks and Minerals for the Collector: The Alaska Highway; Dawson Creek, British Columbia to Yukon/Alaska Border, by Ann P. Sabina, 1973, 146 p., figure, 1 location map, 33 plates and 1 map. ($2.50)

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73-22 A catalogue of Canadian minerals, supplement I, by R.J. Traill, 1974, 260 p. ($5.00)

73-27 Raw materials of Canada's mineral industry, by R.J. Traill, 1973, 80 p. ($2.00)

Economic Geology Report No. 7; Prospecting in Canada, 4th edn., 1971, 308 p. ($10.00)

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9 Kootenay National Park, British Columbia: Wild Mountains and Great Valleys, by David M. Baird. 1964. 94 p. ($1.50)

10 Waterton Lakes National Park, Alberta: Lakes Amid the Mountains, by David M. Baird. 1964. 95 p. ($1.50)

11 Glacier and Mount Revelstoke National Parks, British Columbia: Where Rivers Are Born, by David M. Baird. 1965. 104 p. ($1.50)

No. 12 Rocks and Scenery of Terra Nova National Park (Nfld.), by David M. Baird. 1966. 52 p. ($1.00)

13 Banff National Park: How Nature Carved its Splendour, by David M. Baird. 1967. 307 p. ($3.00)

14 Early Canada, a collection of historical photographs by officers of the Geological Survey of Canada, by E. Hall. 1967. 136 p. ($4.00)

15 Guide to the geology of the National Capital Area (Ottawa), by David M. Baird. 1968. 188 p. ($2.50)

19 Focus on Canadian Landscapes – Regards sur les paysages canadiens, by R.G. Blackadar and L.E. Vincent. 1973. 178 p. ($4.50)

REFERENCES

Abel, M.K.
1967: (1) Aunor Gold Mines Limited; p. 128-131 in Can. Inst. Mining Met. centennial field excursion, northwestern Quebec and northern Ontario; publ. by Can. Inst. Mining Met.

Auger, P.E.
1952: (2) Belleterre area, Guillet Township, Témiscamingue County; Que. Dept. Mines, Geol. Rept. 55.

Backman, O.L.
1948: (3) Broulan Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 554-558.

Baker, M.B.
1917: (4) Alexo nickel mine, Timiskaming district; Ont. Bur. Mines, Ann. Rept. 1917, v. 26, p. 258-273.

Barlow, Alfred Ernest
1899: (5) Report on the geology and natural history of the area included by the Nipissing and Timiskaming map-sheets, comprising portions of Nipissing, Ontario, and of the county of Pontiac, Quebec; Geol. Surv. Can., Ann. Rept. N.S. V. X, 1897, pt. I.

Bartlett, James
1910: (6) Notes on gold discoveries in Whitney and Tisdale townships; Can. Mining J., v. 30, p. 683-684.

Bell, A.M.
1948: (7) Hallnor Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 547-553.

Bell, J. Mackintosh
1922: (8) The occurrence of silver ores in South Lorrain, Ontario, Canada; Bull. Institution Mining Met., no. 209, Feb., 1922, p. 1-17.

1923: (9) Deep-seated oxidation and secondary enrichment at the Keeley silver mine; Econ. Geol., v. 18, no. 7, p. 684-694.

Bennett, G.
1972: (10) The Timagami area; in Precambrian geology and mineral deposits of the Timagami, Cobalt, Kirkland Lake and Timmins region, Ontario; 24th Int. Geol. Congr. Field Excursion A39-39b-C39, p. 7-11.

Berry, L.G., and Mason, Brian
1959: (11) Mineralogy; concepts, descriptions, determinations; W.H. Freeman & Co.

Boyle, R.W.
1968: (12) The geochemistry of silver and its deposits with notes on geochemical prospecting for the element; Geol. Surv. Can., Bull. 160.

Boyle, R.W., and Dass, A.S.
1971: (13) The geochemistry of the supergene processes in the native silver veins of the Cobalt-South Lorrain area, Ontario; in The silver-arsenide deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 358-390.

Bright, E.G.
1972: (14) The Timmins area; in Precambrian geology and mineral deposits of the Timigami, Cobalt, Kirkland Lake and Timmins region, Ontario; 24th Int. Geol. Congr. Field Excursion A39-39b-C39, p. 57-94.

Buffam, B.S.W.
1948: (15) Aunor Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 507-515.

Burrows, A.G.
1909: (16) The Gowganda and Miller Lakes silver area; Ont. Bur. Mines, Ann. Rept. 1908, v. 18, pt. 2, p. 1-20.

1911: (17) The Porcupine gold area; Ont. Bur. Mines, Ann. Rept. 1911, v. 20, pt. 2.

1912: (18) The Porcupine gold area, second report; Ont. Bur. Mines, Ann. Rept. 1912, v. 21, pt. 1, p. 204-209.

1913: (19) The Gowganda silver area; Ont. Bur. Mines, Ann. Rept. 1910, v. 19, pt. 2, p. 165-186.

1915: (20) The Porcupine gold area (third report); Ont. Bur. Mines, Ann. Rept. 1915, v. 24, pt. 3.

1917: (21) Gold-bearing veins in Benoit Township; Ont. Bur. Mines, Ann. Rept. 1917, v. 26, p. 248-251.

1918: (22) The Matachewan gold area; Ont. Bur. Mines, Ann. Rept. 1918, v. 27, pt. 1, p. 215-240.

1922: (23) Gowganda and other silver areas; Ont. Dept. Mines, Ann. Rept. 1921, v. 30, pt. 3.

1925: (24) The Porcupine gold area; Ont. Dept. Mines, Ann. Rept. 1924, v. 33, pt. 2.

1926: (25) Gowganda silver area (fourth report, revised); Ont. Dept. Mines, Ann. Rept. 1926, v. 35, pt. 3, p. 1-61.

Butterfield, A.M.
1941: (26) Geology; Can. Mining J., v. 62, p. 511-516.

Caron, L'Abbe Ivanhoe
1918: (27) Journal de l'expédition du Chevalier de Troyes à la Baie d'Hudson en 1686; La Compagnie de L'Eclaireur.

Carr, G.F.
1955: The granite industry of Canada; Canada Mines Br., Publ. 846.
(28)

Carter, O.F.
1967: The McIntyre Mine; p. 118-122 in Can. Inst. Mining Met centennial field
(29) excursion, northwestern Quebec and northern Ontario; publ. by Can. Inst. Mining Met.

1968: Westfield Minerals Limited (Coniaurum); in Geology and ore deposits of
(30) Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58, p. 153-158.

Carter, W.E.H.
1910: The Porcupine gold area; Can. Mining J., v. 31, p. 361-366.
(31)

Chenier, Augustin
1937: Notes historiques sur le Témiscamingue; Augustin Chenier, Ville-Marie,
(32) P.Q.

Collins, W.H.
1913: The geology of Gowganda mining division; Geol. Surv. Can., Mem. 33.
(33)

Colvocoresses, G.M.
1912: Gowganda during 1911; Can. Mining J., v. 33, p. 256-260.
(34)

Cooke, H.C.
1919: Geology of Matachewan district, northern Ontario; Geol. Surv. Can.,
(35) Mem. 115.

1927: Wright Mine, Duhamel Township; Geol. Surv. Can., Summ. Rept. 1925,
(36) pt. C, p. 20-27.

1946: Canadian lode gold areas (summary account); Geol. Surv. Can., Econ.
(37) Geol. Rept. 15.

Corkill, E.T.
1909: Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1909, v. 18, pt. 1,
(38) p. 79-140.

1910: Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1910, v. 19, pt. 1,
(39) p. 78-130.

1911: Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1911, v. 20, pt. 1,
(40) p. 86-118.

1912: Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1912, v. 21, pt. 1,
(41) p. 100-168.

Corkill, E.T.
1913: (42) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1913, v. 22, pt. 1, p. 62-97.

Dana, Edward Salisbury
1904: (43) The system of mineralogy of James Dwight Dana, 6th edn.; John Wiley & Sons.

Davis, Harold P.
1908: (44) The Montreal River district; Can. Mining J., v. 29, p. 132-135.

1910: (45) The Davis handbook of the Cobalt silver district with a manual of incorporated companies; The Can. Mining J.

1910: (46) Directory of the Cobalt Mines; in the Davis handbook of the Cobalt silver district with a manual of incorporated companies; publ. by Can. Mining J.

Dyer, W.S.
1936: (47) Geology and ore deposits of the Matachewan-Kenogami area; Ont. Dept. Mines, Ann. Rept. 1935, v. 44, pt. 2.

Ecstall Mining Limited, geological staff
1972: (48) Kidd Creek Mine; in Precambrian geology and mineral deposits of the Timigami, Cobalt, Kirkland Lake and Timmins region, Ontario; 24th Int. Geol. Congr. Field Excursion A39-39b-C39, p. 73-77.

Ellsworth, H.V.
1916: (49) A study of certain minerals from Cobalt, Ontario; Ont. Bur. Mines, Ann. Rept. 1916, v. 25, pt. 1, p. 200-243.

Ferguson, S.A.
1946: (50) Some copper properties in Robb, Jamieson and Godfrey townships; Ont. Dept. Mines, Ann. Rept. 1944, v. 53, pt. 4, p. 17-29.

Ferguson, S.A., Groen, H.A., and Haynes, R.
1971: (51) Gold deposits of Ontario, Part 1, districts of Algoma, Cochrane, Kenora, Rainy River, and Thunder Bay; Ont. Dept. Mines, North. Aff., Min. Resour. Circ. No. 13.

Ferguson, Stewart A.
1968: (52) Geology and ore deposits of Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58.

Field, D.J.
1954: (53) Mining operations in 1952; Ont. Dept. Mines, Ann. Rept. 1953, v. 62, pt. 2.

Finley, F.L.
1927: (54) Wasapika section, West Shiningtree gold area, district of Sudbury; Ont. Dept. Mines, Ann. Rept. 1926, v. 35, pt. 6, p. 83-96.

Fisher, Norman R.
1924: (55) The early history of the Timiskaming Mine; Ont. Dept. Mines, Ann. Rept. 1922, v. 31, pt. 2, p. 135-138.

Furse, Geo. D.
1948: (56) McIntyre Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 482-496.

Gard, Anson A.
1908: (57) The real Cobalt; the Emerson Press.

George, Peter T.
1967: (58) The Timmins district; p. 102-107 in Can. Inst. Mining Met. centennial field excursion, northwestern Quebec and northern Ontario; Can. Inst. Mining Met.

Gibson, Thos. W.
1905: (59) Statistical review; Ont. Bur. Mines, Ann. Rept. 1905, v. 14, pt. 1, p. 1-36.

1907: (60) Statistical review; Ont. Bur. Mines, Ann. Rept. 1907, v. 16, pt. 1, p. 3-48.

1909: (61) Statistical review; Ont. Bur. Mines, Ann. Rept. 1909, v. 18, pt. 1, p. 5-78.

1910: (62) Statistical review; Ont. Bur. Mines, Ann. Rept. 1910, v. 19, pt. 1, p. 5-77.

1911: (6) Statistical review; Ont. Bur. Mines, Ann. Rept. 1911, v. 20, pt. 1, p. 5-58.

1914: (64) Statistical review of the mineral industry of Ontario for 1913; Ont. Bur. Mines, Ann. Rept. 1913, v. 23, pt. 1, p. 1-51.

1915: (65) Statistical review of the mineral industry of Ontario for 1914; Ont. Bur. Mines, Ann. Rept. 1914, v. 24, pt. 1, p. 1-65.

Graham, A.R.
1932: (66) Tyrrell-Knight area; Ont. Dept. Mines, Ann. Rept. 1932, v. 41, pt. 2, p. 25-61.

Griffis, A.T.
1968: (67) McIntyre Porcupine Mines Limited; in Geology and ore deposits of Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58, p. 122-130.

Guillet, G.R.
1963: (68) Barite in Ontario; Ont. Dept. Mines, Ind. Min. Rept. 10.

Hassan, A.A.
1910: Preliminary notes on geology of the Porcupine district of Canada; Can.
(69) Mining J., v. 31, p. 561-562.

Hatch, Hamlin Brooks
1910: The Porcupine gold district; Can. Mining J., v. 31, p. 306-308.
(70)

Hawley, J.E.
1927: Ogden, Bristol, and Carscallen townships, Cochrane district; Ont. Dept.
(71) Mines, Ann. Rept. 1926, v. 35, pt. 6, p. 1-36.

Hawley, J.E., and Hart, R.C.
1948: Preston East Dome Mine; in Structural geology of Canadian ore deposits;
(72) Can. Inst. Mining Met., Jubilee Vol., p. 528-538.

Hay, A.M.
1910: The new Porcupine gold fields; Can. Mining J., v. 31, p. 53-56.
(73)

Henderson, J.F.
1936: Geology and mineral deposits of Ville-Marie and Guillet (Mud) Lake map-
(74) areas, Quebec; Geol. Surv. Can., Mem. 201.

Hendry, N.W.
1951: Chrysotile asbestos in Munro and Beatty townships, Ontario; Trans. Can.
(75) Inst. Mining Met., v. 54, p. 28-35.

Hewitt, D.F.
1967: Pyrite deposits of Ontario; Ont. Dept. Mines, Min. Resour. Circ. 5.
(76)

Hewitt, D.F., and Satterly, J.
1953: Asbestos in Ontario; Ont. Dept. Mines, Ind. Min. Circ. 1.
(77)

Hey, Max H.
1962: An index of mineral species and varieties arranged chemically; Jarrold and
(78) Sons Limited, Norwich.

Hoffman, Arnold
1946: Free gold; Rinehart and Company Incorporated.
(79)

Hogan, J.J.
1972: Gold; in Canadian minerals yearbook 1971; Can. Min. Resour. Br., no. 18.
(80)

Hogg, Nelson
1950: The Porcupine gold area; Can. Mining J., v. 71, no. 11, p. 102-106.
(81)

Hogg, Nelson
1955: (82) Geology of Godfrey Township; Ont. Dept. Mines, Ann. Rept. 1954, v. 63, pt. 7.

Holmes, T.C.
1968: (83) Dome Mines Limited; in Geology and ore deposits of Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58, p. 82-98.

Hopkins, P.E.
1915: (84) The Beatty-Munro gold area; Ont. Bur. Mines, Ann. Rept. 1915, v. 24, pt. 1, p. 171-184.

1920: (85) West Shiningtree gold area; Ont. Dept. Mines, Ann. Rept. 1920, v. 29, pt. 3, p. 28-52.

1925: (86) Night Hawk Lake gold area; Ont. Dept. Mines, Ann. Rept. 1924, v. 33, pt. 3, p. 27-36.

Hume, G.S.
1925: (87) Paleozoic outlier of Lake Timiskaming, Ontario and Quebec; Geol. Surv. Can., Mem. 145.

Huntoon, W.
1911: (88) Character of ore deposit and probable milling methods at Porcupine; Can. Mining J., v. 31, p. 811-814.

Jambor, J.L.
1971: (89) General geology; in The silver-arsenide deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 12-33.

1971: (90) Gangue mineralogy; in The silver-arsenide deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 232-262.

1971: (91) Wall rock alteration; in The silver-arsenide deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 272-304.

Jones, W.A.
1944: (92) Mineralogy of the Ross veins, Ramore, Ontario; Trans. Can. Inst. Mining Met., v. 47, p. 55-70.

1948: (93) Ross Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 570-579.

1968: (94) Hollinger Consolidated Gold Mines Limited; in Geology and ore deposits of Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58, p. 102-115.

Karup-Møller, S.
1972: (95) New data on pavonite, gustavite and some related sulphosalt minerals; Neues Jahr. Mineralogie Abh., bd. 117-1, p. 19-38.

Kelly, T.J., and Riddell, G.S.
1962: (96) Statistical review of the mineral industry for 1960; mining operations in 1960; Ont. Dept. Mines, Ann. Rept. 1960, v. 70.

1963: (97) Statistical review of the mineral industry and mining operations for 1961; Ont. Dept. Mines, Ann. Rept. 1961, v. 71.

1964: (98) Statistical review of the mineral industry and mining operations for 1962; Ont. Dept. Mines, Ann. Rept. 1962, v. 72.

Kindle, E.D.
1936: (99) Gold occurrences of Ontario east of Lake Superior; Geol. Surv. Can., Mem. 192.

Kinkel, A.R.
1948: (100) Buffalo Ankerite Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 515-519.

Kish, Leslie
1966: (101) Geology of the east half of Gaboury Township, Témiscamingue County; Que. Dept. Natur. Resour., Prel. Rept. 554.

Knight, C.W., Burrows, A.G., Hopkins, P.E., and Parsons, A.L.
1919: (102) Abitibi-Night Hawk gold area; Ont. Bur. Mines, Ann. Rept. 1919, v. 28, pt. 2.

Knight, Cyril W.
1920: (103) Windy Lake and other nickel areas; Ont. Dept. Mines, Ann. Rept. 1920, v. 29, pt. 1, p. 193-234.

1924: (104) Geology of the mine workings of Cobalt and South Lorrain silver areas; Ont. Dept. Mines, Ann. Rept. 1922, v. 31, pt. 2.

Kulagov, E.A., Evstigneeva, T.L., and Yushko-Zakharova, O.E.
1969: (105) The new nickel sulfide, godlevskite; Geol. Rud. Mestorozhd 11, p. 115-121.

Laird, H.C.
1931: (106) German-Currie area, district of Cochrane; Ont. Dept. Mines, Ann. Rept. 1931, v. 40, pt. 3, p. 1-22.

Lane, H.C.
1968: (107) Preston Mines Limited – Preston East Dome Mine; in Geology and ore deposits of Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58, p. 143-149.

Lang, A.H.
1970: (108) Prospecting in Canada; Geol. Surv. Can., Econ. Geol. Rept. 7 (4th edition).

Lang, A.H., Goodwin, A.M., Mulligan, R., Whitmore, D.R.E., Gross, G.A., Boyle, R.W., Johnston, A.G., Chamberlain, J.A., and Rose, E.R.
1970: (109) Economic minerals of the Canadian Shield; in Geology and economic minerals of Canada; Geol. Surv. Can., Econ. Geol. Rept. 1 (5th edition), p. 151-226.

Leahy, E.J.
1971: (110) Geology of the Night Hawk Lake area, district of Cochrane; Ont. Dept. Mines, North. Aff., Geol. Rept. 96.

Lindeman, E., and Bolton, L.L.
1917: (111) Iron ore occurrences in Canada, volume I, descriptions of principal iron ore mines; Canada, Mines Br., Publ. 217.

Longley, C.S.
1968: (112) Porcupine Paymaster Limited; in Geology and ore deposits of Tisdale Township; Ont. Dept. Mines, Geol. Rept. 58, p. 138-141.

Longley, C.S., and Lazier, T.A.
1948: (113) Paymaster Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 520-528.

Lovell, H.L.
1967: (114) Geology of the Matachewan area; Ont. Dept. Mines, Geol. Rept. 51.

1971: (115) Geology of the Bourkes area, district of Timiskaming; Ont. Dept. Mines, North. Aff., Geol. Rept. 92.

1972: (116) Introduction; in Precambrian geology and mineral deposits of the Timigami, Cobalt, Kirkland Lake and Timmins region, Ontario; 24th Int. Geol Congr. Field excursion A39-39b-C39, p. 1-7.

MacKean, B.E.
1968: (117) Geology of the Elk Lake area; Ont. Dept. Mines, Geol. Rept. 62.

Mason, J.
1959: (118) Geology of Christopher silver mine; Can. Mining J., v. 80, no. 11, p. 71-77.

Masters, Keith
1971: (119) Hudson Bay silver mine; in Geology of Leith, Charters and Corkill townships, district of Timiskaming; Ont. Dept. Mines, North. Aff., Geol. Rept. 89, p. 31-42.

Matten, E.E.
1972: (120) Report on mineral industries operations in Ontario; Ont. Dept. Mines, North. Aff., Ann. Rept. 1970, v. 80.

McIlwaine, W.H.
1970: (121) Geology of South Lorrain Township; Ont. Dept. Mines, North. Aff., Geol. Rept. 83.

McIlwaine, W.H.
1971: (122) Geology of Leith, Charters and Corkill Townships, district of Timiskaming, Ont. Dept. Mines, North. Aff., Geol. Rept. 89.

McLaughlin, Dean B.
1956: (123) Some unusual Precambrian exposures in Ontario; Papers of the Michigan Acad. Sci., Arts, Lett., v. 41, p. 233-240.

McRae, J.A.
1921: (124) The history and romance of the oldest mine in Canada; Can. Mining J., v. 42, p. 655-667.

Michie, Harry
1967: (125) Hollinger Mine; p. 111-117 in Can. Inst. Mining Met. centennial field excursion, northwestern Quebec and northern Ontario; Can. Inst. Mining Met.

Miller, Willet G.
1908: (126) The cobalt-nickel arsenides and silver deposits of Timiskaming (third edition); Ont. Bur. Mines, Ann. Rept. 1907, v. 16, pt. 2.

1913: (127) The cobalt-nickel arsenides and silver deposits of Timiskaming (Cobalt and adjacent areas); Ont. Bur. Mines, Ann. Rept. 1910, v. 19, pt. 2.

Milne, V.G.
1972: (128) Geology of the Kukatush-Sewell Lake area district of Sudbury; Ont. Ministry Mines, Resour. Geol. Rept. 97.

Moore, E.S.
1937: (129) Geology and ore deposits of the Ramore area; Ont. Dept. Mines, Ann. Rept. 1936, v. 45, pt. 6, p. 1-37.

Moore, E.S.
1956: (130) Geology of the Miller Lake portion of the Gowganda silver area; Ont. Dept. Mines, Ann. Rept. 1955, v. 64, pt. 5.

Moorhouse, W.W.
1946: (131) The northeastern portion of the Timigami Lake area; Ont. Dept. Mines, Ann. Rept. 1942, v. 51, pt. 6.

Naldrett, A.J., Gasparrini, Elvira, Buchan, R., and Muir, J.E.
1972: (132) Godlevskite (β-Ni_7S_6) from the Texmont Mine, Ontario; Can. Mineral., v. 11, pt. 4, p. 879-885.

North, H.H., and Allen, C.C.
1948: (133) Young-Davidson Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 633-637.

Osborne, F. Fritz
1934: (134) Commercial granites of Quebec, Part III – North of St. Lawrence River (second edition); Que. Bur. Mines, Ann. Rept. 1933, pt. E.

Parans, John
1967: Pamour Porcupine Mines Limited; p. 123-127 in Can. Inst. Mining Met.
(135) centennial field excursion, northwestern Quebec and northern Ontario; publ. by Can. Inst. Mining Met.

Parks, Wm. A.
1907: Geology of a district from Lake Timiskaming northward; Geol. Surv. Can.,
(136) Summ. Rept. 1904, pt. A, p. 198-225.

Pearce, Richard
1936: The story of Timiskaming's first mining company; The Northern Miner,
(137) annual number, 1936, p. 65, 72.

Petruk, W., Cabri, L.J., Harris, D.C., Stewart, J.M., and Clark, L.A.
1970: Allargentum, redefined; Can. Mineral., v. 10, pt. 2, p. 163-172.
(138)

Petruk, W.
1972: Larosite, a new copper-lead-bismuth sulphide; Can. Mineral., v. 11, pt. 4,
(139) p. 886-891.

Petruk, W., Harris, D.C., and Stewart, J.M.
1969: Langisite, a new mineral, and the rare minerals cobalt pentlandite,
(140) siegenite, parkerite and bravoite from the Langis Mine, Cobalt-Gowganda area, Ontario; Can. Mineral., v. 9, pt. 5, p. 597-616.

Petruk, W., Harris, D.C., Cabri, L.J., and Stewart, J.M.
1971: Characteristics of the silver-antimony minerals; in The silver-arsenide
(141) deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 187-195.

Petruk, W., Harris, D.C., and Stewart, J.M.
1971: Characteristics of the arsenides, sulpharsenides and antimony minerals;
(142) in The silver-arsenide deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 150-186.

Petruk, W., Jambor, J., and Boyle, R.W.
1971: History of the Cobalt and Gowganda area; in The silver-arsenide deposits of
(143) the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 1-7.

Petruk, W., and staff
1971: Characteristics of the sulphides; in The silver-arsenide deposits of the
(144) Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 196-231.

Petruk, William
1971: General characteristics of the deposits; in The silver-arsenide deposits of
(145) the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 76-107.

1971: Mineralogical characteristics of the deposits and textures of the ore
(146) minerals; in The silver-arsenide deposits of the Cobalt-Gowganda region, Ontario; Can. Mineral., v. 11, pt. 1, p. 108-139.

Pinard, R.G.
1972: (147) Mineralogical investigation of an antimony-arsenic ore from the Card Lake Copper Mines Limited, Timmins area, Ontario; Canada, Mines Br., I.C. 288.

Prest, V.K.
1953: (148) Geology of Guibord Township; Ont. Dept. Mines, Ann. Rept. 1951, v. 60, pt. 9.

1957: (149) Geology of Hislop Township; Ont. Dept. Mines, Ann. Rept. 1956, v. 65, pt. 5.

Price, Peter, and Bray, R.C.E.
1948: (150) Pamour Mine; in Structural geology of Canadian ore deposits; Can. Inst. Mining Met., Jubilee Vol., p. 558-565.

Reid, J.A.
1950: (151) Silver in Ontario; Can. Mining J., v. 71, no. 11, p. 129-133.

Rice, C.M.
1948: (152) Dictionary of geological terms; Edwards Brothers, Inc.

Richardson, Charles A.
1924: (153) The discovery of the Timiskaming Mine; Ont. Dept. Mines, Ann. Rept. 1922, v. 31, pt. 2, p. 134-135.

Rickaby, H.C.
1932: (154) Bannockburn gold area; Ont. Dept. Mines, Ann. Rept. 1932, v. 41, pt. 2.

Rickard, T.A.
1944: (155) The gold and silver of Ontario; Can. Mining J., v. 65, p. 688-696.

Riddell, G.S.
1965: (156) Statistical review of the mineral industry and mining operations for 1963; Ont. Dept. Mines, Ann. Rept. 1963, v. 73.

1966: (157) Statistics of the mineral industry and mining operations in Ontario for 1964; Ont. Dept. Mines, Ann. Rept. 1964, v. 74.

1968: (158) Statistics of the mineral industry and mining operations in Ontario for 1965; Ont. Dept. Mines, Ann. Rept. 1965, v. 75.

1968: (159) Statistics of the mineral industry and mining operations in Ontario for 1966; Ont. Dept. Mines, Ann. Rept. 1966, v. 76.

1969: (160) Statistics of the mineral industry and mining operations in Ontario for 1967; Ont. Dept. Mines, Ann. Rept. 1967, v. 77.

Riddell, G.S.
1970: (161) Report on mining operations in Ontario; Ont. Dept. Mines, Ann. Rept. 1968, v. 78.

1971: (162) Report on mining operations in Ontario during calendar year 1969; Ont. Dept. Mines, North. Aff., Ann. Rept. 1969, v. 79.

Rogers, W.R.
1924: (163) Statistical review of Ontario's mineral industry in 1920; Ont. Dept. Mines, Ann. Rept. 1921, v. 30, pt. 1, p. 1-54.

1924: (164) Statistical review of Ontario's mineral industry in 1921; Ont. Dept. Mines, Ann. Rept. 1922, v. 31, pt. 1.

Rose, Edward, R.
1965: (165) Pyrite nodules of the Timigami copper-nickel deposit; Can. Mineral., v. 8, pt. 3, p. 317-324.

1966: (166) The copper-nickel deposits of Timigami Island, Ontario; Econ. Geol., v. 61, no. 1, p. 27-43.

Ross, James Gordon
1931: (167) Chrysolite asbestos in Canada; Canada, Mines Br., Publ. 707.

Satterly, J.
1952: (168) Geology of Munro Township; Ont. Dept. Mines, Ann. Rept. 1951, v. 60, pt. 8.

Savage, W.S.
1936: (169) Part of Strathy Township; Ont. Dept. Mines, Ann. Rept. 1935, v. 44, pt. 7, p. 48-56.

Sergiades, A.O.
1968: (170) Silver cobalt calcite vein deposits of Ontario; Ont. Dept. Mines, Min. Resour. Circ. 10.

Shklanka, Roman
1968: (171) Iron deposits of Ontario; Ont. Dept. Mines, Min. Resour. Circ. 11.

1969: (172) Copper, nickel, lead and zinc deposits of Ontario; Ont. Dept. Mines, Min. Resour. Circ. 12.

Simony, P.S.
1964: (173) Geology of northwestern Timigami area, district of Nipissing; Ont. Dept. Mines, Geol. Rept. 28.

Sinclair, D.G., Cleland, R.H., Keeley, E.C., Cooper, D.F., and Webster, A.R.
1930: (174) Mines of Ontario in 1929; Ont. Dept. Mines, Ann. Rept. 1930, v. 39, pt. 1, p. 164-174.

Sinclair, D.G., Keeley, E.C., Cooper, D.F., Weir, E.B., and Webster, A.R.
1936: (175) Mines of Ontario in 1934: Ont. Dept. Mines, Ann. Rept. 1935, v. 44, pt. 1, p. 67-167.

1937: (176) Mines of Ontario in 1935; Ont. Dept. Mines, Ann. Rept. 1936, v. 45, pt. 1, p. 77-188.

Sinclair, D.G., Tower, W.O., Bayne, A.S., Cooper, D.F., Weir, E.B., and Webster, A.R.
1938: (177) Mines of Ontario in 1936; Ont. Dept. Mines, Ann. Rept. 1937, v. 46, pt. 1, p. 90-238.

Skinner, Brian J., Jambor, John L., and Ross, Malcolm
1966: (178) Mckinstryite, a new copper-silver sulfide; Econ. Geol., v. 61, no. 8, p. 1383-1389.

Somerville, R.
1967: (179) Kam-Kotia Mine; p. 132-134 in Can. Inst. Mining Met centennial field excursion, northwestern Quebec and northern Ontario; publ. by Can. Inst. Mining Met.

Stockwell, C.H., McGlynn, J.C., Emslie, R.F., Sanford, B.V., Norris, A.W., Donaldson, J.A., Fahrig, W.F., and Currie, K.L.
1970: (180) Geology of the Canadian Shield; in Geology and economic minerals of Canada; Geol. Surv. Can., Econ. Geol. Rept. 1 (5th edition), p. 43-150.

Sutherland, T.F.
1914: (181) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1914, v. 23, pt. 1, p. 110-193.

Sutherland, T.F., Collins, E.A., McMillan, J.G., and Bartlett, James
1915: (182) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1915, v. 24, pt. 1, p. 94-170.

1916: (183) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1916, v. 25, pt. 1, p. 66-167.

Sutherland, T.F., Collins, E.A., Stovel, J.H., and Bartlett, Jas.
1917: (184) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1917, v. 26, pt. 1, p. 74-156.

Sutherland, T.F., Collins, E.A., and Stovel, J.H.
1918: (185) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1918, v. 27, pt. 1, p. 86-154.

Sutherland, T.F., Collins, E.A., Stovel, J.H., and Webster, A.R.
1919: (186) Mines of Ontario; Ont. Bur. Mines, Ann. Rept. 1919, v. 28, pt. 1, p. 104-186.

Sutherland, T.F., McMillan, J.G., Bartlett, James, and Webster, A.R.
1920: (187) Mines of Ontario; Ont. Dept. Mines, Ann. Rept. 1920, v. 29, pt. 1, p. 66-141.

Sutherland, T.F., McMillan, J.G., Bartlett, James, and Webster, A.R.
1922: Mines of Ontario; Ont. Dept. Mines, Ann. Rept. 1921, v. 30, pt. 1,
(188) p. 63-158.

Sutherland, T.F., McMillan, J.G., Bartlett, James, Webster, A.R., and Cole, G.E.
1923: Mines of Ontario; Ont. Dept. Mines, Ann. Rept. 1922, v. 31, pt. 10,
(189) p. 11-86.

Sutherland, T.F., McMillan, J.G., Bartlett, Jas., Cole, Geo. E., and Webster, A.R.
1925: Mines of Ontario; Ont. Dept. Mines, Ann. Rept. 1924, v. 33, pt. 7,
(190) p. 6-98.

1926: Mines of Ontario in 1924; Ont. Dept. Mines, Ann. Rept. 1925, v. 34, pt. 1,
(191) p. 66-169.

Sutherland, T.F., McMillan, J.G., Sinclair, D.G., Cole, Geo. E., and Webster, A.R.
1929: Mines of Ontario in 1927; Ont. Dept. Mines, Ann. Rept. 1928, v. 37, pt. 1,
(192) p. 73-184.

Sutherland, T.F., Cleland, R.H., Keeley, E.C., Cooper, D.F., and Webster, A.R.
1930: Mines of Ontario in 1929; Ont. Dept. Mines, Ann. Rept. 1929, v. 39, pt. 1,
(193) p. 164-174.

Taylor, R.B.
1948: Delnite Mine; in Structural geology of Canadian ore deposits; Can. Inst.
(194) Mining Met., Jubilee Vol., p. 504-507.

Thomson, R.
1965: Casey and Harris Townships; Ont. Dept. Mines, Geol. Rept. 36.
(195)

Thomson, Robert
1960: Preliminary report on Bucke Township, district of Timiskaming, descrip-
(196) tions of mining properties; Ont. Dept. Mines, P.R. 1960-2.

1960: Preliminary report on parts of Coleman Township and Gillies Limit to the
(197) south and southwest of Cobalt, district of Timiskaming; Ont. Dept. Mines,
P.R. 1960-3.

1961: Preliminary report on parts of Coleman Township and Gillies Limit near
(198) New Lake, southeast of Cobalt, district of Timiskaming; Ont. Dept. Mines,
P.R. 1961-2.

1961: Preliminary report on part of Coleman Township, concession VI, lots 1 to 6,
(199) district of Timiskaming; Ont. Dept. Mines, P.R. 1961-3.

1961: Preliminary report on part of Coleman Township, concession V, lots 1 to 6,
(200) district of Timiskaming; Ont. Dept. Mines, P.R. 1961-4.

1961: Preliminary report on parts of Coleman Township, concession IV, lots 1 to
(201) 5 and Gillies Limit, the eastern "A" claims, district of Timiskaming; Ont.
Dept. Mines, P.R. 1961-6.

Thomson, Robert
1961: (202) Preliminary report on parts of Coleman Township, concession III, lots 1 to 3 and Gillies Limit, blocks 1 and 2; claims A 48 to 58 and A 88 to 100, district of Timiskaming; Ont. Dept. Mines, P.R. 1961-7.

Todd, E.W.
1926: (203) Gowganda vein minerals; Ont. Dept. Mines, Ann. Rept. 1926, v. 35, pt. 3, p. 62-78.

1926: (204) Anima-Nipissing Lake area; Ont. Dept. Mines, Ann. Rept. 1926, v. 35, pt. 3, p. 79-104.

Tower, W.O., Cave, A.E., Taylor, J.B., Douglas, D.P., Hargrave, W.G., Bayne, A.S., Cooper, D.F., Weir, E.B., and Webster, A.R.
1941: (205) Mines of Ontario in 1939; Ont. Dept. Mines, Ann. Rept. 1940, v. 49, pt. 1, p. 72-242.

Townsley, B.F.
1935: (206) Mine finders; Saturday Night Press.

Traill, R.J.
1970: (207) A catalogue of Canadian minerals; Geol. Surv. Can., Paper 69-45.

Tremblay, Maurice
1949: (208) Statistical review of the mineral industry of Ontario for 1947; Ont. Dept. Mines, Ann. Rept. 1948, v. 57, pt. 1.

Uglow, W.L.
1911: (209) The Alexo nickel deposit; Ont. Dept. Mines, Ann. Rept. 1911, v. 20, pt. 2, p. 34-39.

Vokes, F.M.
1963: (210) Molybdenum deposits of Canada; Geol. Surv. Can., Econ. Geol. Rept. 20.

Vos, M.A.
1971: (211) Asbestos in Ontario; Ont. Dept. Mines, North. Aff., Ind. Min. Rept. 36.

Wilson, Alfred W.G.
1912: (212) Pyrites in Canada; Canada, Mines Br., Publ. 167.

Wilson, Morley E.
1910: (213) Geology of an area adjoining the east side of Lake Timiskaming, Quebec; Geol. Surv. Can., Publ. 1064.

Wright, D.G.H.
1922: (214) Black River area; Ont. Dept. Mines, Ann. Rept. 1921, v. 30, pt. 6, p. 27-62.

Anonymous Publications

1906: (215a) Canadian Mining Review, v. 26.

1906: (215b) Canadian Mining Review, v. 27.

1907: (216) Canadian Mining Journal, v. 28.

1908: (217) Canadian Mining Journal, v. 29.

1909: (218) Canadian Mining Journal, v. 30.

1910: (219) Canadian Mining Journal, v. 31.

1911: (220) Canadian Mining Journal, v. 32.

1912: (221) Canadian Mining Journal, v. 33.

1913: (222) Canadian Mining Journal, v. 34.

1915: (223) Canadian Mining Journal, v. 36.

1916: (224) Canadian Mining Journal, v. 37.

1933: (225) Financial Post survey of Mines 1933-34; The Financial Post.

1934: (226) Canadian Mines Handbook 1934; Northern Miner Press Ltd.

1936: (227) Canadian Mines Handbook 1936; Northern Miner Press Ltd.

1938: (228) Canadian Mines Handbook 1938; Northern Miner Press Ltd.

1939: (229) Canadian Mines Handbook 1939; Northern Miner Press Ltd.

1939: (230) Financial Post survey of mines 1939-40; The Financial Post.

1940: (231) Canadian Mines Handbook 1940; Northern Miner Press Ltd.

1943: (232) Canadian Mines Handbook 1943; Northern Miner Press Ltd.

1955: (233) Gold mining in Ontario; Report of the Committee of inquiry into the economics of the gold mining industry, 1955.

1956: (234) Canadian Mines Handbook 1956; Northern Miner Press Ltd.

1957: (235) Canadian Mines Handbook 1957; Northern Miner Press Ltd.

1958: (236) Canadian Mines Handbook 1958; Northern Miner Press Ltd.

1959: (237) Canadian Mines Handbook 1959; Northern Miner Press Ltd.

1961: (238) Canadian Mines Handbook 1961; Northern Miner Press Ltd.

1962: (239) Glossary of geology and related sciences; American Geological Institute.

1964: (240) Canadian Mines Handbook 1964; Northern Miner Press Ltd.

1964: (241) Financial Post survey of mines 1964; The Financial Post.

1964: (242) The Northern Miner, v. 50, no. 4.

1964: (243) The Northern Miner, v. 50, no. 5.

1966: (244) Canadian Mines Handbook 1966-1967; Northern Miner Press Ltd.

1968: (245) Canadian Mines Handbook 1968-1969; Northern Miner Press Ltd.

1969: (246) Canadian Mines Handbook 1969-1970; Northern Miner Press Ltd.

1971: (247) Canadian Mines Handbook 1971-1972; Northern Miner Press Ltd.

1971: (248) The Northern Miner, v. 57, no. 17.

1971: (249) The Northern Miner, v. 57, no. 23.

1971: (250) The Northern Miner, v. 57, no. 48.

1972: (251) Canadian Mines Handbook 1972-1973; Northern Miner Press Ltd.

1972: (252) The Northern Miner, v. 58, no. 44.

1972: (253) Ontario Department of Mines and Northern Affairs review 1971.

1973: (254) Canadian Mines Handbook 1973-1974; Northern Miner Press Ltd.

1973: (255) Financial Post survey of mines 1973; The Financial Post.

GLOSSARY

Acanthite Ag_2S. H=2-2.5. Iron-black metallic, prismatic aggregates. Sectile. Low temperature form of silver sulphide, argentite being the high temperature form. Ore of silver associated with other silver minerals.

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.

Agglomerate Rock formed by the accumulation of angular fragments ejected by volcanoes.

Albite $NaAlSi_3O_8$. H=6. Generally white tabular crystals or cleavable masses. Vitreous lustre. Variety of plagioclase feldspar. Used in manufacture of ceramics.

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.

Allargentum $Ag_{0.86}Sb_{0.14}$. Grey metallic grains occurring in native silver or as veinlets in calcite containing high-grade silver ore.

Allocalsite An ill-defined material; possibly a bismuthian or a cobaltian glaucodot.

Altaite PbTe. H=3. Tin-white, yellowish metallic; bronze-yellow. Massive. Associated with gold, tellurides or sulphides in vein deposits.

Amazonite $KAlSi_3O_8$. H=6. Green variety of microcline feldspar with grid-like texture and with a silky to silvery sheen that is revealed in the polished cabochon. Occurs in pegmatite. Used as a gem and ornamental stone.

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.

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.

Andesite A dark coloured volcanic rock composed mainly of plagioclase feldspar with amphibole or pyroxene.

Anglesite $PbSO_4$. H=2.5-3. Colourless to white, greyish, yellowish or bluish tabular or prismatic crystals, or granular. Adamantine or resinous lustre. Characterized by high specific gravity (6.36 to 6.38) and adamantine lustre. Effervesces in nitric acid. Secondary mineral formed generally from galena. Ore of lead.

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.

Ankerite $Ca(Mg, Fe)(CO_3)_2$. Variety of dolomite from which it cannot be distinguished in the hand specimen.

Annabergite $(Ni, Co)_3(AsO_4)_2 . 8H_2O$. H=1.5-2.5. Light green finely crystalline or earthy encrustations. Soluble in acids. Secondary mineral formed by oxidation of cobalt and nickel arsenides. Colour and association with nickel minerals are distinguishing characteristics.

Antigorite $Mg_3Si_2O_5(OH)_4$. H=2.5. Green translucent variety of serpentine having lamellar structure.

Antimony Sb. H=3-3.5. Light grey metallic, massive, granular, lamellar, or radiating. Occurs with antimony minerals. Used as a component of lead alloys for manufacture of storage batteries, cable coverings, solders, bearing metal; also for flame-proofing textiles, paints, and ceramics.

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.

Aplite A light coloured dyke rock with a fine-grained granitic texture and with a composition similar to that of granite.

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.

Argentite Ag_2S. H=2-2.5. Dark grey cubic, octahedral crystals; arborescent, massive, metallic. Very sectile. Occurs in sulphide deposits with other silver minerals. Inverts to acanthite at temperatures below 180 °C.

Argillite A clayey sedimentary rock without a slaty cleavage or shaly fracture.

Arkose A sandstone in which feldspar grains predominate.

Arsenic As. H=3.5. Light grey to black, sub-metallic. Massive, reniform or stalactitic. Volatile without fusion giving garlic odour. Occurs in veins with silver, cobalt, nickel ores.

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, pipecovering, clutch and brake components, reinforcing in plastics, etc.

Asbolite A mixture of manganese oxides (wad) containing cobalt oxide with or without oxides of nickel and copper. Occurs as dull black earthy or compact masses.

Axinite $(Ca, Mn, Fe)_3Al_2(BO_3)Si_4O_{12}(OH)$. H=7. Violet, pink, yellow to brown wedge-shaped crystals or massive, lamellar. Vitreous lustre. Fuses readily with intumescence. Occurs commonly in contact-altered calcareous rocks. Transparent varieties used as gemstones.

Azurite $Cu_3(CO_3)_2(OH)_2$. H=3.5-4. Azure-blue to inky blue tabular or prismatic crystals; also massive, earthy, stalactitic with radial or columnar structure. Vitreous, transparent. Secondary copper mineral. Effervesces in acids. Ore of copper.

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.

Basalt Dark coloured, fine grained volcanic rock or lava composed predominantly of an amphibole or pyroxene with plagioclase. Amygdaloidal basalt is one that contains cavities that may be occupied by one or more minerals.

Berthierite $FeSb_2S_4$. H=2-3. Dark steel-grey metallic striated prismatic crystals; fibrous or granular masses. Tarnished surface is iridescent or brown. Generally associated with stibnite and not readily distinguished from it in the hand specimen.

Bismuth Bi. H=2-2.5. Light grey metallic reticulated crystal aggregates; also foliated or granular. Iridescent tarnish. Used as a component of low melting-point alloys and in medicinal and cosmetic preparations.

Bismuthinite Bi_2S_3. H=2. Dark grey striated prismatic or acicular crystals; also massive. Iridescent on tarnished surface. Ore of bismuth.

Bornite Cu_5FeS_4. H=3. Reddish brown metallic. Usually massive and tarnished to iridescent blue, purple, etc. Known as peacock ore and variegated copper ore. Ore of copper.

Bravoite $(Ni, Fe)S_2$. Yellow to grey metallic with violet tinge. Member of the pyrite group.

Breccia A rock composed of angular fragments; may be attractively patterned and coloured and used as an ornamental rock.

Breithauptite NiSb. H=5.5. Copper-red with bright metallic lustre tarnishing to violet. Tabular or prismatic crystals (rare), arborescent or disseminated grains in calcite associated with silver, nickel and cobalt minerals.

Brochantite $Cu_4(SO_4)(OH)_6$. H=3.5-4. Vitreous emerald green acicular crystal aggregates; massive, granular. Secondary mineral formed by oxidation of copper minerals. Distinguished from malachite by lack of effervescence in HCl.

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.

Calaverite $AuTe_2$. H=2.5-3. Brass-yellow to silver-white, metallic, bladed, lath-like or striated short prismatic crystals. Fuses readily; on charcoal gives bluish green flame and gold globules. Ore of gold. Occurs in veins with pyrite, native gold.

Chalcocite Cu_2S. H=3.5-4. Dark grey to black metallic; massive. Tarnishes to iridescent blue, purple, etc. Also referred to as vitreous copper or sulphurette of copper. Soluble in HNO_3. Black colour and slight sectility distinguish it from other copper sulphides. Ore of copper.

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.

Chapmanite $Sb_2O_3.2Fe_2O_3.4SiO_2.H_2O$. Green lath-shaped crystals. Associated with native silver.

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

Chloanthite $(Ni, Co)As_3$. Member of the skutterudite series, high in nickel. Not distinguishable in hand specimen from other members of the series – smaltite and skutterudite in which the cobalt-nickel content is variable.

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.

Chromite $(Mg, Fe)Cr_2O_4$. H=5.5. Black metallic, octahedral crystals (rare); generally massive. Distinguished from magnetite by its brown streaks and weak magnetism. Commonly associated with serpentine. Ore of chromium.

Chrysotile Fibrous varieties of serpentine (asbestos).

Clinosafflorite $CoAs_2$. Monoclinic variety of safflorite. Associated with skutterudite in cobalt ore deposits.

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.

Cobaltite CoAsS. H=5.5. Light grey metallic crystals (cubes, pyritohedrons) or massive. Perfect cleavage. Pinkish tinge distinguishes it from other grey metallic minerals. Associated with cobalt and nickel sulfides or arsenides. Ore of cobalt.

Cobalt pentlandite Co_9S_8. A rare mineral intimately associated with sulphides and arsenides in the Cobalt ore deposits.

Coloradoite HgTe. H=2.5. Dark grey to black metallic granular masses. Soluble in HNO_3. Occurs with gold and silver tellurides.

Concretion Rounded mass formed in sedimentary rocks by accretion of some constituent (iron oxides, silica, etc.) around a nucleus (mineral impurity, fossil fragment, etc.).

Conglomerate A sedimentary rock composed of rounded pebbles or gravel.

Copper Cu. H=2.5-3. Massive filiform or arborescent; crystals (cubic or dodecahedral) rare. Hackly fracture. Ductile and malleable. Occurs in lavas.

Cosalite $CuPb_7Bi_8S_{22}$. H=2.5-3. Dark grey metallic prismatic, needle-like, fibrous or feathery aggregates; massive. Soluble in HNO_3. Associated with smaltite and cobaltite in Cobalt ore deposits.

Covellite CuS. H=1.5-2. Inky blue iridescent in shades of brass yellow, purple, coppery red. Massive; crystals (hexagonal plates) rare. Metallic lustre. Distinguished from chalcocite and bornite by its perfect cleavage and colour.

Cuprite Cu_2O. H=3.5-4. Red to almost black crystals (octahedral, dodecahedral or cubic), massive, earthy. Adamantine, submetallic or earthy lustre. Brownish red streak. Distinguished from hematite by its inferior hardness, from cinnabar and proustite by its superior hardness. On charcoal it is reduced to a metallic globule of copper. Soluble in concentrated HCl. Associated with native copper and other copper minerals. Ore of copper.

Dacite An igneous rock composed mainly of plagioclase with quartz and pyroxene or hornblende.

Diabase Dark coloured igneous rock composed mostly of lath-shaped crystals of plagioclase and of pyroxene. Used as a building, ornamental and monument stone.

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

Diorite A dark coloured igneous rock composed mainly of plagioclase and amphibole or pyroxene.

Djurleite $Cu_{1.96}S$. Properties are similar to those of chalcocite from which it is indistinguishable in the hand specimen. Occurs in some Cobalt ore deposits.

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 lightweight alloys.

Dunite A peridotite consisting essentially of olivine with pyroxene and chromite.

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

Dyscrasite Ag_3Sb. H=3.5-4. Light grey metallic, pyramidal crystals, massive, foliated or granular. Sectile. Occurs in veins with other silver and antimonian silver minerals. Decomposed by HNO_3.

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.

Erythrite $Co_3(AsO_4)_2.8H_2O$. H=1.5-2.5. Rose-red to crimson globular, radial, reniform aggregates; also earthy or pulverulent; prismatic to acicular crystals (rare). Dull to adamantine lustre. Soluble in HCl. Secondary mineral formed by oxidation of cobalt arsenides.

Esker A long stream-deposited ridge or mound formed by the accumulation of sand, gravel, and boulders that were left by retreating glaciers.

Fault Structural feature produced by the movement of one rock mass relative to another; shear zone, brecciated zone, fault zone refer to the region affected by the movement.

Feldspar A mineral group consisting of alumino-silicates of potassium and barium (monoclinic or triclinic), 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.

Felsite A dense, fine-grained pink or grey igneous rock composed mainly of feldspar with little or no quartz.

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 wavelengths 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 the mineral. Used in optics, steel-making, ceramics.

Freibergite A silver-rich variety of the tetrahedrite-tennantite mineral series.

Freieslebenite $Pb_3Ag_5Sb_5S_{12}$. H=2-2.5. Grey metallic striated prismatic crystals. Grey streak. Associated with silver and lead ores.

Fuchsite An emerald-green chromium-rich muscovite.

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 (7.58) specific gravity 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.

Gersdorffite NiAsS. H=5.5. Light to dark grey metallic; octahedral, pyritohedral crystals or granular massive. Associated with other nickel minerals in vein deposits.

Glaucodot (Co, Fe)AsS. H=5. Light grey to reddish-grey metallic, striated prismatic crystals or massive. May form cruciform twins. Decomposed by HNO_3 forming a pink solution. Associated with cobaltite from which it is distinguished by crystal form and colour.

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

Godlevskite Ni_7S_6. Pale yellow metallic. Occurs as microscopic grains and aggregates associated with nickel and copper ores.

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.

Gossan A decomposed or weathered rusty covering on masses of pyrite or in upper zone of veins; consists of hydrated iron oxides.

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

Granodiorite An igneous rock that is intermediate in composition between granite and diorite.

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.

Greenstone A metamorphosed volcanic rock composed mainly of chlorite.

Greywacke Sedimentary rock containing large amounts of amphibole or pyroxene and feldspar.

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.

Heazlewoodite Ni_3S_2. H=4. Yellow metallic; massive, granular, or platy aggregates. Distinguished from pyrite by its inferior hardness.

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 streak. Greasy to dull lustre. Ore of iron.

Hessite Ag_2Te. H=2.3. Grey metallic finely granular, massive. Sectile. Occurs with native gold and with other tellurides in vein deposits.

Heterogenite Hydrous oxide of cobalt. H=3-4. Black to dark brown, reddish globular or reniform masses with conchoidal fracture. Occurs as alteration product of smaltite.

Hexahydrite $MgSO_4 . 6H_2O$. Colourless or white, finely fibrous, columnar; also globular encrustations. Pearly to vitreous lustre. Bitter, saline taste. Occurs sparingly as an alteration product of epsomite. Originally found at a Bonaparte River locality in British Columbia. Associated with other sulphates from which it is not readily distinguished.

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.

Igneous Rocks that have crystallized from magma or from the melting of other rocks; usually composed of feldspar, quartz, and hornblende, pyroxene or biotite.

Ilmenite $FeTiO_3$. H=5-6. Black metallic to sub-metallic. Compact or granular massive; thick tabular crystals. Black streak distinguishes it from hematite. Ore of titanium.

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.

Jasper An opaque deep red to brown, yellow, green or mauve variety of chalcedony. Used as an ornamental stone and as a gemstone.

Krennerite $(Au, Ag)Te_2$. H=2-3. Light grey to yellow metallic prismatic striated crystals. Occurs with other gold tellurides and with native gold in vein deposits.

Lamprophyre Fine-grained dark-coloured dyke rock composed of plagioclase feldspar, amphibole and/or pyroxene.

Langisite $Co_{0.8}Ni_{0.2}As$. Pinkish buff metallic. Occurs as grains, lamellae in safflorite. Named for the Langis Mine where it was originally found.

Larosite $(Cu, Ag)_{21}(Pb, Bi)_2S_{14}$. Whitish-buff acicular crystals associated with chalcocite, stromeyerite in silver-copper ores. Originally found in the Foster Mine deposit, Cobalt. Named for Mr. Fred LaRose, one of the discoverers of silver-cobalt ore in Cobalt.

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. Crystalline limestone (marble) is a limestone that has been metamorphosed and is used as a building and ornamental stone.

Limonite Field term referring to natural hydrous iron oxide whose true identity is unknown. Yellow-brown to dark brown earthy, porous, ochreous masses; also stalactitic or botryoidal. Secondary product of iron minerals.

Linnaeite Co_3S_4. H=4.5-5.5. Light to dark grey metallic tarnishing to copper-red. Octahedral crystals, massive. Decomposed by HNO_3. Uncommon mineral associated with cobalt ores.

Loellingite $FeAs_2$. H=5-5.5. Light to dark grey metallic prismatic crystals; also pyramidal crystals or massive. Occurs with nickel and cobalt minerals in Cobalt deposits.

Magnesite $MgCO_3$. H=4. Colourless, white, greyish, yellowish to brown lamellar, fibrous, granular or earthy masses; crystals rare. Vitreous, transparent to translucent. Distinguished from calcite by lack of effervescence in cold HCl. Used in manufacture of refractory bricks, cements, flooring; for making magnesium metal.

Malachite $Cu_2CO_3(OH)_2$. H=3.5-4. Bright green granular, botryoidal, earthy masses; usually forms coating with other secondary copper minerals on copper-bearing rocks. Distinguished from other green copper minerals by effervescence in HCl acid. Ore of copper.

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.

Mariposite Chrome variety of muscovite. Bright green colour.

Matildite $AgBiS_2$. H=2.5. Iron-black to grey metallic massive, granular. Soluble in HNO_3. Uncommon mineral associated with sulphides and with native silver in some Cobalt ores.

Maucherite $Ni_{11}As_8$. H=5. Grey metallic with reddish tinge tarnishing to copper-red. Tabular or pyramidal crystals; also massive, granular or radiating fibrous. Decomposed by acids. Associated with cobalt-nickel ores in Cobalt, Elk Lake districts. Has been known as temiskamite.

Mckinstryite $Cu_{0.8}Ag_{1.2}S$. Steel-grey metallic becoming black on exposure to air. Associated with silver ore minerals. Originally found in the Foster Mine deposit, Cobalt.

Millerite NiS. H=3-3.5. Pale brass-yellow, slender, elongated, striated crystals; acicular radiating or hair-like aggregates. Grey iridescent tarnish. Distinguished from pyrite by its crystal form, and its inferior hardness. Ore of nickel.

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.

Nickeline NiAs. H=5-5.5. Light copper-coloured metallic massive, reniform with columnar structure; crystals (tabular, pyramidal) rare. Exposed surfaces alter readily to annabergite. Occurs in veins with cobalt arsenides and native silver in Cobalt deposits. Colour is distinctive. Formerly known as niccolite; the use of the new name was recommended recently by International Mineralogical Association's Commission on New Minerals and Mineral Names.

Orthoclase $KAlSi_3O_8$. H=6. Red, pink, or white feldspar. Short prismatic crystals. Vitreous lustre. Perfect cleavage. Distinguished from plagioclase feldspar by absence of twinning striations.

Pararammelsbergite $NiAs_2$. H=5. Light grey metallic rectangular tablets or massive. Exposed surfaces alter readily to erythrite. Associated with nickel and cobalt minerals in the Cobalt district.

Paratacamite $Cu_2(OH)_3Cl$. H=3. Green, dark green to greenish black vitreous, translucent to semi-opaque rhombohedral crystals; also granular massive, powdery encrustations, or "micro" fibrous or spherulitic aggregates. Easily soluble in acids. Secondary mineral formed by alteration of copper minerals.

Parkerite $Ni_3Bi_2S_2$. H=2. Bronze metallic. Exhibits lamellar twinning. Occurs as microscopic grains intimately associated with bismuthinite, native bismuth, cobalt pentlandite, siegenite and bravoite at the Langis Mine. Effervesces in dilute HNO_3.

Pavonite $AgBi_3S_5$. Grey metallic lath-like or elongated grains. Occurs in bismuthinite-matildite-native bismuth intergrowths in the Keeley Mine deposit.

Pearceite $Ag_{16}As_2S_{11}$. H=3. Black metallic hexagonal tabular prisms with bevelled edges and triangular striations on basal face. Decomposed by HNO_3. Associated with silver minerals such as argentite, native silver.

Pegmatite A very coarse grained dyke rock.

Pentlandite $(Fe, Ni)_9S_8$. H=3.5-4. Light bronze-yellow massive, granular aggregates. Octahedral parting distinguishes it from pyrrhotite with which it is commonly associated. Nonmagnetic. Ore of nickel.

Peridotite An igneous rock consisting almost entirely of olivine and pyroxene with little or no plagioclase feldspar.

Petzite Ag_3AuTe_2. H=2.5-3. Light to dark grey metallic; massive granular. Associated with other tellurides in vein deposits. Decomposed by HNO_3.

Picrolite A non-flexible fibrous variety of antigorite (serpentine).

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.

Polybasite $(Ag, Cu)_{16}Sb_2S_{11}$. H=2-3. Black metallic tabular crystals or massive. Thin splinters are deep red in colour. Decomposed by HNO_3. Occurs with silver-bearing minerals in veins.

Porphyry A dyke rock that consists of distinct crystals (phenocrysts) in a fine-grained matrix.

Posnjakite Basic Cu sulphate. Minute blue flaky and radiating sheaf-like aggregates on copper-bearing rocks. Associated with other secondary copper minerals; not readily distinguished from them on hand specimen.

Prehnite $Ca_2Al_2Si_3O_{10}(OH)_2$. H=6.5. Light green globular, stalactitic, masses with fibrous or columnar structure and crystalline surface. Vitreous lustre. Colour and habit are distinguishing features.

Proustite Ag_3AsS_3. H=2-2.5. Red with adamantine lustre. Prismatic crystals or massive. Associated with other silver minerals. Ore of silver. Known as ruby silver.

Pyrargyrite Ag_3SbS_3. H=2.5. Deep red prismatic crystals, massive. Adamantine lustre. Deep red streak. Occurs in veins carrying other silver minerals. Known as ruby silver. Ore of silver. Colour is identifying characteristic.

Pyrite FeS_2. H=6-6.5. Pale brass-yellow metallic crystals (cube, 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.

Pyroclastic rock A rock composed of fragments of volcanic rocks.

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.

Rammelsbergite $NiAs_2$. H=5.5-6. Light grey metallic tinged with red; massive with granular texture or prismatic, radial fibrous structure. Occurs in vein deposits with nickel and cobalt minerals such as smaltite, nickeline.

Rhodochrosite $MnCO_3$. H=4. Pink massive, globular, columnar or botryoidal. Soluble with effervescence in HCl. Distinguished by colour, rhombohedral cleavage, and hardness. Resembles rhodonite but has inferior hardness.

Rhyolite A fine-grained volcanic rock with composition similar to granite.

Romeite $(Ca, Fe, Mn, Na)_2(Sb, Ti)_2O_6(O, OH, F)$. H=5.5-6.5. Yellow or yellowish brown, reddish to dark brown with vitreous, greasy or subadamantine lustre. White to light yellow streak. Occurs as small octahedral crystals or in massive form associated with manganese minerals.

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.

Ruby silver The silver minerals, pyrargyrite and proustite, are known as ruby silver because of their colour.

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.

Safflorite $(Co, Fe)As_2$. H=4.5-5. Light grey metallic, massive with radiating fibrous structure; prismatic crystals resembling arsenopyrite. May form cruciform or six-ray star twins. Occurs with cobalt and nickel minerals and with native silver in vein deposits.

Samsonite $Ag_4MnSb_2S_6$. H=2.5. Dark grey to black metallic striated prisms. Associated with silver and manganese minerals.

Sandstone Sedimentary rock composed of sand-sized particles (mostly quartz).

Scheelite $CaWO_4$. H=4.5-5. White, yellow, brownish; transparent to translucent, massive. Also dipyramidal crystals. High specific gravity (about 6). Generally fluoresces bright bluish white under "short" ultraviolet rays; this property is utilized in prospecting for this tungsten ore.

Schist Metamorphic rock composed mainly of flaky minerals such as mica and chlorite.

Scorodite $Fe'''(AsO_4).2H_2O$. H=3.5-4. Green, greyish green to brown crusts of tabular or prismatic crystals; also massive, earthy, porous or sinter-like. Vitreous to subresinous or subadamantine lustre. Soluble in acids. Secondary mineral formed by oxidation of arsenopyrite.

Selenite See gypsum.

Sericite Fine scaly or fibrous muscovite that is an important constituent of some schists and gneisses.

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.

Serpentinite A rock consisting almost entirely of serpentine.

Shale Fine-grained sedimentary rock composed of clay minerals.

Shear zone A region in which lateral movements along rock planes has produced crushed or brecciated rocks.

Siderite $FeCO_3$. H=3.5-4. Brown rhombohedral crystals, cleavable masses, earthy, botryoidal. Distinguished from calcite and dolomite by its colour and higher specific gravity; from sphalerite by its cleavage. Ore of iron.

Siderotil $FeSO_4.5H_2O$. White, pale green to bluish fibrous crusts, needle-like crystals, or finely granular encrustations. Vitreous lustre. Metallic, astringent taste. Not distinguishable in hand specimen from other iron sulphates.

Siegenite $(Co, Ni)_3S_4$. H=4.5-5.5. Grey metallic tarnishing to copper-red. Octahedral crystals or massive, granular. Uncommon mineral occurring with copper, nickel or iron sulphides in vein deposits.

Silver Ag. H=2.5-3. Grey metallic arborescent, wiry, leafy, platy or scaly forms; crystals (cubic, octahedral, dodecahedral) rare. Tarnishes to dark grey or black. Hackly fracture. Ductile, malleable. Colour, form and sectility are identifying characteristics.

Skarn An altered rock zone in limestone and dolomite in which calcium silicates (garnet, pyroxene, epidote, etc.) have formed.

Skutterudite (Co, Ni)As_3. H=5.5-6. Grey metallic cubic, cubo-octahedral or pyritohedral crystals or massive, colloform. Resembles arsenopyrite but distinguished by crystal form. Associated with other cobalt, nickel minerals in vein deposits.

Slate A fine-grained metamorphic rock characterized by a susceptibility to split into thin sheets.

Smaltite (Co, Ni)As_{3-x}. H=5.5-6. Tin-white to silver-grey, finely granular, massive, colloform; or as cubic or octahedral crystals. Metallic lustre. Crystals can be distinguished from arsenopyrite by the crystal form; massive variety difficult to identify in hand specimen. Ore of cobalt.

Smythite Fe_3S_4. Bronze to brownish black metallic plates or flakes. Magnetic. Resembles pyrrhotite from which it is distinguished by X-ray diffraction pattern. Occurs with other sulphates such as pyrrhotite, pyrite, chalcopyrite, marcasite.

Soapstone A metamorphic rock composed chiefly of talc; has massive fibrous texture and unctuous feel. Used for electrical switch boards, acid-proof table-tops and sinks, and laundry tubs. Attractive varieties used for carved ornamental objects.

Specularite Black variety of hematite having a high lustre.

Sperrylite $PtAs_2$. H=6-7. Light grey metallic, cubic or cubo-octahedral crystals. Associated with pyrrhotite-pentlandite-chalcopyrite ores.

Sphalerite ZnS. H=3.4-4. 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.

Sphene See titanite.

Stephanite Ag_3SbS_4. H=2-2.5. Black metallic striated prismatic or tabular crystals or massive. Decomposed by HNO_3. Occurs in veins in silver deposits.

Stibnite Sb_2S_3. H=2. Lead-grey metallic (bluish iridescent tarnish), striated prismatic crystals; also acicular crystal aggregates, radiating columnar or bladed masses; granular massive. Soluble in HCl. Most important ore of antimony.

Stichtite $Mg_6Cr_2CO_3(OH)_{16}.4H_2O$. Lilac-coloured scaly, micaceous masses associated with serpentine. Also occurs as blebs and veinlets in serpentine.

Stilpnomelane Fe silicate. Black, greenish black foliated plates, fibrous. Commonly associated with iron ores.

Stromeyerite CuAgS. H=2.5-3. Dark grey metallic tarnishing blue. Prismatic crystals or massive. Soluble in HNO_3. Distinguishable from arsenopyrite by its darker colour and inferior hardness.

Syenite An igneous rock composed mainly of feldspar with little or no quartz. Used as a building and monument stone.

Sylvanite (Au, Ag)Te_2. H=1.5-2. Light to dark grey metallic; prismatic or tabular crystals, bladed aggregates, granular. Associated with native gold and other tellurides in vein deposits. Distinguished from other gold tellurides by its inferior hardness.

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.

Temiskamite Name was given to a bronze-coloured material with radiating structure occurring in the Elk Lake-Gowganda silver-cobalt deposits. Synonym for maucherite.

Tennantite See tetrahedrite.

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.

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 prism, by striations, fracture. Used in manufacture of pressure gauges; transparent variety used as a gemstone.

Trachyte A light coloured lava composed essentially of orthoclase with minor biotite, amphibole and/or pyroxene.

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.

Tuff A rock formed from volcanic ash.

Ullmannite NiSbS. H=5-5.5. Light grey metallic striated cubes; octahedral, pyritohedral crystals less common. May form penetration twins. Perfect cleavage. Occurs with nickeline and other nickel minerals in vein deposits. Distinguished from pyrite by its colour.

Valentinite Sb_2O_3. H=2.5-3. Colourless, snow-white to greyish prismatic or tabular striated crystal aggregates; also massive with granular or fibrous structure. Adamantine to pearly lustre. Transparent, associated with stibnite and with other secondary antimony oxides resulting from oxidation of metallic antimony minerals.

Violarite Ni_2FeS_4. H=4.5-5.5. Violet grey, brilliant metallic, tarnishes to violet tint. Massive. Distinguished by colour. Associated with copper, nickel and iron sulphides in vein deposits. Rare mineral.

Wad A field term used for substances consisting mainly of manganese oxides.

Wall-rock The rock forming the walls of a vein.

Wittichenite Cu_3BiS_3. H=2-3. Grey metallic tabular crystals or columnar, acicular aggregates; massive. Fuses easily. Soluble in HCl and gives off H_2S; decomposed by HNO_3. Alters readily to yellowish brown, red, blue colours, and eventually forms covellite.

Wolframite (Fe, Mn)WO_4. H=4-4.5. Dark brown to black, short prismatic striated crystals, lamellar or granular. Submetallic to adamantine lustre. Perfect cleavage in one direction. Distinguishing features are colour, cleavage, and high specific gravity (7.1-7.5). Ore or tungsten.

Xanthoconite Ag_3AsS_3. H=2-3. Dark red to orange or brown tabular or lath-shaped crystals. Adamantine lustre. Orange-yellow streak. Fuses readily. Associated with ruby silver; at LaRose Mine and at Keeley Mine, it occurs as hemispherical radiating aggregates of tiny crystals associated with proustite.

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, analcime belong to this group.

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
Li - lithium
Mg - magnesium
Mn - manganese
Mo - molybdenum
Na - sodium
Nb - niobium
Ni - nickel
O - oxygen
P - phosphorus
Pb - lead
Pt - platinum
R - rare-earth elements
S - sulphur
Sb - antimony
Se - selenium
Si - silicon
Sn - tin
Sr - strontium
Ta - tantalum
Te - tellurium
Th - thorium
Ti - titanium
U - uranium
W - tungsten
Y - yttrium
Yb - ytterbium
Zn - zinc
Zr - zirconium

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