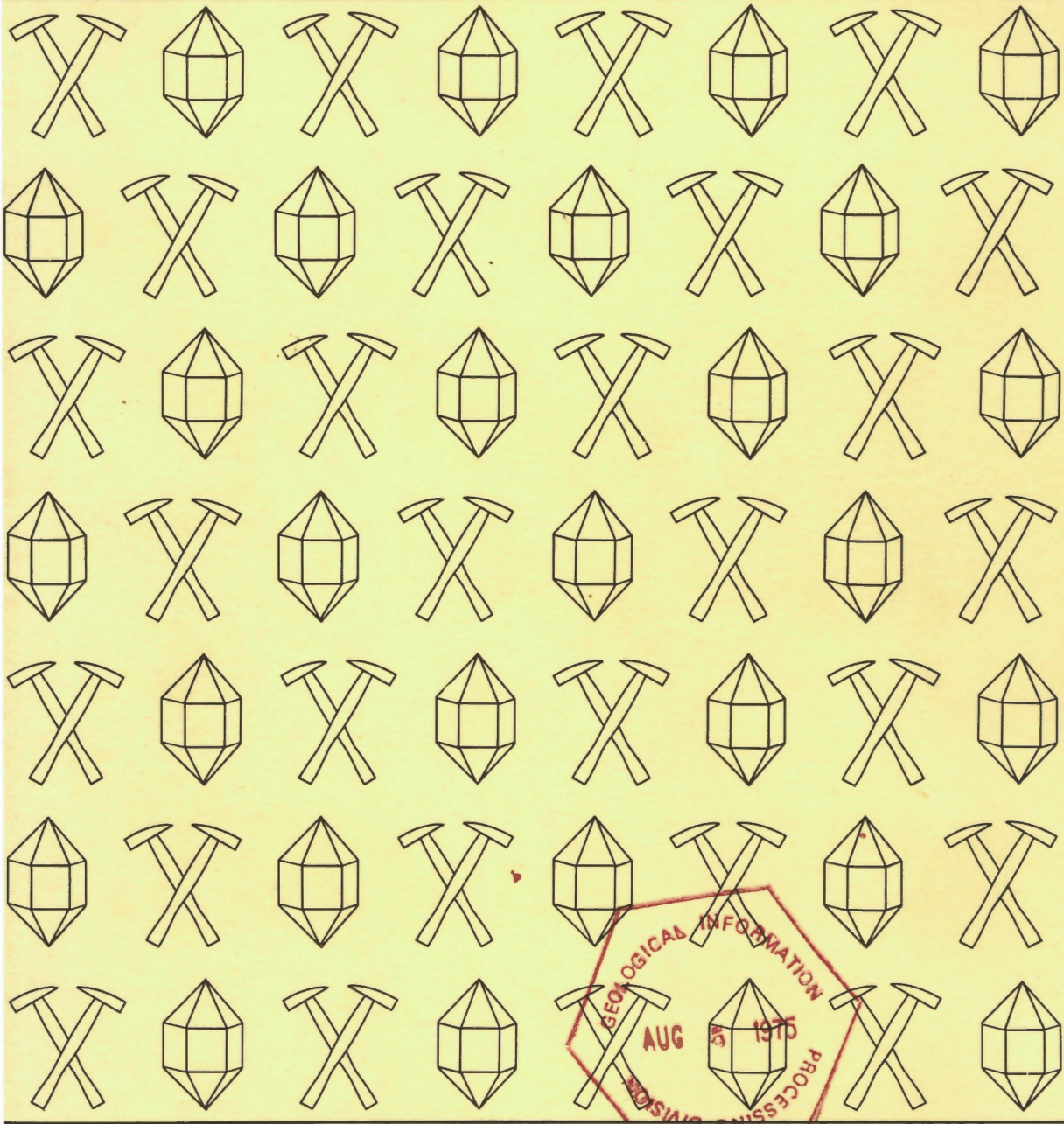
PAPER 66-51

ROCKS AND MINERALS FOR THE COLLECTOR

Eastern Townships and Gaspé, Quebec; and parts of New Brunswick

Ann P. Sabina

1967
Reprinted 1975



DEPARTMENT OF ENERGY, MINES AND RESOURCES

GEOLOGICAL SURVEY
OF CANADA

PAPER 66-51

ROCKS AND MINERALS FOR THE COLLECTOR: EASTERN TOWNSHIPS AND GASPÉ, QUEBEC; AND PARTS OF NEW BRUNSWICK

Ann P. Sabina

DEPARTMENT OF ENERGY, MINES AND RESOURCES

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Price - Canada: $2.75
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Catalogue No. M44-66-51

Price subject to change without notice

Information Canada
Ottawa
1967
Reprinted 1975

Frontispiece: Percé, viewed from south.

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Abstract

Occurrences of minerals, rocks, and fossils are described from one hundred and sixty-five easily accessible localities in the Eastern Townships and Gaspé, Quebec, and in northern New Brunswick. Rocks and minerals from some localities are suitable for ornamental purposes, but the majority of the deposits furnish specimen material only.

In the Eastern Townships, material suitable for ornamental purposes include the soapstone, marble, and serpentine deposits. Some rare minerals are associated with the asbestos deposits, and colourful mineral specimens including vesuvianite, garnet, and copper minerals can be found at abandoned mines in the Sherbrooke-Black Lake area. Placer gold has been recovered from streams in the East Angus, Mégantic and St- Georges areas.

Pebbles of chalcedony and jasper used locally for making jewellery, occur at numerous localities along the Gaspé and Bay of Chaleurs shorelines. Marbles suitable for ornamental purposes include banded marble from the Corner of the Beach—Chandler area and a coralline marble from an abandoned quarry at Port-Daniel. Metallic mineral specimens including galena and sphalerite are available from inactive mines. Good fossil specimens can be collected from road-cuts, shoreline exposures and from old quarries in the Gaspé peninsula.

The New Brunswick shoreline from Campbellton to Bathurst provides good collecting localities for jasper and agates, fossils and a few zeolites. A number of copper, lead, zinc, manganese, and iron minerals occur in the mines in the Bathurst area. Near Napadogan, there is an inactive tungsten mine where topaz, fluorite, beryl, wolframite, molybdenite and other specimens can be collected, and in the Fredericton-Woodstock area, there are former antimony, iron-manganese and lead-zinc mines. Other deposits found in northern New Brunswick include peat and coal.

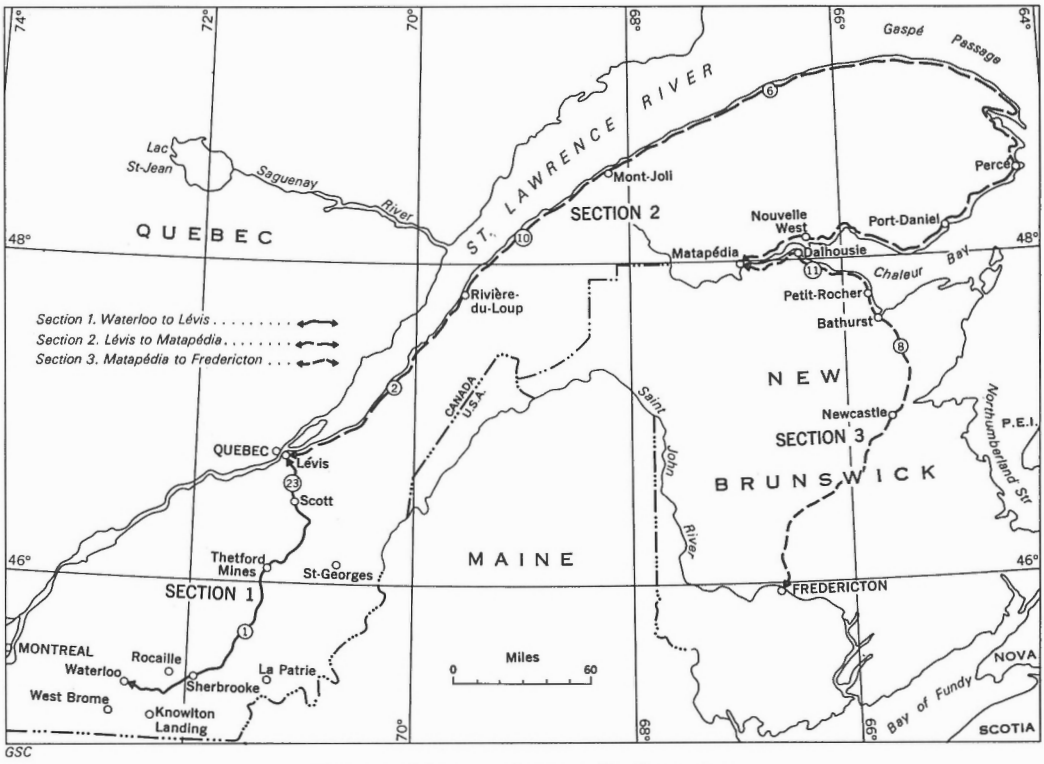


Figure 1. Index map showing collecting routes.

ROCKS AND MINERALS FOR THE COLLECTOR:

EASTERN TOWNSHIPS AND GASPÉ, QUEBEC; AND

PARTS OF NEW BRUNSWICK

INTRODUCTION

This booklet describes mineral, rock and fossil localities in southeastern Quebec (Eastern Townships), in the Gaspé Peninsula, and in central and northeastern New Brunswick. Some of the earliest Canadian mining ventures have been conducted in these areas, and some of the deposits were first recorded by our early explorers. This booklet supplements Geological Survey Paper 64-10, which describes occurrences in southern New Brunswick (Bay of Fundy Area) and part of Nova Scotia.

The localities are easily accessible from the main highways and sideroads, but, in places, may require a hike of about a mile. The shoreline localities should be visited at low tide. Directions to reach each of the occurrences are given in the text and can be used with official provincial road maps. Locality maps are included where deposits may be difficult to find. Additional detailed information can be obtained from the appropriate topographic and geological maps. Maps and tables mentioned are available from the agencies listed on page 137.

Many of the old mines have not been worked for many years and entering shafts, tunnels, and other workings is dangerous. Some of the localities are on private property and the fact thay they are listed in this booklet does not imply permission to visit them. The rights of property owners should be respected at all times.

During the summer of 1965 the localities were visited by the author ably assisted by Judith A.C. Carson. The field investigation was facilitated by information and assistance received from Dr. J.L. Davies, New Brunswick Department of Lands and Forests, from Dr. E.L. Mann, Asbestos Corporation Limited and from Drs. R.W. Boyle and L.M. Cumming, Geological Survey of Canada.

The laboratory identification of minerals by X-ray diffraction was performed by Mr. R.N. Delabio, Geological Survey of Canada. Their assistance is gratefully acknowledged.

A BRIEF GEOLOGICAL HISTORY

The mineral collecting areas described in this booklet are part of a large geological region – the Appalachian Mountain system – extending northeastward from Alabama to Newfoundland. It is underlain chiefly by rocks formed during periods of sedimentation and deformation in the Palaeozoic Era.

Table I

AGE (Millions of Years)	ERA	PERIOD	ROCKS FORMED	WHERE TO SEE THEM
	Cenozoic	Quaternary	Gravel, sand, clay, alluvium	In beaches, gravel pits, stream beds, lakes, throughout area.
			Gold-bearing gravels, alluvium	Moe River-Salmon River area; Ditton area; Stoke Mountain area.
			Peat	St-Fabien area; Grande-Anse; Pokemouche; Shippegan Island.
		Tertiary	Gold-bearing gravel, sand, clay	Ditton area.
			Igneous rocks (syenite, essexite, etc.)	Yamaska, Shefford and Brome mountains.
60				
	Mesozoic			
230				
	Palaeozoic	Permian		
		Pennsylvanian	Sandstone, shale	Clifton-Stonehaven shoreline.
			Sandstone, shale, conglomerate	Minto coalfield.
		Pennsylvanian or Mississippian	Red conglomerate, shale, sandstone	Malbaie-Corner of the Beach shoreline; Percé-Chandler shoreline; Bonaventure Island; Port-Daniel West-Black Cape shoreline; shorelines at Charlo, Jacquet River, Belledune.
		Devonian	Granite	Stratford, Stanstead, Scotstown areas; Antinouri Lake; Bathurst area.
			Volcanic flows, tuffs, porphyry	Gaspé Park; Sugarloaf Mountain; Stewart's Cove.
			Limestone, marble	Dudswell-Lime Ridge area.
			Conglomerate, limestone, shale, sandstone	South and east shores of Lake Aylmer.
			Fossiliferous limestone; shale	Little Gaspé-Cape Gaspé road-cuts, shoreline; Stewart's Cove.
			Conglomerate, shale, sandstone	Pirate Cove-Magusha Point shoreline; Cross Point-Pointe-à-la-Garde; Pointe St-Pierre-Barachois shoreline.
		Silurian	Sericite schist	Eustis, Suffield, Capelton, Aldermac mines.
			Crystalline limestone	Port-Daniel quarries, shoreline.
			Limestone, sandstone, shale conglomerate	Shoreline, road-cuts: Port-Daniel area, Black Cape.
			Fossiliferous limestone; sandstone, conglomerate	Belledune wharf-Quinn Point shoreline; Culligan Station railway cuts.
			Shale, fossiliferous limestone	Shorelines at Dickie Cove, Blacklands Point, Petit Rocher, Green Point.
			Ferruginous slate	Jacksonville area.
		Ordovician	Peridotite, serpentine	Thetford-Black Lake area; Mount Albert.
			Quartzite, slate	Road-cuts: Scotstown-La Patrie, Highway 28 near Lambton, Disraeli-Stratford (east side Lake Aylmer).
			Limestone, slate, quartzite	Road-cuts: Ayers Cliff-Rock Island.
			Crystalline limestone	Phillipsburg area.
			Conglomerate, shale, slate, limestone	Shoreline and road-cuts: Lévis-Cap-des-Rosiers.
			Amphibolite	Mount Albert area.
			Sandstone, shale, conglomerate	South shore Mont-Joli; White Head (Cap Blanc)-Percé shoreline.
			Black slate	Along Tetagouche River; at Elmtree lead mine.
			Schist, iron-formation	In base metal deposits in Bathurst area.
		Cambrian	Schist	Sutton mountains.
			Limestone boulders in conglomerate	Shorelines: Little Métis Bay, Ruisseau-à-la-Loutre.
		Cambrian or earlier	Quartzite, slate, shale, schist	Associated with soapstone, asbestos deposits in Thetford mines area.
600				
	Precambrian	Proterozoic(?)	Quartzite, slate, shale, schist	Shoreline and road-cuts: Chandler-Newport-Anse-aux-Gascons.

The sedimentary rocks laid down by Palaeozoic seas were intensely deformed in Ordovician (Taconic Revolution) and Devonian (Acadian Revolution) times; the emplacement of large bodies of igneous rocks was accompanied by mineralization that produced important asbestos and base metal deposits. The oil and gas fields in the Eastern Townships and Gaspé originated from the accumulation of large quantities of marine organisms in Ordovician time. The coal beds in the Minto area (New Brunswick) were formed from the plant remains of the Pennsylvanian forests.

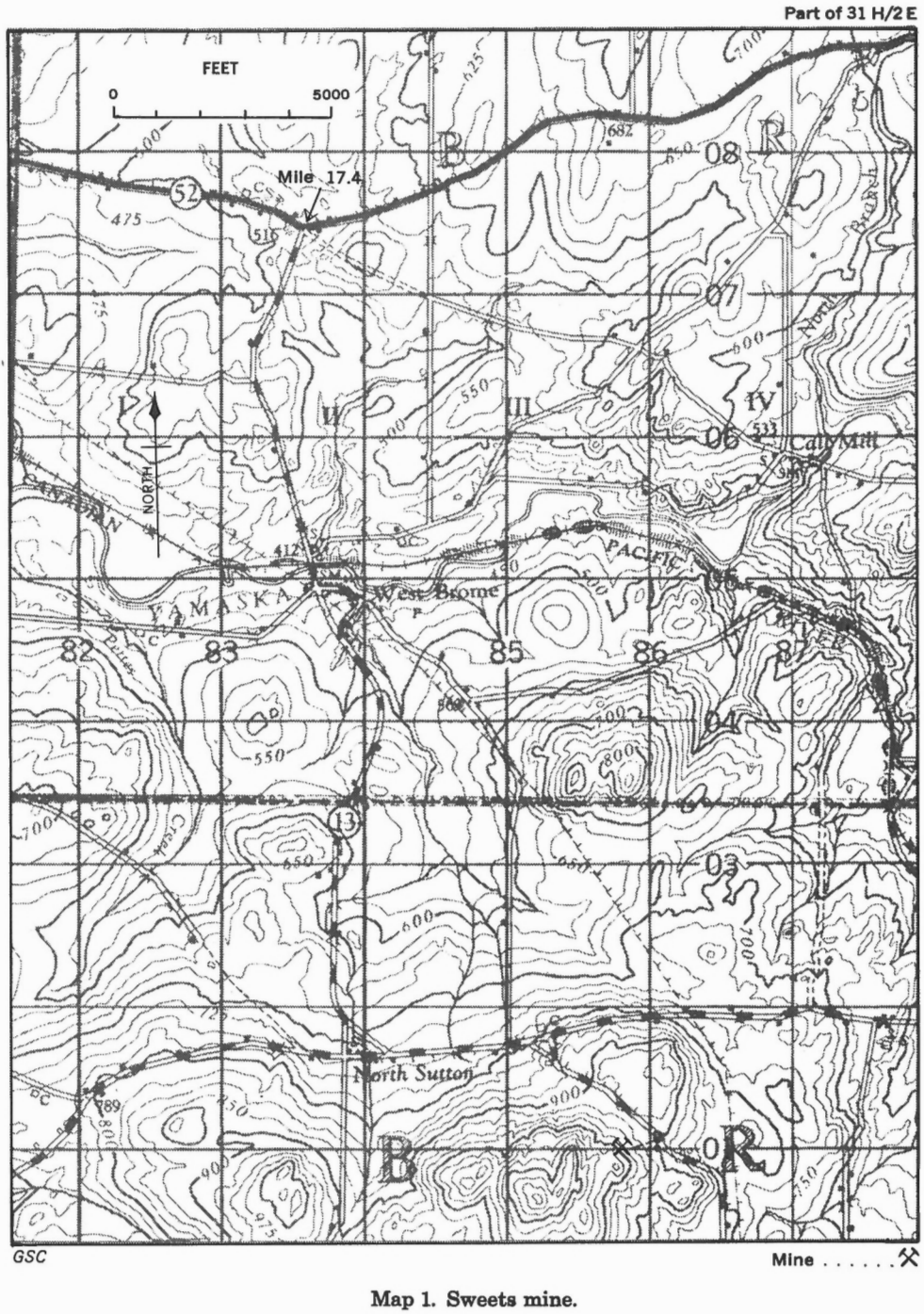
During the Pleistocene Epoch, glaciers covered the region. With their retreat the topography was altered and deposits of gravel, till and clay were left. The lowlands along the St. Lawrence Valley were invaded by the Champlain Sea; when it receded, it left accumulations of sand and clay. Other deposits of Recent times include beach sands, stream detritus and peat bogs.

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

COLLECTING ALONG THE ROUTE

The route, as shown in Figure 1, is divided into 3 sections: (1) from Waterloo to Lévis, Quebec, via Highway 1; (2) from Levis to the New Brunswick border via Highways 2, 10 and 6, through Gaspé; and (3) from the Quebec border to Fredericton, New Brunswick, via Highways 11 and 8.

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



Map 1. Sweets mine.

SECTION 1

WATERLOO - LÉVIS

Mile 0.0 Waterloo, at eastern junction Highways 1 and 39. The main road log will be along Highway 1 from which there will be numerous side trips.

Log for side trip to Sweet's mine, Phillipsburg marble quarries.

Mile 0.0 Junction Highways 1 and 39; proceed south along Highway 39.

9.6 Knowlton, at intersection Highwater Street and Cowansville road; proceed west along Cowansville road (Highway 52).

17.4 Junction road to West Brome, Sutton (Sweet's mine).

22.4 Cowansville, at junction Highway 40; continue along Highway 52.

38.3 Bedford, at town memorial.

39.5 Junction (on left) road to Shawinigan Chemicals Limited quarry.

42.5 Pike River, at junction Highway 7; proceed south along Highway 7.

45.4 Junction (on left) road to limestone quarry.

48.8 Phillipsburg, at junction St-Armand road (to Phillipsburg marble quarries).

Sweet's Mine

CHALCOPYRITE, BORNITE, CHALCOCITE, PYRITE, MALACHITE, BROCHANTITE, POSNJAKITE, MICA, QUARTZ, CALCITE.

In grey schist.

Fine-grained, massive chalcopyrite, bornite, chalcocite and pyrite are associated with quartz, calcite and fine, pearly, white mica. Secondary copper minerals form coatings and encrustations on the sulphides, quartz and schist. Malachite and brochantite are bright emerald green; malachite is botryoidal or earthy, and brochantite is vitreous, fibrous or granular. Posnjakite occurs as flaky or fibrous aggregates with a silky lustre. Generally, the form of the secondary minerals is apparent only under magnification. Specimens of the copper ore were exhibited at the London International Exhibition of 1862, and at the Exposition Universelle of 1867 in Paris.

The mine was worked from 1862 to 1864 and was one of the first mines opened in this part of the Eastern Townships. There is a small dump

adjacent to a fenced-off shaft along the slope of a wooded ridge on the property of Mr. Wilson of Sutton.

Road log from Highway 52 (at mile 17.4):

Mile 0.0 Proceed south along road to West Brome, Sutton.

5.2 Junction trail on right (west) leading 400 yards up hill to the mine. This trail is just north of a turn-off to a summer home, and 3.0 miles north of the intersection of Main and Maple Streets in Sutton.

Refs.: 13 pp. 102-105; 126 p. 15; 127 p. 57.

Maps (T): 31 H/2 E Sutton.
(G): 38 - 1963 Sutton.

Shawinigan Chemicals Limited Quarry

CALCITE, LIMESTONE.

White calcite veins cut dark grey high-calcium limestone which is crushed and used for agricultural purposes. The quarry and crushing plant are situated 0.8 mile south of Highway 52 at Mile 39.5.

Map (T): 31 H/3 E Lacolle

Phillipsburg Marble Quarries

CRYSTALLINE LIMESTONE (MARBLE)

The marble is fine grained, compact, mottled in tones of grey, cream-white and pale green and is veined with white calcite. The deposit has been quarried for over 50 years and has supplied building and decorative stone for numerous buildings including the Chateau Laurier Hotel in Ottawa, the Windsor Hotel and Windsor Station in Montreal and the Royal Ontario Museum, Toronto. The more colourful varieties (rose, yellow, green) of former years are now rare, and recently the marble has been quarried for monuments, terrazzo and construction.

Road log from Highway 7:

Mile 0.0 Phillipsburg, at sharp bend; proceed east along road to St-Armand.

0.05 Turn left (opposite church)

0.7 Gate to quarries.

Ref.: 97 pp. 211-219.

Map (T): 31 H/3 E Lacolle.

Mile 4.4 South Stukely, at junction road to Les Marbres Waterloo limestone quarry.

Les Marbres Waterloo Quarry

CRYSTALLINE LIMESTONE (MARBLE), PYRITE, CHALCOPYRITE, BORNITE, HEMATITE, MALACHITE.

The crystalline limestone is cream-white, grey, or green, fine to medium grained, massive. It is used for terrazzo. Associated with the limestone are white calcite, pyrite cubes (averaging 1/2 inch across), and beds of grey chlorite schist. Behind the present quarry is the site of a former copper mine, the Grand Trunk mine, worked briefly in the 1860s. The copper minerals - chalcopyrite, bornite and malachite - occur with pyrite in the limestone and schist, and can be found in a pit behind the main quarry. Black, metallic hematite flakes occur in the schist.

The quarry and crushing plant are operated by Les Marbres Waterloo of St. Hyacinthe. A road, 0.9 mile long, leads south from Highway 1 to the property.

Refs.: 13 pp. 119-120; 57 pp. 232-234.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 4.8 South Stukely Marble Quarry

CRYSTALLINE LIMESTONE (MARBLE), PYRITE.

The marble is fine-grained with mauve, pink, yellow, green and light brown patches or streaks in a white background. When polished it makes an attractive ornamental stone and has been used in the interior of numerous buildings including the Chateau Laurier, Ottawa and the Confederation Life Building, Winnipeg. Pyrite cubes averaging 1/2 inch across occur in the limestone. The quarry is inactive at present.

Road log from Highway 1 at mile 4.8:

Mile 0.0 South Stukely, at Post Office; proceed north along gravel road.

0.3 Crossroad; continue straight ahead.

0.65 Turn left onto single lane road.

0.85 Quarry.

Ref.: 57 pp. 203-209.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Langlois et Frères Quarries

CRYSTALLINE LIMESTONE (MARBLE), PYRITE, CALCITE.

The limestone is similar to that quarried by Les Marbres Waterloo in South Stukely. Pyrite cubes (averaging 1/2 inch across) occur in the limestone and in associated beds of schist. Cleavable masses of calcite are common in the limestone. The deposit is quarried by Les Carrières Langlois et Frères for use as terrazzo, and for construction and agriculture.

Road log from Highway 1 at Mile 4.8:

Mile	0.0	South Stukely, at Post Office; proceed north along gravel road.
	0.3	Crossroad; continue straight ahead.
	0.65	Turn-off to South Stukely marble quarry; continue straight ahead.
	0.8	Fork; bear left.
	2.1	Quarry and crushing plant.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile	10.1	Eastman, at junction road to Bolton Centre, Mansonville.

Log for side trip to Ives, Bolton, Huntingdon and Van Reet mines.

Mile	0.0	Eastman; proceed south along road to Bolton Centre, Mansonville.
	0.8	Turn-off (left) to Ives mine.
	2.4	Turn-off (left) to Bolton mine.
	3.1	Huntingdon mine on left side of road.
	4.2	Fork; bear right.
	7.9	Bolton Centre, at junction road to St. Benoit-sur-Lac; continue straight ahead.
	11.0	South Bolton; turn right onto road to Knowlton.
	12.4	Turn-off (left) to Van Reet mine.

Ives Mine

CHALCOPYRITE, PYRITE, PYRRHOTITE, LANGITE, POSNJAKITE, BROCHANTITE, SOAPSTONE.

In dark grey schist and greyish green soapstone. Crystalline to massive pyrite, the most abundant sulphide, occurs with lesser amounts of massive chalcopyrite and massive pyrrhotite. The secondary copper minerals – langite (as blue fibrous or acicular aggregates), brochantite (as bright green fibrous aggregates), and posnjakite (as blue to blue-green granular patches), form encrustations and coatings on the schist, sulphides and soapstone. Specimens of ore were exhibited at the Exposition Universelle of 1867 in Paris. This mine, the Bolton, and the Huntingdon were among the numerous copper deposits discovered in the Eastern Townships during the copper rush (1862-1867) caused by the increased demand for the metal during the American Civil War. The abnormally high price of copper (reaching a peak of 59 3/4 ¢ per lb. in 1864) and the cheap local labour supply (75 cents to $1.25 per day) – reinforced by deserters (Skidaddlers) from the Union Army – stimulated vigorous mining activity until just after the war when prices returned to normal and the rich Keeweenawan Peninsula (Michigan) copper mines began production.

During the first period of mining at the Ives mine (1866-1876), the ore grade was 12 per cent copper. It was transported to Waterloo by horsedrawn vehicles, the only means of transport before the railway was built. The mine was reopened for about 3 years immediately prior to World War I, and was prospected in 1918, 1925, 1929.

The workings consisted of 3 shafts; several dumps can be found on the property. The mine is 50 yards east of the Eastman-Bolton Centre road and can be readily seen from it.

Refs.: 13 pp. 25, 30, 52-54, 175-185; 37 pp. 129-130; 59 p. 462; 127 p. 56.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Bolton (Canfield or Canadian) Mine

CHALCOPYRITE, PYRITE, PYRRHOTITE, MALACHITE.

The deposit is similar to that at the Ives mine and was worked for a short time in the 1860s. Two caved shafts and small dumps can now be found on the property. The mine is about 75 yards east of the Eastman-Bolton Centre road and is connected to it by a single-lane road.

Ref.: 13 pp. 24-25, 165-166.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Huntingdon Mine

PYRITE, CHALCOPYRITE, PYRRHOTITE, SPHALERITE, ARSENOPYRITE, BROCHANTITE, LANGITE, MALACHITE, ARAGONITE.

In chlorite schist.

This deposit is similar to those described at the Ives and Bolton mines. Sphalerite and arsenopyrite are reported to occur sparingly. The secondary copper minerals – brochantite, malachite, langite – are found as encrustations on the ore minerals and the host rock.

Some patches of white, fibrous aragonite occur on the schist. Specimens of chalcopyrite were exhibited at the Exposition Universelle of 1867 and 1878 in Paris, and at the Philadelphia International Exhibition in 1876.

The deposit was discovered in 1865 by Mr. Avary Knowlton. Its first period of activity – 1865 to 1883 – was the most productive in its history in spite of the costly means of transporting the ore (by horse-driven vehicles to Waterloo) and the decline in the price of copper after the American Civil War. Since then, the mine and mill were operated at various intervals: 1893, 1912, 1919-1923, and 1954-1958 when it was worked by Quebec Copper Corporation Limited. The workings consisted of four shafts; the most recent was sunk in 1956. Large dumps remain. The mine is on the east side of the Eastman-Bolton Centre road.

Refs.: 13 pp. 25, 29-30, 52-53, 166-174; 20 p. 13; 21 p. 12; 37 pp. 128-129; 60 p. 19; 127 p. 56; 128 p. 28.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Van Reet Mine (Baker Talc Limited).

TALC, MAGNESITE, DOLOMITE, CHROMITE, PYRITE, SOAPSTONE.

In serpentine dykes cutting schist.

Talc occurs as translucent apple-green foliated aggregates, as silky white to pale green translucent fibres (about 1/2 inch long) resembling asbestos, and as white, green, or grey, fine-grained masses. In places the massive talc contains orange-yellow streaks and translucent light brown nodules of magnesite and tiny grains of pyrite and chromite. One-quarter inch cubes of pyrite were noted in the schist. White dolomite, showing good cleavage, is associated with massive talc. Grey to green soapstone, suitable for sculpturing, is obtained from the underground operations.

The mine has been operated by Baker Talc Limited for the past 13 years. The development includes an open pit, adit and shaft. The talc and soapstone is processed at the company's mill at Highwater.

Access to the mine is by a road 0.4 mile long leading south from the Eastman-Bolton Centre-Knowlton road at mile 12.4.

Maps (T): 31 H/1 W Memphremagog.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 12.9 Highway 1 rock-cut, opposite Orford Lake.

Road-cut

SERPENTINE, PYROXENE, MAGNETITE.

The road-cut exposes dark green massive serpentine containing small black magnetite grains; white veinlets of pyroxene cut the serpentine.

The rock-cut is on the south side of Highway 1 opposite the lookout at Orford Lake.

Maps (T): 31 H/8 W Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 16.9 Junction road to St-Bénoît-sur-Lac (turn-off to Castle Brook fossil locality and Lake Memphremagog copper mine)

Castle Brook Fossils

GRAPTOLITES, PYRITE.

In slate.

The fossils occur with pyrite in hard black slate beds exposed along Castle Brook about 100 yards below the point where the St-Benoît-sur-Lac road bridges the brook. This is 0.8 mile south of Highway 1.

Ref.: 37 pp. 45-46.

Maps (T): 31 H/8 E Orford
(G): 994A Magog-Weedon (1 inch to 2 miles).

Lake Memphremagog (Smith's, Patton) Mine.

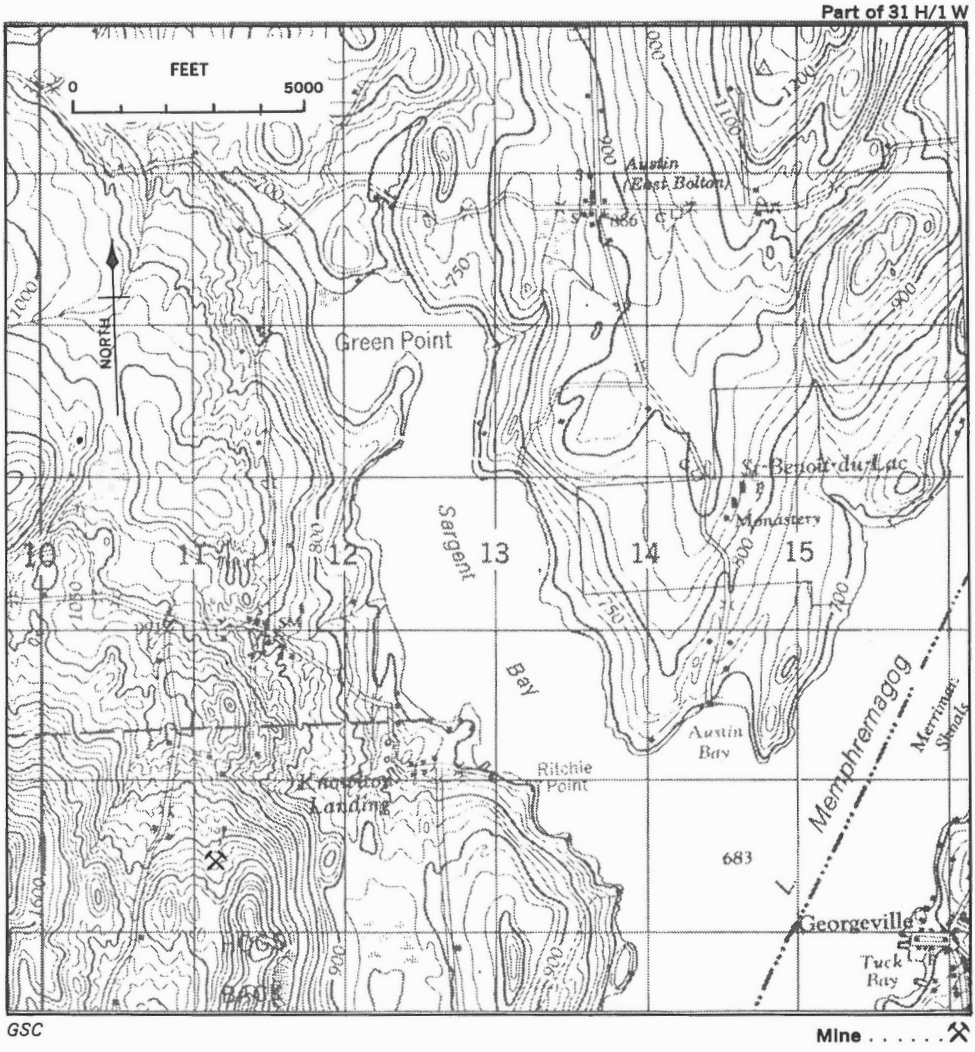
PYRRHOTITE, PYRITE, CHALCOPYRITE, SPHALERITE, LIMONITE, CALCITE.

In diabase and slate.

Massive pyrrhotite, the most abundant sulphide, occurs with pyrite, chalcopyrite and sphalerite. Black calcite is associated with the ore minerals. Limonite, or bog iron ore, formed a covering up to 10 feet thick over the orebody and had to be removed to make way for mining operations.

The deposit was discovered in 1889 and was worked intermittently for the next 20 years. It was a low grade deposit and was one of the less important copper deposits in the Eastern Townships. The workings consisted of an open pit, an adit and two shafts.

Road log from Highway 1 at mile 16.9:



Map 2. Lake Memphremagog mine.

Mile 0.0 Proceed south along road to St-Benoît-sur-Lac.

0.8 Bridge over Castle Brook (fossil locality).

9.7 Austin, at crossroad; continue straight ahead.

11.3 Fork; bear left onto road to Knowlton Landing, Vale Perkins.

12.9 Junction; turn right (west).

13.4 Junction; turn left (south).

14.3 Junction trail on left. Follow this trail east through the woods for about 400 yards to a fallen shack; turn right and follow a path about 200 yards to the mine.

Refs.: 13 pp. 39, 51, 152-160; 37 pp. 130-131.

Maps (T): 31 H/1 W Memphremagog.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 19.5 Magog, at junction Highway 50.

28.6 Junction road to Rock Forest (turn-off to Suffield mine).

Suffield (Griffith's) Mine.

PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, DEVILLINE, MALACHITE.

In sericite schist.

Pyrite is the most abundant metallic mineral; it occurs as fine-grained masses and as cubes averaging 1/2 inch across. Massive chalcopyrite, sphalerite and galena occur in small amounts, and malachite occurs sparingly as irregular patches on the schist. Specimens of copper ore were exhibited at the Exposition Universelle of 1867 in Paris.

The deposit was worked for copper (low grade) at brief intervals between 1864 and 1914. In 1950 and 1955, two additional shafts were sunk by Suffield Metals Corporation and the deposit was worked for copper, lead, zinc, silver and gold. The mine was closed in 1956. Some of the buildings and a large dump remain on the property.

Road log from Highway 1 at mile 28.6:

Mile 0.0 Proceed east along road to Rock Forest.

1.8 Rock Forest, at crossroad; continue straight ahead along road to Ste-Catherine (Katevale).

3.3 Crossroad; continue straight ahead along gravel road.

Mile 4.3 Junction; turn right onto paved road.

4.8 Junction; turn left onto gravel road.

5.0 Junction mine road; turn left onto single lane road leading 1/2 mile to mine. The property belongs to Mrs. James Jardine whose farm house is located 0.2 mile beyond (south) the turn-off to the mine.

Refs.: 13 pp. 38, 49, 259-263; 49 p. 15; 115 p. 30; 127 p. 56.

Maps (T): 21 E/5 W Sherbrooke.
(G): 994A Magog-Weedon (1 inch to 2 miles).
911A Sherbrooke.

Mile 33.3 Junction road to St-Elie (Chemin St-Elie), Bonsecours.

Log for side trip to Webster Lake serpentine, Orford nickel mine and Orford marble quarry.

Mile 0.0 Junction St-Elie, Bonsecours road and Highway 1; proceed west toward St-Elie.

7.0 Crossroad; gravel road on right leads to Webster Lake and Orford mine. Continue straight ahead for marble quarry.

15.9 Junction (on right) road to Orford marble quarry.

Webster (Montjoie) Lake Serpentine Occurrence

SERPENTINE, CALCITE, CHROMITE, PYROAURITE.

The serpentine is translucent, fine grained massive, in various shades of green including yellow-green, bluish green and deep green to almost black; in some specimens two or more tones produce mottled or streaked patterns, and these could be used for ornamental purposes. Some of the serpentine is very compact and resembles porcelain. Veins of transparent, colourless to white, fine-grained and fibrous calcite, and white to pale green asbestos veinlets (1/8 inch wide) traverse the serpentine. Irregular patches of shiny black, fine-grained chromite also occur in the serpentine. Pyroaurite is present as yellowish to orange, thin patches on serpentine.

Specimens can be found in numerous pits and dumps at the northwestern end of Webster Lake. The pits were opened during prospecting for chromite at the time of World Wars I and II. Much of the serpentine in the dumps is very brittle due to weathering, but fresh material can be obtained by working the walls of the pits.

Road log from mile 7.0 of St-Elie-Bonsecours road:

Mile 0.0 Turn-off right (north) at crossroad.

Mile 2.9 Turn-off (left) to Rheaume farm house (this is just beyond the turn-off to a boy's camp). Continue west from the farm house along a single lane road leading to Webster Lake.

4.2 Clearing on right opposite an opening through the woods to the shore. From the clearing a trail leads northwest 50 yards to some pits. Others are scattered through the woods in this general area.

Ref.: 37 pp. 133-134.

Maps (T): 31 H/8 E Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Orford Nickel Mine

GARNET, DIOPSIDE, TREMOLITE, MILLERITE, CHROMITE, CALCITE.

In calcite vein at the contact between serpentinized peridotite and acid volcanic rock.

Colourful specimens of emerald green, transparent to translucent garnet with cream-white to grey, yellow-green or greyish green, transparent to opaque diopside and/or white calcite are plentiful at this mine. Garnet occurs as aggregates of tiny crystals with individual crystals less than 1/8 inch across; these are not of gemstone quality. The green colour is due to chromium. Diopside occurs as masses of prismatic crystals, commonly in radiating and columnar forms. Yellow metallic millerite is found sparingly as striated elongated prisms and as fine-grained tiny patches in white cleavable calcite and in a garnet-calcite-diopside assemblage. Millerite crystals exceeding 3 inches in length have been reported. Shiny, jet black grains and patches of chromite are commonly associated with garnet, and masses of fine, silky white fibres of tremolite are found on some of the diopside. Specimens from this deposit were exhibited at the London International Exhibition of 1862, and at the Exposition Universelle of 1878 in Paris.

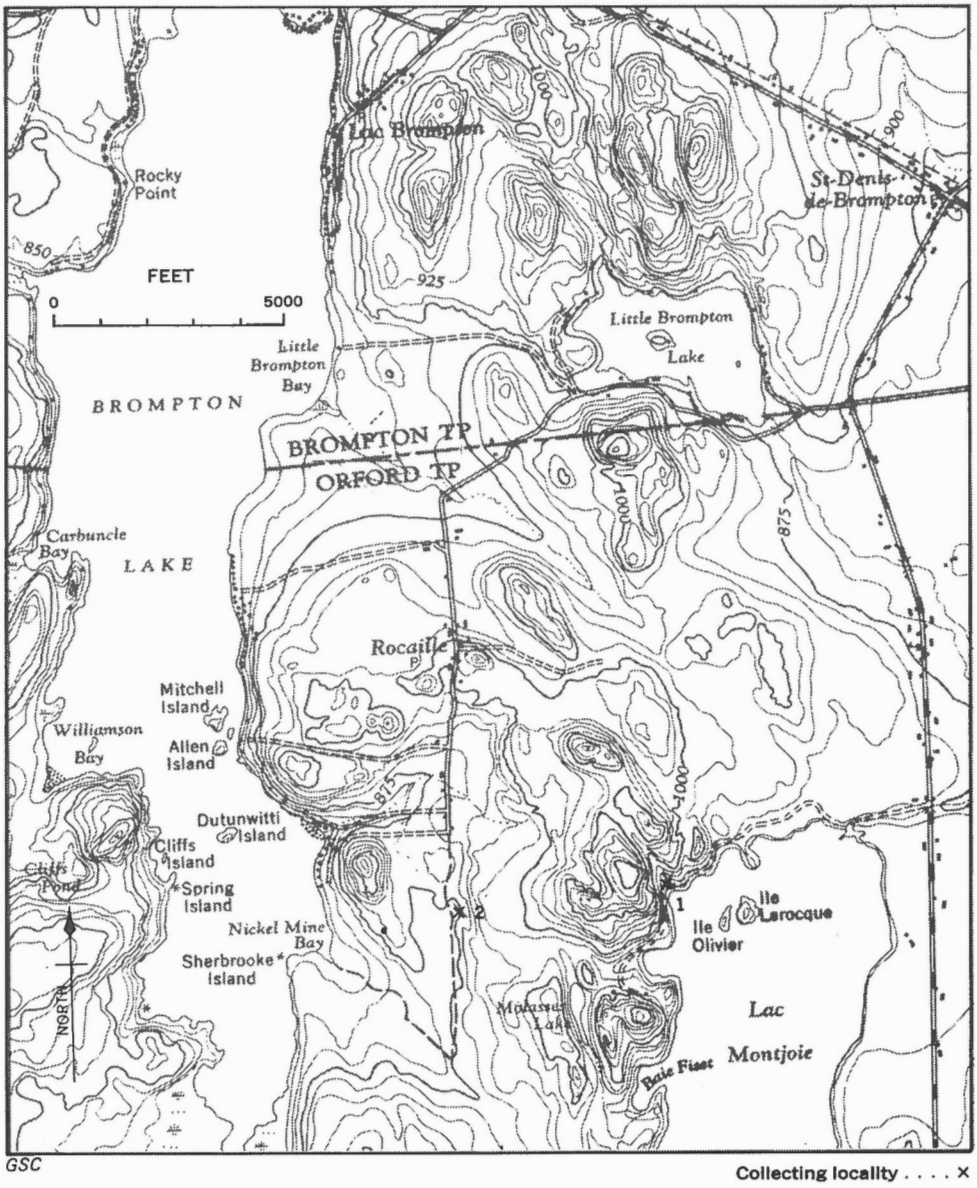
The deposit was first explored at about 1860 as a copper prospect – the bright green colour of the garnet was mistaken for an indication of copper. When the ore was assayed it was shown to contain one per cent nickel, and in spite of the low grade, the deposit was worked. Records indicate that work was done in 1877 but was suspended by 1882. Two shafts had been sunk and houses, a store, powder-house and smelting furnace had been erected. These buildings no longer exist and the area has become overgrown. Several small dumps are found in the vicinity of the shafts.

Road log from mile 7.0 of St-Elie–Bonsecours road:

Mile 0.0 Turn right (north) at crossroad.

2.9 Turn-off to Rheaume farm house (to Webster Lake serpentine locality); continue straight ahead.

Part of 31 H/8 E



Map 3. 1. Webster Lake serpentine; 2. Orford nickel mine.

Mile 4.6 Crossroad; turn left (west) onto road to Rocailles.

8.3 Road curves to the right. At the bend, a trail leads straight ahead through the woods. Follow this trail across a brook, through a clearing, and again through the woods for a total distance of about 500 yards. At this point, some piles of light coloured rocks are visible in the woods on left. The dump and shafts are about 30 yards further in on the left side of the road.

Refs.: 37 pp. 134-135; 60 pp. 41-42; 76 p. 738; 119 p. 5; 126 p. 18

Maps (T): 31 H/8 E Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Orford Marble Company Quarry

MARBLE, SERPENTINE, CALCITE, ACTINOLITE, MAGNETITE, CHROMITE.

In peridotite.

The marble is mostly deep red calcite cut by green and white calcite veins. Closely associated with it are green needle-like masses of actinolite. Fine-grained massive and fibrous green serpentine containing tiny grains of chromite and magnetite occurs with the calcite. Varieties of marble include: breccia of red fragments cemented by white calcite, breccia of dark green fragments cemented by light green serpentine, light green serpentine with yellow spots, dark red marble with green spots and a green marble cut by red veins. The marble, with its deep rich colour is particularly appealing when polished; it can be seen in the interior decor of the Post Office Building in Sherbrooke and of His Majesty's Theatre in Montreal, and in the entrance of the Drummond Building in Montreal. Most of the rock quarried has been crushed on the premises and used for terrazzo. The property is owned by Orford Marble Company of Bonsecours.

Road log from mile 15.9 on St-Elie–Bonsecours road:

Mile 0.0 Turn right (north) at road sign "Orford Marble Company"

2.2 Junction road to quarry; turn right.

2.4 Orford Marble Company quarry.

Refs.: 37 p. 136; 84 p. 59; 108 pp. 219-220.

Maps (T): 31 H/8 E Orford.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 36.8 Sherbrooke, at junction Highway 5/22 i.e. intersection King Street (Highway 1) and Wellington Street (Highway 5/22).

Road log for side trip along Highway 5, south of Sherbrooke:

Mile	0.0	Proceed south along Highway 5/22 (Wellington Street) from its junction with Highway 1.
	2.0	Lennoxville, at junction Highway 28, i.e. intersection Queen Street (Highway 5) and Belvedere Street.
	3.7	Junction Highway 22.
	5.9	Junction road to Capelton, Albert, Eustis mines.
	11.1	Junction North Hatley road.
	31.6	Junction road to Rock Island, Beebe.

Moe River Placer Deposit

GOLD.

In alluvium

Gold was first recorded as occurring in the Moe River gravels in 1908 when the Compton Gold Dredging Company was formed to work the deposit; there is, however, no record of production. Since then the river has been prospected several times. The gold that was found was of a bright colour and occurred as paper thin flakes; the most productive bars were those between Moe's River village and the junction of the Moe and Salmon (Ascot) Rivers (about 6 miles north of Compton and 1/4 mile north of Milby). Panning revealed that the gold was most abundant near the surface of the bars (within 2 or 3 feet) yielding up to 20 colours and flakes per pan. The most recent work was done in 1939-1940 by Moe River Gold Mines Limited; trenches and pits were dug along the Moe River, above and below Moe's River village. The company reported satisfactory results.

The road log given below is to easily accessible points on the Moe River within the region where gold had previously been reported.

Road log from Highway 5 at mile 3.7:

Mile	0.0	At junction, turn left (east) onto Highway 22.
	2.9	The forks of the Moe and Salmon (Ascot) Rivers is on the left (east) side of the highway. Gold-bearing gravels have been reported from here southward and mileages are given for points where the river is accessible from the highway.
	3.2	Junction, road on left leading 50 yards to covered bridge over Moe River. The settlement here is called Milby.
	3.4	Junction, road on left leading 50 yards to bridge over Moe River.
	4.6	Picnic site on bank of Moe River on left.

Mile 4.9 Moe River on left parallels highway. From just south of this point the river banks are very steep and not easily accessible.

8.8 Compton, at junction (on left) road to Moe's River village. Turn left onto this road 0.2 mile to fork opposite cemetery; bear left and continue 1.8 miles to bridge over Moe River at Moe's River village. From the west side of the bridge, a road leads south paralleling the river for about 3 miles; this is the southern extremity of the gold-bearing gravels.

Ref.: 72 p. 14; 86 pp. 33-36.

Maps (T): 21 E/4 W Coaticook
21 E/5 W Sherbrooke
(G): 994A Magog-Weedon (1 inch to 2 miles).
911A Sherbrooke

Capelton (Capel), Albert Mines

PYRITE, CHALCOPYRITE, BROCHANTITE, POSNJAKITE, DEVILLINE.

In quartz and sericite schist.

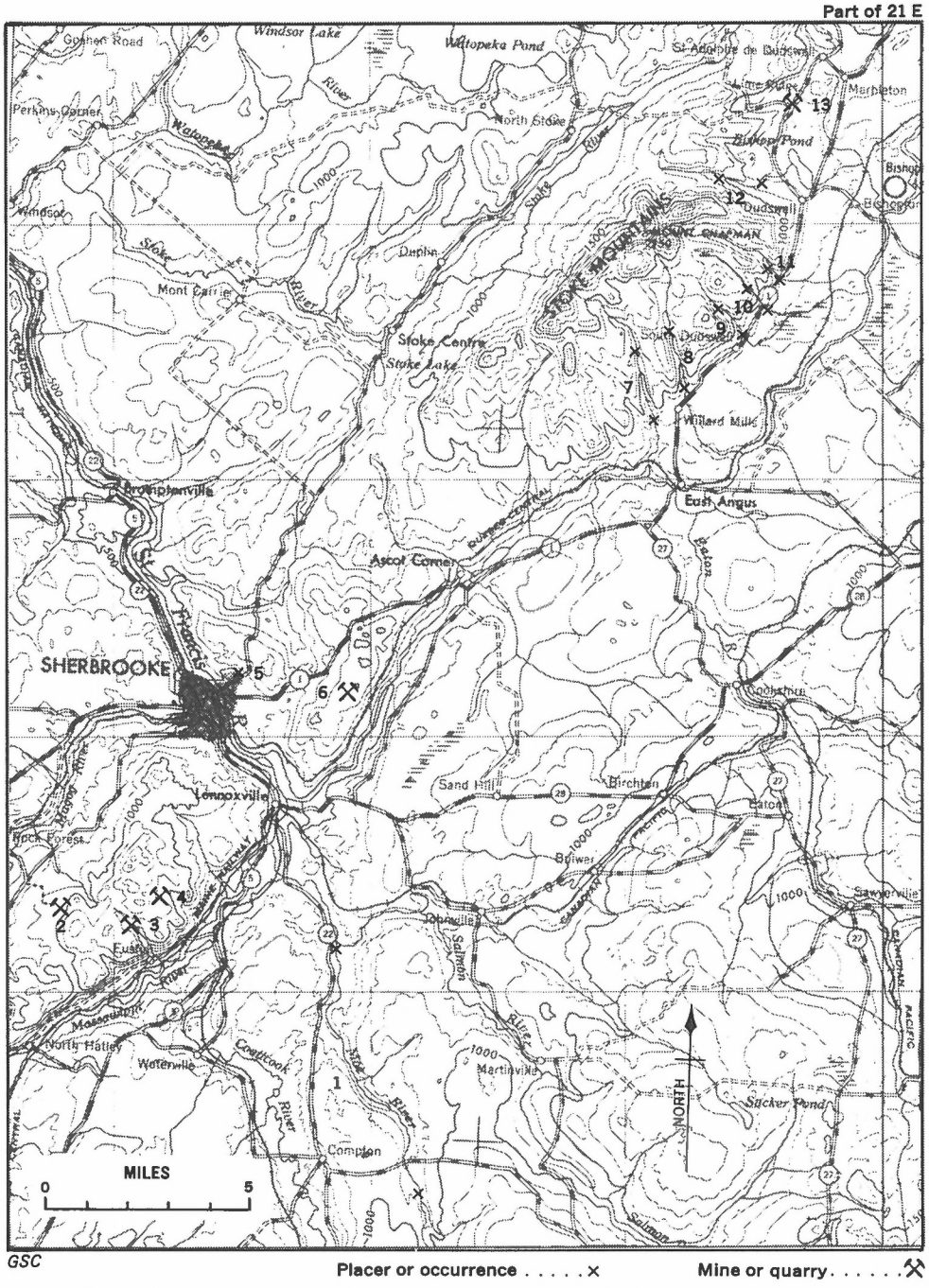
Fine-grained massive and crystalline (individual crystals averaging 1/2 inch across) pyrite is associated with minor chalcopyrite. Posnjakite (blue-green) and brochantite (emerald green) occur as thin encrustations on quartz, schist and on the sulphides. The posnjakite is more abundant than the brochantite and is commonly associated with silky white patches of devilline. The orange to brown stain on the schist is due to iron from the pyrite. Ore specimens were exhibited at the Exposition Universelle of 1867 in Paris.

When discovered (1863), the deposit was thought to be a gold prospect but was later found to be a cupriferous pyrite body containing low values in silver and gold. It was one of the most important deposits discovered during the copper rush of the early 1860s and was worked almost continuously from 1863 to 1907. It was reworked recently (1951) by Albert Metals Corporation. The deposit was worked for copper and for sulphur. In the late 1880s, chemical plants were built for the manufacture of sulphuric acid and of chemical fertilizers for which phosphate from the Ottawa area deposits was used. The extraction of sulphur in addition to copper ensured the survival of this deposit (and the Eustis) for many years after the copper boom of the 1860s

This deposit is on the east side of Capelton Hill and was at first worked as a single mine (the Capel mine) but later became known as the Capelton and Albert mines. The workings included several shafts and a plant to treat the ore (Huntingdon and Eustis ores were also treated here). Remnants of the plant and several large dumps can be seen on the property at present. Specimens of the copper ore and secondary minerals are plentiful in these dumps.

Road log from Highway 5 at mile 5.9:

Mile 0.0 Turn right (west) onto road to Capelton, Eustis.



Map 4. Sherbrooke area: 1. Moe River placers; 2. Suffield mine; 3. Eustis mine; 4. Capelton, Albert mines; 5. Sherbrooke jasper occurrence; 6. Aldermac Moulton Hill mine; 7. Big Hollow Brook placers; 8. Willard Brook placers; 9. Kingsley Brook placers; 10. Andrews Brook placers; 11. Rowe Brook placers; 12. Hall Brook placers; 13. Lime Ridge quarries.

Mile 0.75 Junction single lane road on right. This road leading up-hill to the mine is rough and should be checked before proceeding by automobile.

1.5 Dumps on right. This is the old Capel mine. Continue straight ahead to reach Albert mine.

2.0 Albert mine. An alternate route to this mine is: from Lennoxville proceed west along Belvedere Street for 3 miles; turn left (south) onto gravel road and continue 2.6 miles to the mine.

Refs.: 13 pp. 24-25, 37, 220-223; 50 p. 16; 127 p. 56.

Maps (T): 21 E/5 W Sherbrooke.
(G): 994A Magog-Weedon (1 inch to 2 miles).
911A Sherbrooke.

Eustis (Crown, Hartford, Lower Canada) Mine

PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, TETRAHEDRITE - TENNANTITE, POSNJAKITE, BROCHANTITE.

In sericite schist and quartz.

Pyrite, as pale bronze, fine to coarse crystalline aggregates, is closely associated with small amounts of chalcopyrite, sphalerite, galena and tetrahedrite-tennantite. The secondary copper minerals – posnjakite and brochantite – occur sparingly as coatings on quartz, schist and pyrite. Much of the schist on the dumps is orange- to brown-tinted due to iron staining. Pyrite is the most abundant mineral on the dumps. Ore specimens were exhibited at the Exposition Universelle of 1867 and 1878 in Paris.

This mine outlived all the copper mines discovered during the 1860s. It was worked almost continuously from 1865 to 1939 and produced an estimated 2 1/2 million tons of ore. In its first year of operation it yielded 12 per cent copper but the overall average was about 2 per cent. When it was closed, the shaft (inclined) had reached a depth of 7429 feet making it the deepest copper mine in Canada. The ore was treated for copper at the mine and at Capelton, and it was used at the plant in Capelton for the production of sulphuric acid and fertilizer. A smelter operated prior to 1890 but proved a community disaster because the fumes from the smelter damaged the vegetation and caused great distress to local farmers. According to an early report (Ref. No. 45) the Orford process used in refining nickel was applied to the ores from this mine and possibly derives its name from it: at one time, this mine was known as the Orford mine, probably when its operator was the Orford Nickel and Copper Company (1879-1886). During this period the ore was sent to the Orford Copper Works in New York state for refining. The Orford process has since become notable for treating nickel ore from Sudbury.

Road log from Highway 5 at mile 5.9:

Mile 0.0 Turn right (west) onto road to Capelton, Eustis.

0.75 Turn-off to Capelton and Albert mines; continue south on main road.

1.8 Trail on right (just beyond bridge over Eustis Brook) leading 400 yards to large dump. The shafts are about 500 yards farther up the hill.

Refs.: 13 pp. 35-36, 68, 75, 239-246; 37 pp. 125-127; 45 pp. 269-272; 50 p. 16; 60 p. 19; 127 p. 56.

Maps (T): 21 E/5 W Sherbrooke.
(G): 994A Magog-Weedon (1 inch to 2 miles).
911A Sherbrooke.

Stanstead Granite Quarry (Plate I)

GRANITE, PYRITE, GARNET, ZIRCON.

The granite is medium grained, white to grey and is composed of white feldspar, quartz, colourless to black mica and rare grains of garnet, pyrite and zircon. It is commonly referred to as "Stanstead Grey" and has been used for almost 100 years as a building and monument stone.

This quarry has been operated since about 1880 (Plate I); the present operators – Stanstead Granite Quarries Company Limited – have been working it since 1889. The sawed blocks of stone are taken to the company's dressing plant in Beebe. Stone from this quarry has been used in the construction of several buildings including the Sun Life Building in Montreal, the Chateau Laurier and Royal Mint in Ottawa, the Buffalo-Fort Erie bridge and the University of Saskatchewan (3 buildings) in Saskatoon. For the exterior of the Sun Life Building, 40,000 tons of granite were used; this comprised the 60,200 separate stones (weighing 5 to 17 tons each) and 114 freestanding columns weighing 6,000 tons and having a total length of 4,700 feet. At the quarry there is a viewing stand from which quarrying operations can be observed.

Road log from Highway 5 at mile 31.6:

Mile 0.0 Turn right (west) onto road to Rock Island, Beebe.

0.6 Rock Island; turn left onto road to Beebe.

3.1 Beebe; turn right onto road to Fitch Bay, Georgeville.

3.5 Beebe; turn left onto road to Graniteville.

6.0 Graniteville; turn left at church.

6.2 Observation platform and quarry on left.

Plate I. Quarrying operations at Stanstead Granite Company Quarries Limited, Graniteville.

Ref.: 27 pp. 19-28; 29 pp. 104-112.

Maps (T): 31 H/1 E Memphremagog.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 36.8 Sherbrooke, at intersection King (Highway 1) and Wellington (Highway 5/22) Streets.

Road log for side trip along Highway 5/22 north of Sherbrooke:

Mile 0.0 Proceed north along Highway 5/22 from its junction with Highway 1.

4.1 Junction road to Lac Brompton. For alternate route to Orford nickel mine proceed west along road to Lac Brompton for 7.8 miles to the crossroad on mile 4.6 of log to Orford mine.

24.6 Richmond, at junction Highway 32/39. From this point, commence trips to the St. Francis mine, to Acton Vale and to Asbestos.

St. Francis Mine

BORNITE, CHALCOCITE, CHALCOPYRITE, MALACHITE, CHRYSOCOLLA, NATIVE COPPER, HEMATITE, GOETHITE, CHLORITE, QUARTZ.

In calcite-quartz-feldspar veins cutting schist.

Bornite and chalcocite were the principal ore minerals at this old copper mine. They occurred in massive form with small amounts of chalcopyrite. Black flaky hematite (specularite) and dark brown, earthy goethite patches are associated with the copper minerals; the hematite flakes are also disseminated through the schist. Malachite is common as emerald green, transparent, fibrous, sheaf-like aggregates and as dull green coatings and encrustations on bornite, calcite and quartz. Chrysocolla occurs as small, bright blue, transparent masses with a conchoidal fracture, associated with quartz. Tiny transparent crystals (about 1/2 inch long) of quartz are found with malachite and specularite in cavities in quartz and in the host rock. Native copper has been reported from this mine. The calcite fluoresces bright pink, particularly under "short" rays. Fine-grained, brick-red, massive patches (1 inch to 2 inches across) in the dark schist consist of feldspar with a little quartz. Specimens from this deposit were exhibited at the International Exhibition of 1862 in London, the Exposition Universelle of 1867 in Paris and at the Colonial and Indian Exhibition of 1886 in London.

The deposit, opened in 1861, was worked by a shaft sunk into the east side of a wooded ridge. It was mined for about 8 years and some of the ore was shipped to Capelton for treatment. At present there is an adit (which was put in to drain water from the shaft) and a small partly overgrown dump from which copper ore minerals and colourful specimens of malachite in calcite and quartz can readily be obtained. The property belongs to Mr. H.B. Lanchard.

Road log from Richmond:

Mile 0.0 Intersection Highways 5/22 and 32/39; proceed northwest along Main Street (i.e. road to Trenholme).

Mile 1.1 Turn right onto Wilfrid Street.

1.4 Turn left onto Spooner Road.

2.5 Junction; turn right.

3.5 Junction; turn left onto road to Cub Camp.

4.6 H.B. Lanchard farm house on left. The mine is in the woods behind the pasture, about 500 yards south of the road.

Ref.: 13 pp. 138-143.

Maps (T): 31 H/9 E Richmond.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Acton Mine

BORNITE, CHALCOPYRITE, CHALCOCITE, PYRITE, AZURITE, MALACHITE, BROCHANTITE, POSNJAKITE, CALCITE.

In grey limestone.

Bornite, the most abundant sulphide, is closely associated with massive chalcopyrite, dull black chalcocite, and some pyrite. The bornite occurs as ink-blue metallic, and purplish-blue iridescent masses. Of the secondary copper minerals, malachite is the most common; it forms dull to bright green, earthy, botryoidal, and transparent fibrous coatings and encrustations on the ore minerals and on the limestone. With it are associated blue to blue-green, transparent, fine, flaky aggregates of posnjakite, blue vitreous patches of azurite and bright green granular brochantite. Yellow-brown earthy goethite coats the limestone. Cleavable masses of white and pink calcite occur in the limestone; it fluoresces pink when exposed to ultraviolet rays. Specimens from this mine were exhibited at the London International Exhibition of 1862 and at the Colonial and Indian Exhibition of 1886 in London. This deposit was discovered in 1858 when bornite-bearing blocks of limestone were noticed lying on the surface at the present mine site. In its first weeks of operation, the ore yielded 30 per cent copper, and the exciting news of this remarkably rich ore quickly became widespread, stimulating prospecting for copper throughout the Eastern Townships. A visitor to the mine at this time gave the following account of the open-pit operations (Ref. No. 70): "About 200 men, women, and boys are engaged in various departments of the works. The strong men are busy boring and blasting and carrying off the precious fragments from the mines. Others are breaking the masses of rock into small pieces, and then a multitude of boys and girls are washing, picking, and arranging the pieces according to the quantity of copper they contain. Other workmen fill the barrels with the broken washed and selected ore; and from the mines to the Railway station at the village, there is a constant traffic of Canadian carts laden with the metallic spoils".

The mine was worked by numerous open pits and 5 shafts until 1864 when it was closed after the ore had been exhausted. The average ore grade for the 6 years was about 12 per cent copper. Subsequent attempts to rework the

mine were unsuccessful. In 1910 the dumps were handpicked and the ore treated at a smelter erected on the site. The openings are now filled with water; there is a large dump and many smaller ones scattered in the woods and specimens containing colourful copper minerals are abundant.

Road log from Richmond:

Mile 0.0 From junction Highways 5/22 and 32/39, proceed west on Highway 32 to Melbourne and Acton Vale.

23.0 Limestone quarry on left. It is operated by Carrière d'Acton Vale Limitée for agricultural and construction purposes. The rock is similar to the limestone at the Acton Mine.

23.5 Acton Vale at railway crossing and intersection de la Mine Street.

23.65 Acton Vale, at intersection de la Mine Street and Boulevard Acton. Proceed straight ahead through this intersection onto gravel road to the left of a school building.

23.95 Trail on left (opposite stadium) leads to mine. The large pit and dump are about 50 yards in from here.

Refs.: 13 pp. 85-90; 70 pp. 349-362; 74 pp. 6-7; 126 pp. 11-12; 129 p. 41.

Maps (T): 31 H/10 E St-Hyacinthe.
(G): 862 Eastern Townships Copper Bearing Rocks (1 inch to 10 miles).

Jeffrey Mine (Plate II)

SERPENTINE (ASBESTOS), MAGNETITE, GARNET, VESUVIANITE, BRUCITE, PREHNITE, WOLLASTONITE, TALC.

In peridotite.

Asbestos has been mined from this deposit for over 80 years. Both cross-fibre and slip-fibre occur, but the former constitutes most of the ore. The fibres are pale green, transparent, and occupy veins (cross-fibre type) generally less than 1/4 inch wide but occasionally up to 3 inches wide. The slip-fibre variety is commonly associated with white to pale green fibrous and platy brucite; some of the brucite occurs as broom-like bundles of long stiff fibres (bundles up to 2 inches by 50 feet have been reported) and these are occasionally seen projecting from quarry walls. Other varieties of serpentine include green columnar picrolite and dark green massive serpentine. In places, picrolite has been replaced by magnetite resulting in a fibrous to columnar form of magnetite. Talc occupies slip planes and is disseminated in the host rock. Attractive, transparent pink crystalline garnet (individual crystals up to 1/2 inch across) occurs with transparent aggregates of vesuvianite, grass green prismatic aggregates of diopside, white to greenish white striated columnar or prismatic masses of prehnite and white fibrous wollastonite. These minerals occur at the contact of peridotite with granitic

Plate II. Open pit operations at Jeffrey mine, Canadian Johns-Manville Company Limited, Asbestos.

rock. Not too common in the granite, are cavities filled with delicate aggregates of sea-green transparent vesuvianite crystals. Specimens of asbestos were exhibited at the Paris International Exhibition of 1900.

This is the Free World's largest known asbestos deposit and is equipped with the Free World's largest mill; it accounts for 40 to 45 per cent of the total Canadian production of asbestos. Discovered in the 1870s, it was first mined in 1881 by Mr. W.H. Jeffrey of Richmond and has been in operation continuously since that time. The present operators, Canadian Johns-

Manville Company Limited, have worked the deposit since 1918. At present, the mine is operated by open-pit methods; underground mining was conducted from 1950 to 1962 below the open pit. Guided tours to view the milling and open-pit mining operations are conducted for visitors each Monday, Tuesday, Thursday and Friday at 1:30 P.M. Those wishing to participate should proceed to the mine gate located on Boulevard St - Luc.

Road log from Richmond:

Mile 0.0 From junction Highways 5/22 and 32/39, proceed north along No. 5.

11.3 Junction; turn right onto Highway 32.

15.2 Asbestos; at observation point (view of open pit) on Mansville Street.

16.0 Asbestos; at intersection of Mansville Street East and Boulevard St. Luc; turn right onto Boulevard St. Luc.

17.2 Turn right to Mine Gate.

Refs.: 8 pp. 27-36; 58 pp. 41-42; 130 pp. 167-168; 137 p. 62.

Maps (T): 21 E/13 W Warwick.
(G): 38A Danville Mining District.

Mile 36.8 Sherbrooke, intersection King and Wellington Streets; proceed east on Main Street (Highway 1).

37.9 Sherbrooke, at junction Highway 1 and 10th Street.

Sherbrooke Jasper Occurrence

JASPER, MAGNETITE.

Deep red and brownish red, fine-grained to granular jasper occurs in quartz-hematite-magnetite rock in old pits. Magnetite veinlets cut the jasper. The finer grained uniformly coloured jasper is suited for ornamental purposes; the polished surface is mottled red with grey due to the mixture of jasper with quartz and hematite.

The pits were opened many years ago and are now partly overgrown. Loose fragments are not abundant so that the rock would have to be chiselled out or blasted to yield good specimens.

Road log from Highway 1 at mile 37.9:

Mile 0.0 Turn left (north) onto 10th Street from King Street East (Highway 1).

0.6 Turn left onto De la Bruère Street.

Mile 0.65 Illuminated cross on left. Walk south behind cross through wooded area about 100 yards to pits and outcrops.

Ref.: 108 p. 217.

Maps (T): 21 E/5 W Sherbrooke.
(G): 911A Sherbrooke.

Mile 43.1 Junction gravel road on right opposite picnic site.

Aldermac Moulton Hill Mine.

PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, TENNANTITE, CHALCOCITE, BROCHANTITE, DEVILLINE, BARITE, MAGNESITE, GOETHITE.

In sericite schist.

Pyrite, as 1/4-inch crystals and granular masses, is the most abundant metallic mineral; it is closely associated with the other metallic minerals producing a fine-grained mixture. Quartz, barite, goethite and magnesite are the gangue minerals. Patches of bright green, flaky, brochantite occur in quartz and on the sulphides, and pale greenish blue, fine, flaky devilline is found sparingly on the schist. Specimens of brochantite and devilline are not plentiful. This is one of the most recently discovered copper deposits in the Eastern Townships. It was discovered in 1942 by Aldermac Copper Corporation and was one of the first deposits in Canada discovered by geophysical prospecting methods. If it had not been for these modern methods, the deposit may have been overlooked because it lay beneath a hay-field where there were no outcrops. The mine was worked by underground methods from 1944 to 1946 and from 1950 to 1954 (by Ascot Metals Corporation) producing copper, lead, zinc, gold and silver. This ore and ore from the Suffield mine were treated at the Moulton Hill mill. The mine buildings have been dismantled; some of the dump material remains on the property.

Road log from Highway 1 at mile 43.1:

Mile 0.0 Turn right (south) onto gravel road opposite picnic site.

2.7 Turn right (west) onto single lane road leading to and beyond gravel pit at road side.

3.0 Mine on left.

Refs.: 61 pp. 367-401; 104 pp. 4-9; 114 p. 20; 132 pp. 15-17, 20, 23.

Maps (T): 21 E/5 W Sherbrooke.
(G): 911 Sherbrooke.

Mile 50.2 East Angus, at junction road to Scotstown, Lac-Mégantic. For side trips from Scotstown, proceed 20.8 miles to Scotstown. The junction of the road to La Patrie, Chartierville will be the starting point for collecting localities.

Scotstown Granite Quarry

GRANITE.

The granite is coarse grained, grey and has been used in the building of the National Research Council on Sussex Drive, Ottawa, the Sherbrooke Trust Building in Sherbrooke, and the Crescent Building in Montreal. The quarry was first operated 70 or 80 years ago. Mr. Lacroix of Scotstown is the present operator.

Road log from Scotstown:

Mile 0.0 Junction road to La Patrie, Chartierville; continue straight ahead (east) along road to Lac-Mégantic.

0.2 Turn left onto road to Lingwick.

2.1 Gate on right; turn right onto road leading to quarry.

2.8 Quarry.

Refs.: 27 pp. 81-86; 29 pp. 114-116.

Maps (T): 21 E/11 W Scotstown.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mount Megantic Quarry

NORDMARKITE, GRANITE.

Nordmarkite (augite syenite) is a dark bluish to oil green, medium grained rock composed mainly of feldspar with augite, hornblende, olivine, and biotite. It takes an excellent polish and exhibits a bluish schiller due to the feldspar. "Scotstown Green Granite" is the commercial name for the stone. It has been used mostly as a monument stone but is also suitable for the interior of buildings. A polished slab of nordmarkite set in Scotstown grey granite makes up the War Memorial at Scotstown. Grey granite similar to that of the Scotstown granite quarry is found along the quarry walls.

This quarry has been operated at intervals since 1929; the most recent work was done by the Scotstown Granite Company. It was not in operation in the summer of 1965.

Road log from Scotstown:

Mile 0.0 Junction road to La Patrie, Chartierville; continue east along road to Lac-Mégantic.

Mile 0.2 Turn right onto Lac-Mégantic road.

2.6 Junction; turn right.

6.3 Junction single lane dry-weather road on right; turn right. This road is not suitable for automobiles with low clearance.

7.1 Quarry.

Refs.: 27 pp. 87-89; 29 pp. 116-118.

Maps (T): 21 E/6 E La Patrie.
(G): 1029 Lake Megantic (1 inch to 2 miles). Out of print.

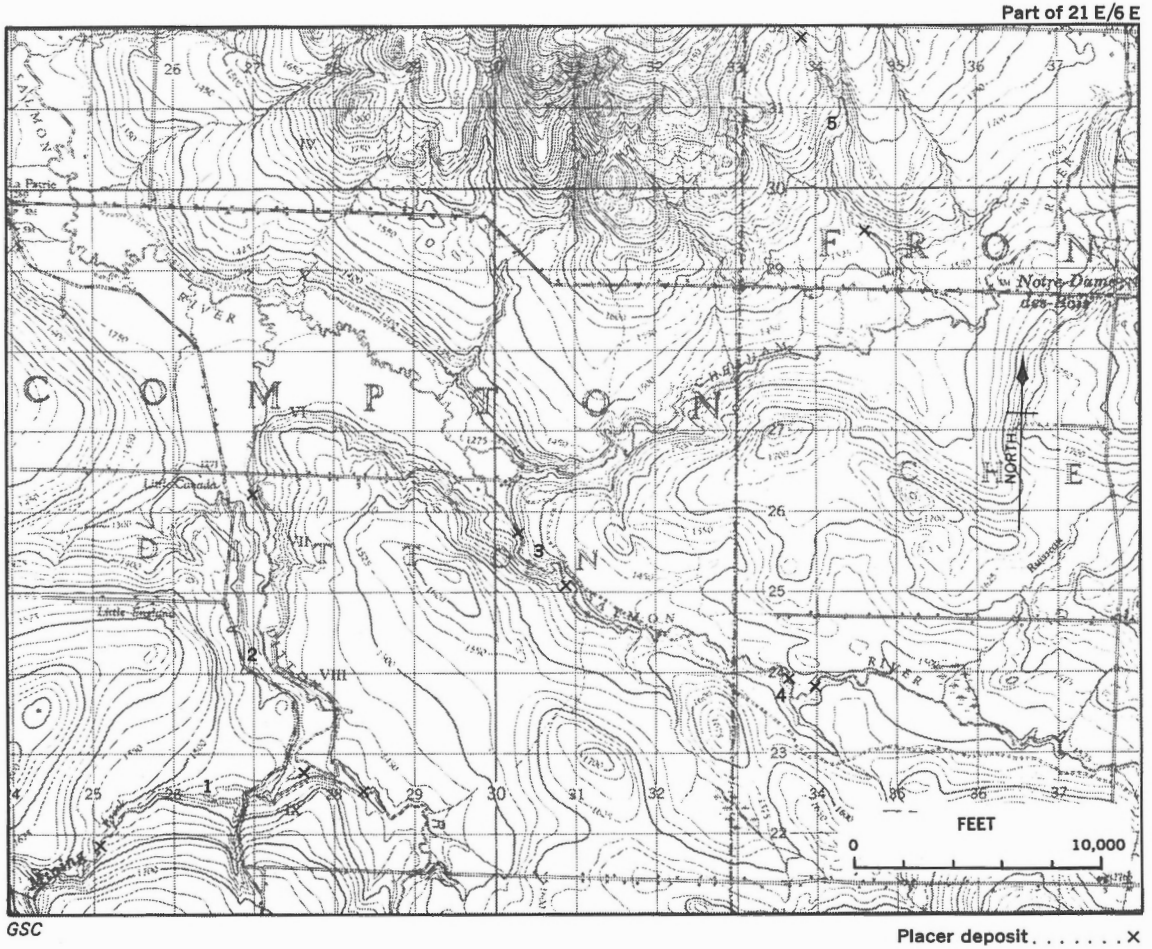
Ditton Area Placer Deposits

GOLD, PYRITE.

In stream gravels, sand and clay.

Placer gold has been found in the following streams: Mining Brook (Little Ditton River), for about 2 miles upstream from its junction with the Ditton River; the Ditton River, from a point 1/2 mile south of the Little Canada road bridge to the junction with Mining Brook; the Salmon River, at a locality 1/2 mile east of the Chesham-Ditton boundary, and from a point 1/2 mile south of the Little Canada road bridge upstream for 3/4 mile; and on a branch of the Chesham River that crosses the La Patrie-Notre-Dame-des-Bois road at a point 1.7 miles west of the crossroad at Notre-Dame-des-Bois. Other localities in the region's streams have yielded less significant amounts of gold. Bright yellow flakes and small rounded and angular nuggets of as much as 7 ounces in weight of gold were found with ragged gold in quartz. The value of the nuggets is reported to have ranged from $50 to $150. The highest concentrations were found on bedrock or a few inches above; where the bedrock consisted of schistose or slaty sediments, the gold that was washed down the streams became trapped on the rough, jagged surfaces. The gold was located not only in the stream beds, but also in the sands and gravels above present stream levels. It is believed that the gold was derived from quartz veins cutting the sediments.

The Ditton placers were discovered in 1863 by Archie Annis, a Dartmouth College student. The mining rights over an area of about 5,000 acres were obtained in 1868 by the Hon. J.H. Pope who for 15 to 20 years, concentrated operations on Mining Brook, near the point where it is bridged by the La Patrie-Chartierville road. An estimated $500, 000 worth of gold was recovered later (1891-1893); the Ditton Gold Mining Company sank shafts and installed machinery on Mining Brook just above the bridge, but this operation proved to be unsuccessful. In 1933, the Gold River Mining Company Limited did some trenching and sluicing on Mining Brook and the Ditton River, and between 1936 and 1940 Embergold Mines Limited conducted underground operations from a 26-foot shaft on Mining Brook. The two localities mentioned on the Salmon River were explored by pits and tunnels, and the branch of the Chesham River was worked by a shaft and sluice; the latter locality



GSC

Map 5. Ditton area placer gold deposits: 1. Mining Brook; 2. Ditton River; 3, 4. Salmon River; 5. Branch of Chesham River.

yielded several thousand dollars worth of gold. Pyrite crystals 1/4 to 3/4 inch across occur in black slate exposed in road-cuts in the area.

Road log from Scotstown:

Mile	0.0	At junction Lac-Mégantic and Chartierville roads, proceed south on La Patrie-Chartierville road.
	7.1	Road-cut on right.
	7.6	Road-cuts on both sides of road. These two localities expose the slate containing pyrite crystals.
	9.1	La Patrie, at crossroad. The road on left (to Chesham, Woburn) leads east 7.1 miles to the bridge over the branch of Chesham River where gold was found. The gold-bearing gravels extend north from the bridge to the edge of Mégantic Mountain. To reach other placers, continue straight ahead on La Patrie-Chartierville road.
	12.1	Intersection Little Canada road. Turn left (east) to bridges over Ditton River (0.05 mile) and Salmon River (2.05 miles).
	($\frac{14.3}{14.4}$)	Road-cuts on right exposing slate containing pyrite crystals.
	14.9	Bridge over Mining Brook. The scene of most of the mining activity was on the west side of the bridge where remnants of the sluices are still visible. Mining Brook joins the Ditton River 1,000 yards east of the bridge.
	17.8	Chartierville, at crossroad.

Refs.: 72 p. 14; 85 pp. 90-100; 86 pp. 20-23.

Maps (T): 21 E/6 E and W La Patrie.
(G): 1029 Lake Megantic (1 inch to 2 miles). Out of print.

Arnold River Placer Deposit

GOLD.

In gravel, sand.

Placer gold was found at the beginning of this century in the Arnold River, mainly in the area where it is joined by Morin Brook. The occurrence is about 2 miles south of Woburn village (St-Augustin-de-Woburn).

Ref.: 83 p. 5.

Maps: (T): 21 E/7 W Woburn.
(G): 1029 Lake Megantic (1 inch to 2 miles). Out of print.

Lac Mégantic Copper Mine

PYRITE, CHALCOPYRITE, GALENA, SPHALERITE.

At contact between volcanics and quartzite.

Fine-grained massive pyrite occurs with small amounts of galena and sphalerite. In the 1930s a 30-foot shaft was sunk and the surface was explored by trenching. It was prospected in 1953 by the Marston Copper Corporation. There are at present some small dumps at the mine site but the area is overgrown and difficult to reach from the end of the road.

Road log from Woburn village:

Mile	0.0	Woburn, at junction Highway 34 and road to Woburn, Notre-Dame-des-Bois. Proceed north on Highway 34.
	2.2	Junction road to Piopolis; proceed straight ahead (north) onto gravel road.
	8.8	Junction; turn left (south).
	10.5	End of road at Martel farm. Walk straight ahead along trail about 400 yards to a clearing. The mine is at the edge of the wooded area.

Ref.: 83 p. 5.

Maps (T): 21 E/7 W Woburn.
(G): 1029 Lake Megantic (1 inch to 2 miles). Out of print.

Road-cuts

PYRITE.

In slate and quartzite.

The pyrite occurs as cubes generally 1/4 inch across and less commonly 1/2 to 3/4 inch in diameter. The pyrite-bearing rocks were noted on the Woburn-Piopolis-Marsboro road at the rock exposures indicated in the following log:

Mile	0.0	Woburn, at junction Highway 34 and road to La Patrie; proceed toward Piopolis.
	8.8	Junction road to copper mine.
	9.3	Junction road to Valracine, Notre-Dame-des-Bois.
	11.6	Rock exposures on left.
	12.5	Rock exposures on left.

Mile 12.7 Rock exposures on left.

13.6 Bridge over Victoria River.

16.5 Rock exposures on left.

18.7 Junction Highway 34.

Maps (T): 21 E/10 W Mégantic.
(G): 379A Megantic.

Victoria River Placer Deposit

GOLD.

In alluvium.

Gold was first found about 60 years ago in the bars of Victoria River when it was being prospected from its mouth at Victoria Bay, Lac Mégantic, to its headwaters on Mount Mégantic. The prospecting excitement was caused by the discovery in 1905 of visible gold in a quartz vein cutting a granite dyke on Mr. Alex McLeod's farm, about 2 miles west of Marsboro (lot 19, range IV, Marston township). The rock was exposed during farming operations and was first noticed by the farmer's little boy, Malcolm. A 50-foot shaft and stamp mill were used to explore the deposit but there is no record of production. The occurrence of gold in the Victoria River was verified about 30 years ago when gold particles were found in the vicinity of Valracine and downstream by geologists from the Quebec Bureau of Mines.

The Victoria River is easily accessible at 3 bridges: (a) on the Woburn-Marsboro road, 13.6 miles from Woburn (see log above); (b) on the Piopolis-Valracine road, 6.7 miles west of its junction with the Woburn-Marsboro road (0.3 mile west of the crossroad at Valracine); (c) on the Valracine-Notre-Dame-des-Bois road, 0.7 mile south of the crossroad at Valracine.

Refs.: 43 p. 12; 47; 86 pp. 36-38; 95 p. 9.

Maps (T): 21 E/10 W Mégantic.
21 E/6 E La Patrie.
21 E/11 E Scotstown.
(G): 1029 Lake Mégantic and Vicinity (1 inch to 2 miles).
Out of print.
370A Megantic.
994A Magog-Weedon (1 inch to 2 miles).

Mile 50.2 East Angus, at junction road to Lac-Mégantic, Scotstown. Continue north along Highway 1.

52.1 Junction Gosford road on left.

52.3 Bridge over Willard Brook.

Mile 54.6 Bridge over Kingsley Brook.

55.8 Bridge over Andrew Brook.

56.3 Bridge over Rowe Brook.

58.0 Junction (on left) road to Lime Ridge, St-Adolphe-de-Dudswell.

Placer Deposits, East Angus Area

GOLD.

In stream gravels.

The placer deposits in streams flowing eastward from the Stoke Hills have been known since 1851 and were worked most intensively in the 1890s. Some of the streams that have been worked more recently are: Big Hollow Brook (1940), Willard Brook (early 1930s) and Andrew Brook (1933 and 1934). The gold is believed to have been derived from the quartz veins cutting local granitic and sedimentary rocks. Details regarding gold-bearing streams crossed by or near Highway 1 are given below:

Big Hollow Brook. The workings consisted of trenches, shafts (25 to 50 feet deep) and sluices mainly on the east side of the brook beginning 2,300 feet north of the Gosford road and extending for a distance of 5,450 feet. Gold was found near bedrock and in the stream beds, the most recent work (1940) was done by hand shovelling and sluicing. Early mining was done intermittently from 1882 to 1903 and the estimated value of gold recovered was about $275. Big Hollow Brook is bridged by the Gosford road at a point 0.85 mile west of Highway 1.

Willard (Maynard or Harrison) Brook. About $200 worth of gold was obtained by trenching (to a depth of as much as 7 feet) at a spot 3,500 feet north of Highway 1 bridge. Most of the gold was in gravels that occupy crevices and hollows in the granitic bedrock. The stream was also worked by pits on its east side, 850 feet north of the highway.

Kingsley Brook. This was the most productive stream, yielding about $4,000 (minimum estimate) worth of gold including individual nuggets valued up to $45. Operations extended upstream 1,000 feet beginning at a point 1,500 feet north of the Highway 1 bridge; the lower 500-foot stretch was the most productive. Gold was recovered from the gravels in crevices (up to 2 or 3 feet deep) in schistose to slaty rocks and from the gravels immediately above bedrock. The pits and trenches were put in on the east side of the stream; a dam, an 80-horsepower boiler and a hydraulic pump had been set up near the source of the brook, but the venture was not as successful as anticipated.

Andrews Brook. Gold was mined a few hundred feet north of Highway 1 bridge but reports indicate that the returns were not high. It was also found just north of the highway in gravel bars in the stream beneath up to 4 feet of gravel.

Rowe Brook. The work was done from just east of the highway for about 2,000 feet upstream but was concentrated in the stream bed and its banks in an area 800 to 1,600 feet west of the highway. About $100 worth of gold was recovered including a 10-dollar nugget.

Hall Brook. Gold was recovered from shallow diggings close to or in the brook; the deeper pits (up to 50 feet) are reported to have been the least productive. After obtaining an estimated $500 to $600 worth of gold including one 90-dollar nugget, and others valued at $10, the work was abandoned due to water seepage in the pits. At one time before 1890, a 10-stamp mill was installed to treat the fine material along the stream bed. The workings extended for about 1,900 feet upstream from a point about 1/2 mile west of the Lime Ridge road.

Road log to Hall Brook placer from Highway 1 at mile 58.0:

Mile	0.0	Turn left onto the road to Lime Ridge, St-Adolphe-de-Dudswell.
	1.1	Bridge over Hall Brook.
	1.2	Junction road on left; turn left. This road leads west paralleling Hall Brook.
	1.7	The old workings on Hall Brook (on north side of road) began opposite this point and extended westward.

Refs.: 72 p. 14; 86 pp. 38-54.

Maps (T): 21 E/5 E Sherbrooke.
21 E/12 E Dudswell.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Lime Ridge Quarries

FOSSILS, CALCITE, PYRITE, CHLORITE.

In limestone.

The Lime Ridge limestone deposits have been operated since 1890. The rock is a fine-grained, compact, metamorphosed, light to dark grey, white or cream coloured, high-calcium limestone used for the production of lime, crushed limestone and agricultural limestone. In places, it contains coarsely crystalline white or pink calcite, fine-grained massive pyrite and crystals of pyrite averaging 1/4 inch across, pale green chlorite patches, and crinoid stems (about 1/4 inch in diameter). The deposit is worked by Dominion Lime Limited.

The quarries, kilns and crushing plant are located along the Lime Ridge road at a point 3.3 miles from Highway 1.

Ref.: 37 p. 136.

Maps (T): 21 E/12 E Dudswell.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 61.4 Junction road to Marbleton. This may be used as an alternate route to the Lime Ridge Quarries. Via St-Adolphe-de-Dudswell, the locality is 2.3 miles from Highway 1.

69.9 Weedon, at junction road to Fontainebleau, Gould.

Weedon (McDonald) Mine

PYRITE, CHALCOPYRITE, PYRRHOTITE, SPHALERITE, GALENA, HEMATITE, ANTHOPHYLLITE, GYPSUM, JAROSITE, ROZENITE.

In sericite and chlorite schist.

The most common mineral is pyrite; it occurs as cubes averaging 1/4 inch along the edge and as fine granular and crystalline masses. Specimens of solid pyrite are abundant. The freshly broken specimens show pale yellow, metallic pyrite in the white rock with minor chalcopyrite, pyrrhotite and galena. Hematite occurs as a reddish brown coating on the schist. Encrustations of yellowish white granular gypsum, yellow powdery to earthy jarosite and snow-white granular to globular aggregates of rozenite occur on the massive ore. Anthophyllite is found as brownish fibrous aggregates in the host rock.

The discovery of this deposit was made in 1909 by Mr. John McDonald of Sherbrooke. The area in the vicinity of the orebody had attracted prospecting for several years because of the rusty appearance of the schist in the outcrops. The deposit was worked from 1910 to 1921 and from 1951 to 1959. During the second period of operations, an additional shaft was sunk and a mill built by the Weedon Mining Corporation (formerly Weedon Pyrite and Copper Corporation). The ore produced copper, sulphur and some gold and silver. The mine buildings have been dismantled and the shaft has been fenced off. Specimens can be obtained from several small dumps across the road from the shaft.

Road log from Highway 1:

Mile 0.0 Weedon; proceed east along road to Fontainebleau, Gould.

3.9 Junction, just beyond railway crossing; turn left.

8.7 Fontainebleau, at post office; continue straight ahead past the church.

10.0 Mine.

Refs.: 13 pp. 271-279; 51 p. 18; 134 pp. 102-103.

Maps (T): 21 E/11 W Scotstown.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Mile 75.3 St-Gérard, junction Highway 34.

Road log for side trip along Highway 34 (east).

Mile 0.0 Junction Highways 1 and 34; proceed east along No. 34.

2.0 Junction (on right) gravel road to granite quarries.

6.7 Junction road to Disraeli.

(6.8 / 7.3) Road-cuts on north side of highway.

7.7 Crossroad; road on left (north) leads to Solbec mine, and road on right leads to Cupra mine.

17.0 Stornoway, at junction Highway 28; turn left onto No. 28 (north).

(24.7 / 24.8) Road-cuts (similar to those described for mile 6.8-7.3).

27.7 Lambton; turn right onto road to St-Samuel, St-Sébastien.

31.8 Road-cuts (similar to those described for mile 6.8-7.3).

36.6 Junction; turn left (east).

38.5 Abandoned granite quarry on left. (See description of stone under Silver Granite quarry)

39.8 Crossroad, at Abbé Charles Halle memorial. Road on left (north) leads to Copperstream-Frontenac mine; road on right leads to granite quarry and Grégoire molybdenum property.

White Diamond Granite Quarry

GRANITE.

The granite is medium grained, light grey, similar to the Stanstead granite; it is composed of quartz, white feldspar, muscovite and biotite. The stone from this area has been used as a building stone and for monuments since 1928. Examples of its use are: the Assumption Church at Granby, the St. Charles Garnier Church at Sillery, and the War Memorial at Shawinigan. The White Diamond Granite Company Limited operates the quarry and dressing plant. The property is 2.5 miles by road, east of Highway 34 at mile 2.0.

Ref.: 29 pp. 118-123.

Maps (T): 21 E/11 W Scotstown.
(G): 994A Magog-Weedon (1 inch to 2 miles).

Road-cuts, East Side Lake Aylmer

PYRITE.

In grey quartzite.

Pyrite occurs as cubes measuring up to 3/4 inch across. The road-cuts are on the east side of the Disraeli-Stratford road at points 4.6 to 5.6 miles north of its junction with Highway 34 (mile 6.7).

Maps (T): 21 E/14 W Disraeli.
(G): 418A Disraeli (west half).

Road-cuts, Highway 34.

CALCITE.

In veins cutting chloritic schist.

The calcite occurs as pinkish white to white fine grained and cleavable masses, in veins up to 2 inches wide; it fluoresces very bright pink when exposed to ultraviolet rays (brightest under the 'short' rays).

The road-cuts are on the north side of Highway 34 at points 6.8 and 7.3 miles east of its junction with Highway 1.

Maps (T): 21 E/14 W Disraeli
(G): 418A Disraeli (west half).

Solbec Mine

PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, TETRAHEDRITE-TENNANTITE, MAGNETITE, SIDEROTIL.

In schist and in quartz.

The ore consists of a fine grained, massive mixture of sulphides, tetrahedrite-tennantite and magnetite. Pyrite, in massive form and as crystals up to 1/2 inch across is the most abundant mineral. Copper, zinc, silver, lead, gold and cadmium are produced from the ore. Associated with the ore, is a greyish white opaque, soft encrustation; this is the rare iron-sulphate siderotil. The deposit is a recent one having been discovered in 1958. Solbec Copper Mines Limited, the present operators, commenced sinking a shaft in 1960 and installed a mill in 1962. There is a large dump just beyond the gate to the property. The mine is 1.0 mile by road north of Highway 34 at mile 7.7.

Refs.: 52 p. 10; 137 pp. 291-292.

Maps (T): 21 E/14 W Disraeli
(G): 418A Disraeli (west half).

Cupra Mine

PYRITE, CHALCOPYRITE, BORNITE, SPHALERITE, GALENA, JASPER, CHLORITE, CALCITE.

In schist.

Pyrite, the most abundant sulphide, occurs as fine-grained masses closely associated with sphalerite, chalcopyrite, bornite and galena, and as 1/2-inch cubes. Very colourful specimens of iridescent, inky-blue tarnished bornite with bright brassy chalcopyrite and pale brass-yellow pyrite can be found on the dumps near the shaft. Associated with the ore are dark green, flaky chlorite, quartz and pinkish white calcite (fluoresces pink, especially bright under 'short' rays). A very attractive jasper breccia occurs here; it is composed of orange-red irregular jasper fragments in a maroon-red jasper matrix traversed by tiny calcite veinlets. It takes a very good polish and can be used for ornamental purposes. This copper-lead-zinc-silver deposit was found at about the same time as the Solbec. It is operated by a shaft, and the ore is treated at the Solbec mill. The mine is operated by Cupra Mines Limited; production commenced in September 1965. The property is 1.6 miles by road south of Highway 34 at mile 7.7.

Refs.: 52 pp. 10-11; 137 pp. 100-101.

Maps (T): 21 E/14 W Disraeli
(G): 418A Disraeli (west half)

Copperstream-Frontenac Mine (Plate III)

MOLYBDENITE, PYRRHOTITE, PYRITE, CHALCOPYRITE, QUARTZ CRYSTALS.

In quartz veins cutting granite dyke and sedimentary rocks.

Molybdenite occurs generally as fine, flaky masses in quartz associated with chalcopyrite, pyrite and pyrrhotite. Pockets of coarse, flaky molybdenite, and vugs lined with quartz crystals (up to 3/4-inch in diameter) or less commonly with white feldspar crystals, have been found in the quartz.

The deposit was first opened by pits and trenches shortly after World War I in search of gold, small amounts of which are reported to have been found. At about 1940, interest in the property was renewed when a woodcutter found specimens of molybdenite-bearing rock in the old dumps. Several pits and trenches were dug and an adit driven into the side of Mount St-Sébastien; a a carload of ore was shipped to the Quyon Molybdenite Company's mill at Quyon. Further underground development was done between 1956 and 1964. There are some buildings, an explosives shed, and a large dump near the adit.

Road log from crossroad at mile 39.8:

Mile 0.0 Proceed north.

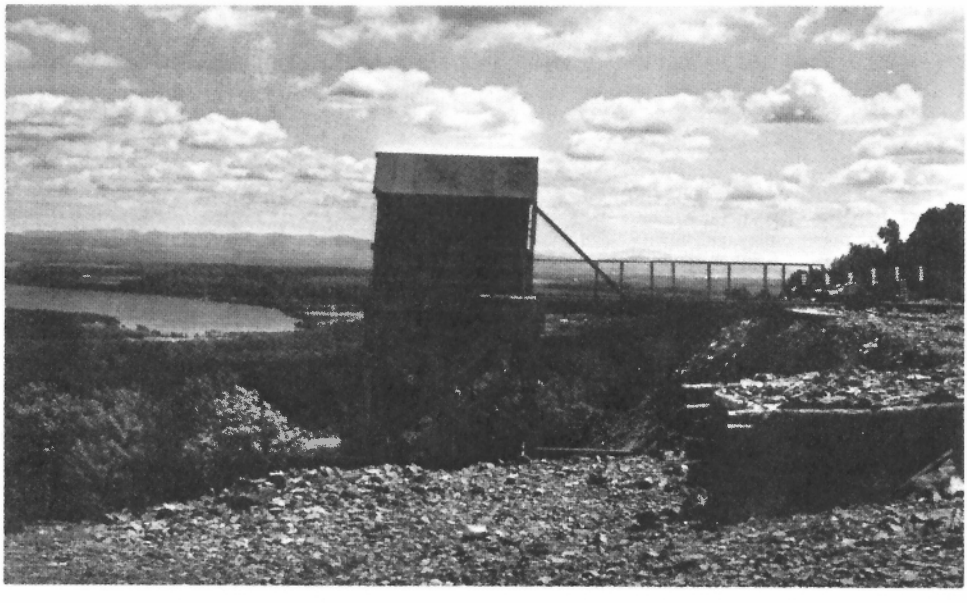


Plate III. View from dump of Copperstream-Frontenac mine.

Mile 1.3 Gate on left and road leading to mine at sign "Frontenac Mining Corporation".

3.1 Mine.

Refs.: 9; 136 pp. 82-83; 137 p. 96.

Map (T): 21 E/15 W St-Evariste.

Silver Granite Quarry

GRANITE, TITANITE.

The granite is medium to coarse grained and is grey with a pinkish tinge. It is composed of white to pinkish white feldspar, quartz, biotite, muscovite and black amphibole. Titanite occurs as transparent reddish-brown grains. This rock is typical of the granite found in the St. Sebastien-St. Samuel area. Numerous quarries have been operated in this area to produce stone for building and for monuments. One of the first quarries to be opened in 1911 is the abandoned quarry at mile 38.5. The Silver Granite Company's quarry has been in operation since 1924 when it was opened to furnish stone for the Basilica Ste. Anne de Beaupré. Other buildings constructed, in whole or in part, of granite from this district include the Parliament Building Annex, the Provincial Museum, and Laval University all in Quebec City; St. Joseph Oratory in Montreal; Notre Dame Church at Sherbrooke; and churches at

Disraeli, Ste-Agathe and Mont-Joli. The Abbé Charles Halle memorial at mile 39.8 is an example of the use of this granite as a monument stone.

Road log from crossroad at mile 39.8:

Mile	0.0	Proceed south along road to Ste-Cécile Station.
	1.7	Junction; turn right.
	2.4	Silver Granite Company's quarry and plant on right.

Refs.: 27 pp. 89-99; 29 pp. 123-127.

Maps (T): 21 E/10 W Megantic.
21 E/15 W St-Evariste.
(G): 379A Megantic (west half).

Grégoire Molybdenite Deposit

MOLYBDENITE, PYRITE, MARCASITE, GALENA, SPHALERITE, CHALCOPYRITE, FELDSPAR, QUARTZ CRYSTALS, TREMOLITE, JAROSITE, ROZENITE.

In quartz veins cutting hornfels.

Molybdenite occurs as very fine, flaky masses associated with massive galena, sphalerite, chalcopyrite, pyrite and dull black marcasite in quartz and feldspar. The quartz has cavities lined with drusy quartz crystals and contains white fibrous to flaky aggregates of tremolite. Rozenite occurs as snow-white encrustations on marcasite and pale yellow jarosite forms powdery coatings on quartz and on the ore minerals.

The deposit has been exposed by pits and trenches at the side of a hill. There are a few small dumps near the openings. The deposit is on the farm of Joseph Grégoire.

Road log from crossroad at mile 39.8:

Mile	0.0	Proceed south toward Ste-Cécile Station.
	1.7	Junction; turn left.
	6.0	Ste-Cécile Station, at junction where main road turns left. Continue straight ahead on road to Grégoire farm.
	6.4	Joseph Grégoire farm on right.

Maps (T): 21 E/10 W Megantic.
(G): 379A Megantic.

Mile 80.0 Junction Highway 34 (to South Ham, Victoriaville).

Lac Nicolet (South Ham) Antimony Mine

STIBNITE, NATIVE ANTIMONY, GUDMUNDITE, BERTHIERITE, VALENTINITE, KERMESITE, SENARMONTITE, STIBICONITE, JAROSITE, QUARTZ CRYSTALS.

With quartz and dolomite in arkosic sediments.

The metallic antimony minerals occur as follows: stibnite, as grey (may have bluish tarnish), metallic, acicular aggregates or fine grained massive; native antimony, as light grey, lamellar, radiating or massive aggregates; berthierite, as dark grey, metallic, columnar masses, as acicular, clusters or fine grained massive; gudmundite, as light grey, metallic (with iridescent bronze or dark brown tarnish), tiny, striated, flattened prisms, as fine platy masses, and as fine grained patches. These minerals are generally found in massive quartz but also occur with tiny quartz crystals (less than 1/4-inch across) in cavities, and in the host rock. Associated with them are the following secondary antimony minerals: kermesite, as deep red, metallic, tufted, radiating aggregates (up to 1/2-inch across), or nests of tiny, needle-like crystals; senarmontite, as colourless, transparent crystals (octahedral) and crystalline aggregates; valentinite, as colourless to greyish, transparent, striated, tiny, tabular prisms, or as tiny, white, rounded masses with fibrous structure, or as snow-white, powdery patches; stibiconite, as pale to canary yellow, vitreous, granular masses, or as earthy, radiating, fibrous aggregates. These minerals generally occur together with antimony and stibnite, but good specimens are no longer readily available from the dumps. The metallic minerals are easy to find, but may be difficult to distinguish from each other in hand specimen. Jarosite occurs as tiny, pale yellow, acicular aggregates in quartz cavities and as a yellowish orange powder on the metallic minerals. Stibnite specimens have been exhibited at international exhibitions in Paris (1867) Philadelphia (1876) and London (1886).

This deposit was discovered about one hundred years ago and was of considerable interest at the time because there were then only two other known antimony deposits in Canada; one at Lake George, New Brunswick and the other in Nova Scotia. In the 1880s attempts were made to mine the deposit by shafts and an adit, and a concentrator was installed. About 180 tons of ore (averaging 5 per cent Sb) were mined. The workings were re-examined in 1940 by Reed Realties Limited. At present the workings are quite overgrown, but specimens are readily found at two dumps near an old shaft at the side of a wooded ridge.

Road log from Highway 1 at mile 80.0:

Mile	0.0	Proceed west along Highway 34.
	3.6 to 3.8	Road-cuts on right; epidote, pyrite, calcite, and quartz veins cut chlorite schist.
	7.8	Junction; continue straight ahead.

Mile 7.9 Junction; continue straight ahead.

8.4 Junction; single lane road on left; turn left.

8.5 End of road at garbage dump. Walk straight ahead (i.e. continue in direction of road) down the hill, through a clearing to a path beginning at the evergreen trees. Proceed along this path to a wooden gate (about 150 yards from garbage dump); pass through gate and continue along path for another 300 yards to the dumps at the side of the ridge on left.

Refs.: 26 pp. 126-127; 48 pp. 95-96; 54 pp. 80-81; 119 pp. 3-5; 127 p. 58; 128 p. 43; 129 p. 66; 131 p. 11.

Maps (T): 21 E/13 E Warwick.
(G): 419A Warwick (east half).

Mile 86.3 Disraeli at junction road to St-Fortunat, St-Jacques.

Belmina Mine

SERPENTINE, MAGNETITE, PYROAURITE, ARAGONITE, SJOGRENITE, HYDROMAGNESITE.

In peridotite.

Varieties of serpentine include: pale green chrysotile (asbestos) fibres up to 3/4-inch long, pea-green picrolite and dark green, fine grained massive serpentine; in the massive variety, tiny black crystals and small granular patches of magnetite occur. Pyroaurite, as tiny, bottle green, shiny, transparent flakes, and sjogrenite as colourless to pale green, transparent, glistening aggregates of very fine flakes are found sparingly on fracture planes in massive serpentine. Tiny, white, botryoidal patches of hydromagnesite occur on sjogrenite, and small aggregates of colourless, transparent, platy aragonite were found associated with pyroaurite. Sjogrenite is a very rare mineral that has not previously been reported from a Canadian locality.

The mine was opened in about 1890 and was worked by open pits for crude fibre asbestos (i.e. fibre up to 1-inch long). It is inactive at the present time. A large dump and remnants of some of the buildings can now be seen on the property, which belongs to Asbestos Corporation Limited. Permission to enter the property must be obtained from the Company's Office in Thetford Mines prior to the visit.

Road log from Highway 1 at Disraeli:

Mile 0.0 Proceed west along gravel road to St-Fortunat, St-Jacques.

8.3 St-Jacques (Stenson), at post office; turn right (north).

9.3 Junction; turn right.

Mile 10.2 Gate on left; proceed through gate onto single lane mine road.

10.8 Mine.

Refs.: 30 pp. 184-186; 103 pp. 84-85.

Maps (T): 21 E/14 W Disraeli.
(G): 418A Disraeli (west half).

Mile 90.7 Coleraine, at junction road to Vimy Ridge.

Continental Mine

SERPENTINE, CHROMITE, CHLORITE, DOLOMITE, GOETHITE, ANTHOPHYLLITE.

In peridotite.

Translucent, very fine grained, porcelain-like serpentine is of interest here. It occurs in pastel shades of blue (robin's egg blue, greyish blue), green (bluish and yellowish tones), yellow (most common of the pastel shades) and pink (very rare). Fragments measuring 3 inches by 1/2 inch can be found. This type of serpentine is referred to as precious serpentine because it can be cut into cabochons and used for ornamental purposes. Most of the serpentine at this mine is deep green and massive. Associated minerals include: chlorite, as white botryoidal crusts; dolomite, as colourless to white fine grained or platy masses; fine-grained brown goethite, tiny fine grained patches of chromite; and patches of colourless to greyish white flaky or fibrous anthophyllite.

The mine was worked for asbestos in the 1920s and in 1951-52; the later operation was by Continental Asbestos Company Limited. At present the pit is filled with water, but specimens may be obtained from the walls of the quarry and from broken blocks of serpentine at the edge of the pit.

Road log from Highway 1 at Coleraine:

Mile 0.0 Proceed west along road to Vimy Ridge. The Vimy Ridge mine (Asbestos Corporation Limited) is 5 1/2 miles from here.

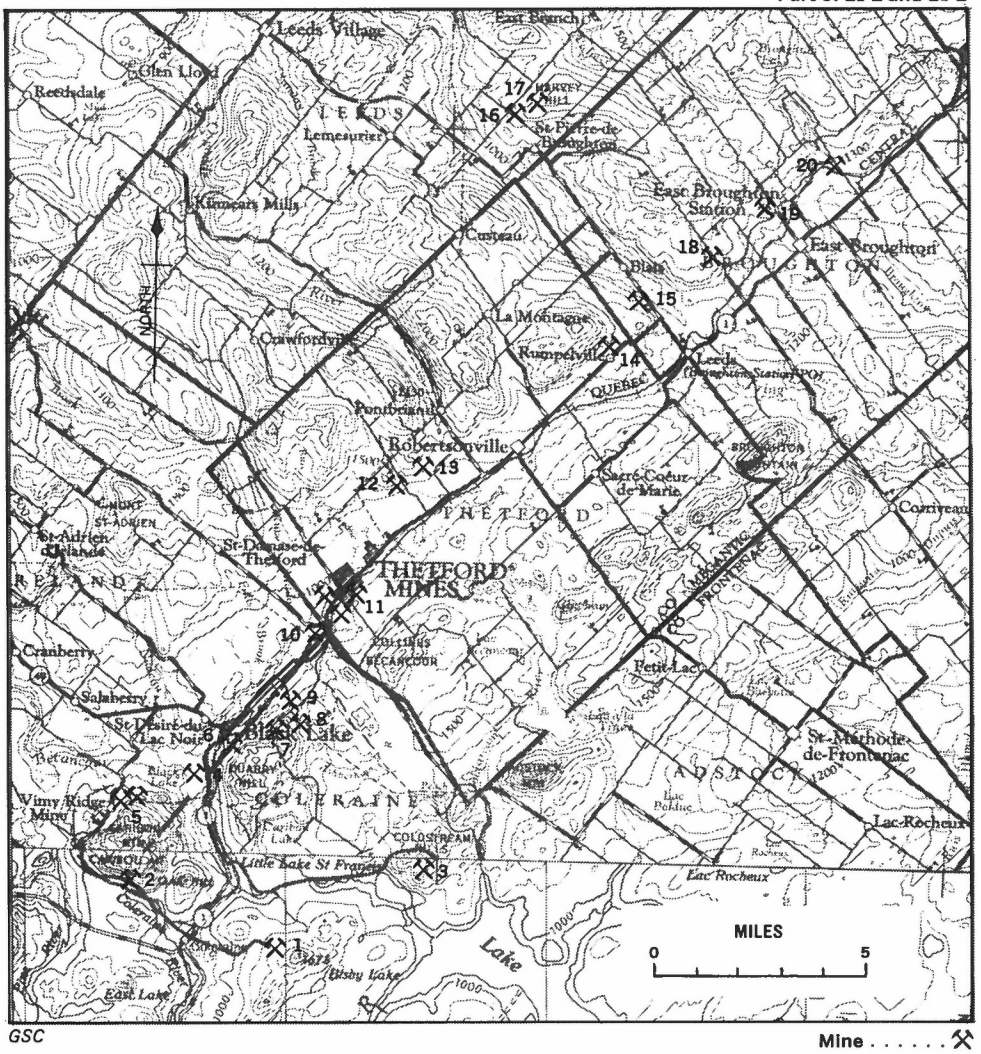
1.4 Junction gravel road at sign "Demerco Mines and Industries Ltée"; turn right proceeding beyond the Demerco plant.

1.6 Mine.

Refs.: 23 pp. 34-35; 102 p. 21.

Maps (T): 21 E/14 W Disraeli.
(G): 418A Disraeli (west half).

Part of 21 E and 21 L



GSC

Mine . . . . . ⚒

Map 6. Coleraine-Thetford Mines area: 1. Windsor mine; 2. Continental mine; 3. Montreal Chrome pit; 4. Lake Asbestos of Quebec, Limited; 5. Vimy ridge, Normandie mines; 6. British Canadian, Johnson mines; 7. Union mine; 8. Southwark mine; 9. Maple Leaf mine; 10. Bell Asbestos Mines Limited; 11. Asbestos Corporation Limited (King-Beaver, Johnson mines); 12. Flintkote Mines Limited; 13. National Asbestos Mines Limited; 14. Kitchener Soapstone Quarry Limited; 15, 16. Broughton Soapstone & Quarry Limited; 17. Harvey Hill mine; 18. Quebec Asbestos Corporation pits; 19. East Broughton (Fraser) mine; 20. Carey-Canadian Mines Limited.

Windsor Mine

SERPENTINE, CALCITE, MAGNETITE.

In dunite.

Most of the serpentine is fine grained, massive, translucent yellow-green to deep green, but some pea-green picrolite and pale green chrysotile (asbestos) are also present. Calcite and magnetite partially replace picrolite and retain the fibrous structure. Magnetite also occurs as disseminated grains in massive serpentine.

The mine was worked briefly about 50 years ago by the Windsor Asbestos Company, and reopened for a short time in 1953. The present owner is Aylmer Mines Limited. It is not in operation and the pit is filled with water. Two large dumps lie near the pit.

Road log from Highway 1 at Coleraine:

Mile	0.0	Turn right (east) onto rue Martel (opposite junction of Vimy Ridge road).
	0.1	Turn left onto avenue St. Joseph.
	0.3	Turn left onto gravel road.
	1.4	Junction, turn left.
	1.7	Junction, turn right.
	2.9	Mine.

Refs.: 102 p. 21; 137 p. 35.

Maps (T): 21 E/14 W Disraeli
(G): 418A Disraeli (west half).

Mile 92.9 Junction road to Petit Lac St-François.

Montreal Chrome Pit

VESUVIANITE, DIOPSIDE, GARNET, ARAGONITE, SERPENTINE, CHROMITE, CALCITE.

In peridotite at the contact with granitic dykes.

This former chromite mine has long been known for its attractive and unusual mineral specimens. One of the most interesting for the collector is the finely crystalline, massive, lilac-coloured and emerald green vesuvianite which generally occurs with colourless, transparent, crystalline diopside or white, massive diopside. Compact, massive vesuvianite suitable for lapidary purposes is uncommon. Tiny crystal aggregates of pale yellow vesuvianite and calcite are found in cavities in massive vesuvianite. Some of the

diopside occurs as white to lilac groups of tabular crystals and platy masses. Other minerals closely associated with vesuvianite and diopside are: garnet (andradite), as pale yellow to olive green, tiny crystals; aragonite, as colourless, transparent, radiating, bladed aggregates; and tabular crystals and crystalline masses of deep green clinochlore. The serpentine is massive, translucent and deep green, or fibrous and yellow-green (picrolite); some narrow chrysotile (asbestos) is also present. The chromite is black, fine grained, massive and occurs in massive serpentine.

This was a low-grade chromium deposit and was worked (1894 to about 1905, 1915-1918) by open pits, the largest being 450 feet by 100 feet and 150 feet deep. The vesuvianite, diopside and associated minerals were found in this pit. Smaller pits are located just northwest of this one. During its first period of operation, the mine was worked entirely by hand and the blasted rock was loaded manually onto carts. The mine-camp included a residence, office building and other buildings, and a concentrator. None of these buildings are there now; the area is partly overgrown and the large pit is water-filled. Good specimens can be obtained from the dump in the vicinity of this pit.

Road log from Highway 1 at mile 92.9:

Mile	0.0	Proceed east along gravel road to Petit Lac St-François.
	0.1	Fork just beyond railway tracks; bear right.
	1.1	Junction; turn left.
	3.3	Fork; bear right.
	3.7	Fork, at road-sign showing map of Lake St-François; bear left.
	4.1	Junction single lane road on left just behind old gravel pit on left. Proceed up this road (not suitable for automobiles).
	5.7	Mine at top of ridge.

Refs.: 42 pp. 76-81; 94 pp. 25-26; 98 pp. 16, 24, 30-36, 49-59, 64-66, 73-79.

Maps (T): 21 E/14 W Disraeli
21 L/3 W Thetford
(G): 418A Disraeli (west half).

Mile 95.0 Road-cut and Lookout

SERPENTINE, MAGNETITE.

In peridotite.

The road-cut exposes asbestos-bearing rock and provides the visitor with an example of the ore being mined in the Black Lake-Thetford Mines area. Pale

green, transparent, silky, chrysotile (asbestos) veins, about 1/4-inch wide, cut massive, dark green serpentine. Ribbon-fibre asbestos – alternating bands of thin asbestos veinlets (about 1/8-inch wide) separated by massive serpentine bands – may be observed toward the south end of the exposure. This type of asbestos was mined at the Vimy Ridge mine (Asbestos Corporation Limited). Slip fibre asbestos and picrolite – the paler green serpentine with a compact fibrous or columnar structure – can also be seen in the rock-cut. Tiny black crystals and fine grained patches of magnetite occur in the massive serpentine.

The Black Lake-Thetford Mines asbestos deposits were discovered in 1877 and mining operations have been continuous since 1878. The excellent quality of the asbestos fibre mined in the early days (veins measured 1/2 to 4 inches wide) commanded high prices and provided an impetus to mining and further prospecting. The ore was extracted by hand-cobbing until the 1890s when mechanical methods were introduced. Only open-pit mining methods were used until 1928 when the first underground operations were attempted; both methods are being used now. The mines in the Eastern Townships (including those at Asbestos) account for 95 per cent of Canada's production of asbestos and 40 per cent of the world's supply. In the Black Lake-Thetford Mines area, 10 mines are currently operated by 6 companies: Lake Asbestos of Quebec, Limited; Asbestos Corporation Limited (5 active mines); Bell Asbestos Mines Limited; Flintkote Mines Limited; National Asbestos Mines Limited and Carey-Canadian Mines Limited. In general it is impractical to accommodate casual visitors due to large-scale mining operations conducted at the various mines; however seriously interested groups may sometimes be accommodated after making prior written arrangements.

An excellent vantage point to view open pit operations is the lookout at mile 95.0 opposite the road-cut.

Refs.: 36 pp. 88-89; 103 pp. 3-6, 81-82.

Lake Asbestos of Quebec, Limited

The large open pits viewed from the lookout were, until about 10 years ago, the bottom of Black Lake which had to be drained to make way for mining operations. On the left side of the pits are the mine offices, other mine buildings and the mill. The large greyish white, tailing dumps to the left of the mill have become a characteristic of the Black Lake-Thetford Mines topography. This mine has been in production since 1958.

Ref.: 135 p. 26.

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford (west half).

Mile 95.9 Junction, road to Black Lake village. This road passes some large asbestos mines enabling the visitor to glimpse the immense operations between Black Lake and Thetford Mines.

Road log along Black Lake Road:

Mile 0.0 Leave Highway 1 and proceed to the business section of Black village.

0.9 Entrance on right to British Canadian mine (operated by Asbestos Corporation Limited).

1.3 Turn-off (right) to Union and Southwark mines (description given below).

2.6 Turn-off (right) to Maple Leaf mine (description given below).

3.7 Entrance on left to King Beaver mine (operated by Asbestos Corporation Limited).

4.1 Thetford Mines, at intersection Notre Dame sud and Alfred est continue along Notre Dame sud which later becomes rue Johnson ouest. On both sides of the road, there are large open pits operated by the Asbestos Corporation Limited, and Bell Asbestos Mines Limited.

5.1 Intersection rue Johnson ouest with rue Caouette sud at traffic light. From this intersection, it is 1.6 miles to the south end of the Thetford Mines by-pass, and 4.7 miles to the north end.

Union, Southwark Mines

GARNET, VESUVIANITE, DIOPSIDE, ARAGONITE, ZOISITE, COLERAINITE, HYDROTALCITE, ARTINITE, MAGNETITE, SERPENTINE.

In peridotite and pegmatitic rock.

At the Union mine, garnet occurs as colourless to pale pink, transparent, crystalline aggregates associated with green clinochlore, green or reddish brown vesuvianite, brown diopside and tiny, white, aragonite crystals. Pink garnet crystals measuring up to 1/2 cm, and yellowish to green garnet have previously been reported. Zoisite is pink (slightly lilac tinted), fine grained, massive, and occurs with the feldspar; when polished it has a pink and white mottled effect and would make attractive cabochons. The mineral is present only in small quantities. Colerainite – the pearly white to pinkish, translucent to opaque, botryoidal encrustation on white pegmatitic rock – was named for the locality; it is a member of the chlorite group. Botryoidal spheres of colerainite composed of tiny hexagonal plates have been found measuring up to 1/2-inch in diameter; some show a concentric banded appearance. Hydrotalcite occurs with the colerainite. Artinite occurs as transparent, colourless to white, slightly greenish tinted, radiating fibrous aggregates, (fibres averaging up to 1/2-inch long) with satin lustre; it is found with tiny magnetite octahedra on dark greenish black, massive serpentine. This is believed to be the first report of an occurrence of artinite in Canada. The minerals listed above were found in Pit No. 9. Transparent, colourless, crystalline garnet with reddish brown vesuvianite crystals

(measuring up to 1 1/2 cm long) and clinochlore have previously been reported from the Southwark mine but were not found during this visit.

The Union and Southwark mines were worked for asbestos intermittently from 1890 to 1924. They are the property of Asbestos Corporation Limited. Permission to visit these properties must be obtained by writing to the company.

Road log from Black Lake road (mile 1.3):

Mile	0.0	Turn right (east) onto road to Crabtree village.
	0.6	British Canadian pit (formerly Megantic pit) on right. This mine is operated by Asbestos Corporation Limited.
	1.3	Fork at Crabtree village; bear left.
	1.5	Tailings dump on left. The dump on right is from the Union mine's No. 5 pit.
	1.8	Union mine, Pit No. 9. Specimens can be found along the walls and floor of the quarry. The Southwark mine is about 1/2 mile east of this pit and can be reached by a foot path; the pit is water filled.

Refs.: 30 pp. 189-191; 98 pp. 45-47, 57, 72; 103 p. 86.

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford (west half).

Maple Leaf Mine

VESUVIANITE, DIOPSIDE, GARNET, CALCITE, CHLORITE, CHROMITE, HEAZLEWOODITE, MAGNETITE, FELDSPAR, SERPENTINE.

In peridotite and granitic rocks.

The vesuvianite is transparent, colourless to pale yellowish green or yellowish brown. It occurs as masses of striated prisms (individual crystals less than 3/8-inch wide) generally with white prismatic aggregates of diopside. The diopside contains tiny black patches of chromite and bronze specks of heazlewoodite. Emerald green transparent garnet occurs in massive form in the diopside. Colourless to light brown chlorite occurs sparingly in the vesuvianite. These minerals are associated with white feldspar. The serpentine is medium to dark green, massive, and contains tiny black magnetite crystals. Picrolite and chrysotile (asbestos) are common on the dump.

This mine belongs to Asbestos Corporation Limited and has been idle for almost 20 years. There is a large dump at the mine; permission to visit it must be applied for by writing to the company's office at Thetford Mines.

Access to the property is by a road, 0.8 mile long, leading east from the Black Lake road at mile 2.6.

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford (west half).

Bennett-Martin and Bell Pits

ZOISITE, GARNET, DIOPSIDE, STILBITE, FELDSPAR, CHLORITE, MAGNETITE, SERPENTINE.

In peridotite and granitic rocks.

Zoisite (pink, slightly lilac-tinged, platy masses), garnet (transparent, colourless to peach-pink, crystalline), diopside (white to pale lilac, massive), stilbite (transparent, light brown, platy aggregates) and feldspar (milky to pearly white, coarse platy aggregates) are associated with calcite and chlorite in fine-grained, grey, granitic rock. Pale to pea-green picrolite is commonly replaced in part, by magnetite which retains the fibrous structure. Most of the serpentine is dark green, massive. Pale green asbestos (chrysotile) fibres measure up to 1 1/4 inches long.

The Bennett-Martin and Bell pits are in the town of Thetford Mines and are the property of Asbestos Corporation Limited. As they are located in the active mining area, they are not accessible to casual visitors.

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford.

Mile 96.9 Black Lake village, at junction Highway 49.

Ragged (Racquet) Brook Placer

GOLD.

In stream gravel.

In about 1885, this stream was worked for placer gold. A small amount of gold and a nugget valued at several dollars were obtained from the gravels in the vicinity of the Highway 49 bridge.

Road log from Highway 1.

Mile 0.0 Proceed west along Highway 49.

0.9 Junction, on left, road to Normandie mine (operated by Asbestos Corporation Limited).

6.2 Bridge over Ragged Brook.

Ref.: 86 p. 25.

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford.

Mile 98.9 Junction (south) road to Thetford Mines business section. The road log continues along the by-pass (i.e. bear left).

105.3 Junction, on left, road to Flintkote Mines Limited.

Flintkote Mines Limited

This asbestos mine has been in operation since 1946. Arrangements for group visits should be made by writing to the manager; casual visitors are not generally permitted to visit the mining area but may obtain from the office, asbestos kits containing specimens of crude and milled asbestos.

The property is 1.2 miles from Highway 1.

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford.

Plate IV. Peridotite block cut by asbestos veins, at turn-off (mile 105.8) to National Asbestos Mines Limited; company's tailing dump is in left background.

Mile 105.8 Junction, on left, road to National Asbestos Mines Limited.

National Asbestos Mines Limited (Plate IV)

This mine has been in production since 1958. At the junction of the mine road with Highway 1, there is a large specimen of asbestos-bearing

Plate V. Kitchener soapstone quarry.

peridotite. This specimen is a good example of crude asbestos in the host rock (do not mutilate this specimen).

Maps (T): 21 L/3 W Thetford.
(G): 416A Thetford.

Mile 111.1 Junction on left, road to Kitchener Soapstone quarry.

Kitchener (Rumpel) Soapstone Quarry (Plate V)

TALC, MAGNETITE, PYRRHOTITE, SOAPSTONE, CHLORITE.

In altered peridotite.

The talc is translucent, apple-green to greyish green. The term soapstone is used for an impure talc; at this deposit it has a mottled grey and green appearance and contains tiny flakes of chlorite, a few specks or tiny patches of magnetite and pyrrhotite. Some of the soapstone has a platy or layered form. The soapstone is typical of the deposits in this area; it has been used for making stoves, clock-cases, ash-trays, ornamental objects, tinsmith's crayons, etc.

This quarry was opened in 1933 and operated intermittently for about 15 years. Soapstone is exposed along the walls and floor of the quarry. The ledges or benches indicate where blocks were sawed off.

A road 0.2 mile long leads to the quarry from Highway 1.

Refs.: 36 p. 149; 113 p. 89.

Maps (T): 21 L/3 E Thetford.
(G): 415A Thetford (east half).

Mile 112.7 Junction road to St-Pierre.

Road log for side trip to Broughton Soapstone quarries and Harvey Hill copper mine.

Mile	0.0	Turn left (at sharp bend) onto gravel road to St-Pierre.
	0.7	Old Broughton soapstone quarry and soapstone house on left.
	5.5	Junction at St-Pierre (West Broughton); turn right.
	5.8	Crossroad; turn left.
	7.1	Turn-off (right) to Broughton soapstone quarry (about 50 yards from here).
	7.7	Junction road to Harvey Hill mine; turn right.
	8.1	Harvey Hill mine.

Broughton Soapstone Quarries (Plate VI).

TALC, MAGNESITE, RUTILE, PYRITE, SOAPSTONE.

In altered peridotite.

The talc is white to pale green, and less commonly mauve. Associated with it are: pale yellow to yellowish orange, massive dolomite; transparent, reddish brown, granular patches of rutile; transparent, grey nodules (about 1/4 inch in diameter) of magnesite; and pyrite grains. These minerals were identified in specimens obtained from the Broughton Soapstone and Quarry Limited property at mile 7.1. This quarry is currently worked for soapstone; the rock is grey, mottled or streaked with white, pale green and light brown.

The inactive quarry at mile 0.7 was operated by the Broughton Soapstone and Quarry Limited. It is now water-filled, and has been idle for many years. Beside the quarry is a small building constructed of blocks of greenish white and grey mottled soapstone (Plate VI); it was built in 1933 and served as the office for the Company. The mill is across the road from the quarry. Specimens of blocks of soapstone from either of these quarries could be cut and polished but the general appearance of the rock is rather drab.

Ref.: 113 pp. 84-86.

Maps (T): 21 L/3 E Thetford.
21 L/6 E St-Sylvestre.
(G): 415A Thetford (east half)

Harvey Hill Copper Mine

BORNITE, CHALCOPYRITE, BROCHANTITE, PYRITE, CHALCOCITE, CHLORITE, CHLORITOID.

In quartz-calcite-dolomite veins cutting schist.

Bornite, chalcopyrite and chalcocite (less common) are the copper ore minerals; they occur in massive form in the veins in the host rock. Brochantite is present as bright-green encrustations on the ore minerals and on the schist. Specimens containing these minerals can readily be found in the dump near the shaft. Molybdenite and native gold have previously been reported from this deposit.

Very rich ore was obtained in the early days of mining and specimens were sent to numerous international exhibitions including those in Paris (1867, 1878, 1900), London (1862, 1886), Philadelphia (1876) and St. Louis (1903). This was one of the first copper deposits found (about 1850) in the Eastern Townships and the rich ore (30% copper) stimulated prospecting for copper in the area. Mining operations were continuous from 1858 to 1864 but during the following 35 years they became intermittent due to lower grade of ore and lack of capital. Several shafts were sunk and a smelting plant was erected nearby. Limestone from the Lime Ridge deposits was used as the flux. Before a railway was built near the deposit, the ore was transported by

Plate VI.

Mine Office building constructed of soapstone blocks, Broughton Soapstone Quarry Company Limited.

horse-drawn wagons to a station 31 miles away. The deposit was reopened briefly in 1956 by the Mogul Mining Corporation. The mine buildings and equipment are in the charge of a caretaker. Copper ore specimens are readily available on the dumps.

Refs.: 13 pp. 30-33, 45-46, 52, 144-151; 60 p. 19; 126 p. 14; 127 p. 55; 128 p. 29; 129 pp. 42-43; 130 p. 101.

Map (T): 21 L/6 E St-Sylvestre.

Mile 115.5 Junction on left, road to Quebec Asbestos Corporation pits.

Quebec Asbestos Corporation Pits

SERPENTINE, MAGNETITE.

In peridotite.

Varieties of serpentine include: yellow-green to dark green massive serpentine, colourless to pale green asbestos, and pea-green picrolite. Tiny crystals and granular patches of magnetite occur in the massive serpentine. The mine consists of two large steep-walled pits, one on each side of the road, connected by a tunnel. It is dangerous to enter the tunnel because there is a steep drop into the pit on the south side of the road.

The deposit was last worked in 1945. Access is by a road, 1.4 miles long, leading northwest from Highway 1.

Maps (T): 21 L/3 E Thetford.
(G): 415A Thetford (east half).

Mile 118.0 East Broughton, at junction road to Broughton Station.

East Broughton (Fraser) Mine (Plate VII)

SERPENTINE, MAGNESITE, MAGNETITE, PYRITE.

In peridotite.

Massive serpentine, chrysotile and picrolite are exposed along the walls and floor of the quarry. Grains of magnetite and pyrite occur in the massive serpentine, and magnetite partially replaces picrolite, retaining the fibrous structure. White magnesite occurs as cleavable and fibrous masses, with fibres several inches long. Specimens of these minerals are plentiful in an old dump near the southern extremity of the long, narrow quarry.

The deposit was worked by the Quebec Asbestos Corporation from 1945 to 1958 when it became depleted. The pit at the south end is partly filled with water.

Plate VII. East Broughton (Fraser) mine dumps. White tailing dumps such as those seen in the background are typical of the asbestos-mining region.

Road log from Highway 1:

Mile	0.0	East Broughton; proceed northwest along road to Broughton Station.
	1.0	Broughton Station; turn left onto 13th Street West.
	1.5	Fork. The right fork bisects the quarry. Bear left to reach dumps.
	1.6	Fork; bear right.
	2.1	Dumps on left.

Ref.: 21 pp. 91-92.

Maps (T): 21 L/3 E Thetford.
(G): 415A Thetford (east half).

Mile 121.5 Junction (on left) road to Carey-Canadian Mines Limited.

Carey-Canadian Mines Limited

This is an open pit asbestos mine which has been in production since 1958. Prospective visitors should present themselves at the mine office to obtain a visitor's permit and guide. The property is about 0.7 mile from Highway 1.

Ref.: 135 p. 20.

Map (T): 21 L/6 E St-Sylvestre.

Mile 133.0 Vallée-Jonction, at junction Highway 23.

Road log for side trip along Highway 23 south from Vallée-Jonction:

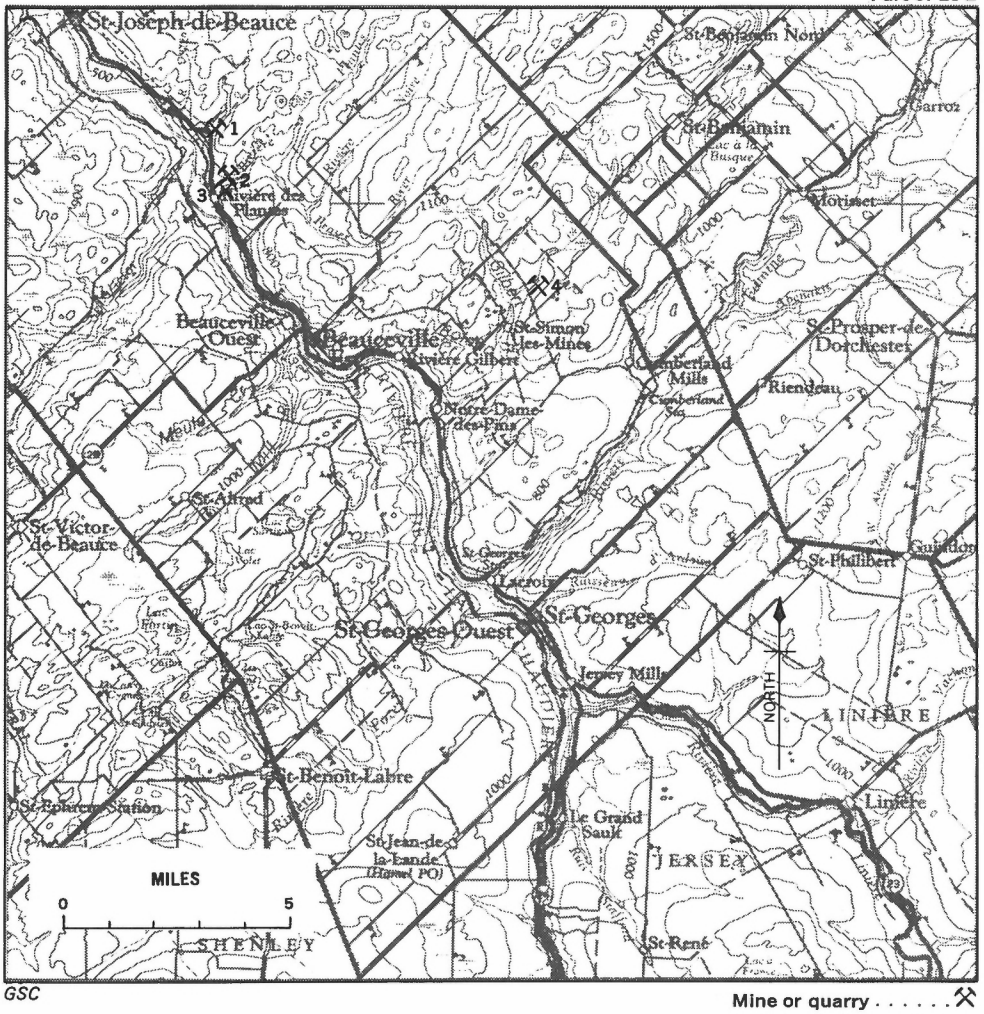
Mile	0.0	Proceed south along Highway 23. From this junction to mile 27.2, the highway follows the east side of the Chaudière River.
	9.6	Bridge over Calway River.
	9.8	Turn-off (left) to Gilbert marble deposit.
	10.9	Bridge over Rivière des Plantes.
	10.95	Turn-off (left) to Golden Age mine.
	15.0	Beauceville, at junction Highway 28.
	18.6	Junction (on left) road to St-Simon-les-Mines and Beauce Placer Mining Company Limited.
	19.7	Bridge over Gilbert River.
	24.2	Bridge over Famine River.
	24.5	St-Georges, at junction (on right) road to business section.
	25.3	St-Georges, at junction Highway 24 (north), and bridge over Slate (Ardoise) Brook.
	27.2	Junction Highway 24 (south). From this junction Highway 23 follows the Linière River and Highway 24 follows the Chaudière River.
	39.0	Bridge over Metgermette River.

Gilbert Marble Deposit

CRYSTALLINE LIMESTONE

The marble is dark red and is traversed by white calcite veinlets. It is fine grained, hard, and takes a good polish. It was first quarried about 50 years

Part of 21 L



Map 7. St-Georges area: 1. Gilbert quarry; 2. Rivière des Plantes molybdenum deposit; 3. Golden Age mine; 4. Beauce Placer Mining Co. Ltd.

ago for use as a building and ornamental stone, but sufficiently large blocks could not be obtained. The quarry was worked again (1942-1945) and the marble was crushed for use as terrazzo. It has not been worked recently. Fragments and a few small blocks of marble can be found at the quarry, but the rock is not abundant.

The quarry is on the Gilbert property which is 0.3 mile by road east of Highway 23 at mile 9.8.

Refs.: 22 p. 44; 80 p. 88.

Maps (T): 21 L/7 W St. Joseph.
(G): 1835 Beauceville (1 inch to 4,000 feet).

Rivière des Plantes Molybdenum Deposit

MOLYBDENITE, GARNET, VESUVIANITE.

With quartz at granite-peridotite contact.

Molybdenite flakes and small flaky masses occur in quartz. Pale green vesuvianite and yellowish garnet are associated with colourless quartz producing a finely granular rock. The deposit had been mined by a few pits which are now overgrown. The main showing is 200 yards north of the des Plantes River at a point about 400 yards east of Highway 23. It is on the property of François Jacques whose farm house is on the east side of the highway, just north of the bridge over des Plantes River.

Ref.: 80 pp. 84-85.

Maps (T): 21 L/7 W St. Joseph.
(G): 1835 Beauceville.

Golden Age Asbestos Mine

SERPENTINE, MAGNETITE, CALCITE.

In peridotite.

Chrysotile asbestos was mined here between 1958 and 1962. The asbestos is associated with massive, olive-green to dark green, translucent serpentine containing specks of magnetite. Some of the fibrous serpentine has been replaced by magnetite and calcite which have retained the fibrous structure. Specimens are abundant in the vicinity of the pits (now water-filled) on both sides of the des Plantes River. The mill is adjacent to the pits. The property is on the east side of Highway 23, just south of the bridge over des Plantes River. The mine watchman (in 1965) Mr. Alphonse Lessard lives just south of the mine.

Ref.: 137 p. 134.

Plate VIII. Dredge at Beauce Placer Mining Company Limited, Gilbert River.

Maps (T): 21 L/7 W St. Joseph.
(G): 1835 Beauceville (1 inch to 4,000 feet).

Beauce Placer Mining Company Limited (Plate VIII)

PLACER GOLD.

In gravel.

This gold mining operation is unique in that it is the only placer gold deposit being worked in southern Canada. The gold occurs as flakes and, occasionally, as small nuggets. The gold-bearing gravels are beneath a thick blanket of clay, sand and gravel, and prior to dredging, this layer of overburden is

stripped. The dredge has been in operation at intervals since 1961. This deposit is on the south side of the Gilbert River; prospective visitors should apply at the Company's office in St-Georges-Est for permission.

Road log from Highway 23 at mile 18.6:

Mile	0.0	Proceed east along road to St-Simon-les-Mines. This junction is just south of the turn-off to Notre-Dame-de-la-Providence.
	2.2	St-Simon; turn right at junction.
	2.3	St-Simon; at bridge over Gilbert River.
	2.5	Junction; turn left.
	3.3	Crossroad; turn left.
	3.8	Junction road to deposit; turn right.
	4.0	Beauce placer mine.

Maps (T): 21 L/2 E Beauceville.
(G): 1835 Beauceville (1 inch to 4,000 feet).

Chaudière (and tributaries) Placer Deposits

PLACER GOLD.

In gravels of stream beds and banks.

About 3 million dollars worth of gold was recovered in the latter part of the 19th century from the placers of this district, making it the most productive placer operation in the province. The gold occurs as dust, flakes and nuggets (some nuggests found were jagged and contained quartz) in the Recent gravels of the stream beds, bars, deltas and terraces, and in the buried pre-Glacial stream channels either on bedrock or in the gravels immediately above it. The pre-Glacial deposits were the most productive and yielded most of the nuggets which measured up to the size of a man's hand. About half of the amount of gold mined was found in the Gilbert River in the stretch 2 miles south and northeast of St-Simon-les-Mines. This was the richest placer deposit in Eastern Canada. Numerous water-worn nuggets were found, including one valued at $851. The streams ranking next in production were Meule Creek in the 1-mile stretch extending west from its junction with Mill River, and Rivière des Plantes in its gorge 500 to 1,000 yards east of the Highway 23 bridge. Other streams from which gold was recovered are: Famine River (east of Cumberland Mills); Slate or Ardoise Creek (about a mile east of St-Georges); Chaudière River (at Devil's Rapids which is about 2 miles south of the Highway 28 bridge at Beauceville, and at the falls within 2 miles south of its junction with the Linière River); Linière or du Loup River (near its junction with the Chaudière); Pozer River; Metgermette River; Mill River; Cumberland River; and Bolduc, Black and Stafford Creeks.

The discovery of gold in this district was made in 1823 by a lady who noticed a nugget in the mouth of the Gilbert River, then known as the Touffe de Pins River; in 1834, a nugget weighing about 69 grains was picked up by another lady when she took her horse to water in the same spot. The latter discovery was officially reported in the following year and the exclusive mining rights were granted to the de Lery family in 1846. A few years later, news of the discovery of gold in the East Angus area reached this district and exploration began in earnest. The first streams to be worked were: the Gilbert, des Plantes, Famine, Chaudière and Linière (then known as Rivière du Loup). Rich pockets of gold were found in all these rivers but most of the activity was centred on the Gilbert River where coarse gold and nuggets, up to 71 oz., were found. Reports of operations on the Gilbert River mention that a local farmer Narcisse Rodrigue, panned $1200 worth of gold in one day, and 10 lb. of gold was panned by a 4-man team in 11 days. Mining methods included panning, dry-digging, hydraulicking, sluicing and the use of shafts sunk on bedrock to a depth of 165 feet. Most of the gold was obtained from the deep channels which presented difficulties due to the depth of the glacial material including a layer of up to 35 feet of sand. Lack of water was a problem in hydraulic operations, and at Meule Creek water had to be brought by a system of ditches from Lake Fortin, about 7 miles to the southwest.

The peak of mining activity in the district was reached in the decade 1875-1885 when 500 miners were at work and 2 million dollars worth of gold was recovered from the Gilbert River (the largest producer), the Rivière des Plantes, Meule Creek and Famine River. After 1886, mining activity decreased due to unsatisfactory returns. Just before World War I, the Gilbert River, Meule Creek and a few other streams were re-worked and a $51-nugget was found by 11-year-old Eugene Caron while setting a mink trap on the terrace of Linière River. During the past 50 years, gold values have from time to time been obtained by various operators in the Chaudière district, and local residents report that even now children find gold flakes in stream gravels and old pits in or near stream valleys.

A number of the gold-bearing streams are bridged by Highway 23 and these have been noted in the road log. Other accessible localities are: Linière River, where it is bridged by Highway 24 at a point 0.7 mile south of the Highway 23 junction (mile 27.2); Stafford Brook where it is bridged by Highway 24 at a point 2.6 miles south of the Highway 23 junction. Meule Creek is bridged by a road leading south from Highway 28 at a point 1.6 miles west of the junction with Highway 23 at Beauceville; the gold-bearing stretch extends eastward about 1 mile from the bridge to the junction with Mill River. (In the topographical map, 21 L/2 W, the stream marked Rivière du Moulin is Meule Creek and Mill River is the first stream south.)

Refs.: 17 pp. 55-61; 44 pp. 51-66; 56 p. 5; 80 pp. 34, 70-80; 126 p. 19; 128 p. 43; 130 p. 13.

Maps (T): 21 L/1 W St-Zacharie.
21 L/2 E and W Beauceville.
21 L/7 W St. Joseph.
(G): 1835 Beauceville (1 inch to 4,000 feet).

Road-cut at St-Georges.

FOSSILS.

In limestone.

Forty species of Devonian fossils have been found in limestone beds extending northeastward from the Chaudière Valley on the south side of the Famine River. Corals, crinoids, fenestelloids, brachiopods, pelecypods, gastropods and trilobites have been found. The fossil-bearing limestone is exposed in the big road-cut on the east side of Highway 23, 0.35 mile south of the bridge over the Famine River (i.e. just beyond the turn-off to St-Georges business section). Local residents have found fossil-bearing blocks of limestone in the bed of the Famine River in the vicinity of the Highway bridge.

Ref.: 80 pp. 31-32.

Maps (T): 21 L/2 E Beauceville.
(G): 1835 Beauceville (1 inch to 4,000 feet).

Eastern Metals Mine

PYRITE, CHALCOPYRITE, MILLERITE, GERSDORFFITE, SPHALERITE, CHALCOCITE, BORNITE, NATIVE COPPER, GALENA, MARCASITE, PYRRHOTITE, VIOLARITE, RETGERSITE, SPECULARITE, SIDERITE, HISINGERITE, ALLOPHANE, CYANOTRICHITE.

With quartz in altered sediments and serpentinite.

The principal nickel mineral – millerite – occurs as pale bronze, fine grained masses, and as crystalline aggregates with individual crystals measuring up to 2 inches long. It is associated with fine-grained, brecciated masses of pyrite, sphalerite, marcasite and small amounts of gersdorffite (grey metallic) and violarite (grey metallic with purple tinge). Pale to apple-green retgersite forms soft, opaque, fine grained irregular, thin crusts on millerite and quartz. Chalcopyrite, the most conspicuous mineral present, is associated with pyrite and small amounts of chalcocite, bornite, sphalerite and galena. Pyrrhotite and thin scales of native copper have been noted on slip surfaces of serpentinite. Specimens of quartz with coarsely foliated specularite and pale yellow granular aggregates of siderite were found on the dumps. Other minerals reported to occur with the nickel minerals are hisingerite, allophane and cyanotrichite.

The deposit was discovered in 1949 by Theodore Bélanger of St-Fabien when he noticed the rusty gossan on the surface in the vicinity of the present shaft. Drilling by Eastern Metals Corporation (now Territory Mining Company Limited) revealed a copper-nickel-zinc orebody. The shaft was sunk in 1955 and since then exploration work has been done. On the site, at the present time, there is a large dump, a shaft and a mine office.

Road log from Highway 23 at St-Georges (mile 25.3):

Mile 0.0 Proceed north along Highway 24.

Mile 55.5 St-Fabien, at turn-off to business section; bear left.

55.8 St-Fabien, at crossroad at top of hill; continue straight ahead (this is now Highway 26).

56.9 Junction gravel road; turn left.

58.6 Junction mine road; turn right.

59.0 Mine.

Refs.: 14 pp. 34-41; 137 pp. 115, 304.

Map (T): 21 L/9 E St. Magloire.

Mile 145.2 Scott; junction Highways 1 and 23. The road log continues along Highway 1.

173.4 Rotary; at bridge to Quebec City.

181.5 Lévis, at the Rond; junction Highways 3, 2, 5.

SECTION 2

LÉVIS - NEW BRUNSWICK BORDER (via Gaspé)

Mile 0.0 Lévis, at the Rond traffic circle; junction Highways 1, 2, 5, 23. Proceed northeast along Highway 2.

118.7 Rivière-du-Loup; proceed northeast along Highway 10.

146.5 Trois-Pistoles Limestone Quarry

CALCITE.

In limestone.

White calcite veins, about 1 inch wide, cut dark grey massive limestone; the calcite fluoresces bright pink when exposed to ultra-violet rays (especially bright under "short" rays). Limestone breccia containing angular fragments of quartz and darker grey limestone occurs with the massive limestone. The quarry is on the south side of Highway 10 at a point 1 1/2 miles west of Trois-Pistoles. It is not being worked at present.

Maps (T): 22 C/3E Trois-Pistoles
(G): 43-1961 Rivière-du-Loup–Trois-Pistoles.

Mile 166.7 Junction road to Roy and Ross mine.

Roy and Ross Barite Mine

BARITE, GALENA.

In limestone conglomerate.

The barite is white, coarsely-crystalline, and contains galena cubes measuring up to 1/2 inch across. The deposit has been exposed by a tunnel dug into the side of the hill. There is a small dump and a mine office near the tunnel. The property belongs to Les Mines Roy and Ross Inc. of Rimouski.

Road log from Highway 10 at mile 166.7:

Mile 0.0 Turn right (south) onto road leading through railway over-pass.

0.5 Junction mine road; turn left.

0.9 Mine.

Map (T): 22 C/7 W and 22 C/6 E Rimouski.

Mile 167.4 St-Fabien, at junction road to St-Eugène.

178.4 to 179.7 Peat Bogs a few hundred feet north of the highway. These were being worked in 1965.

207.4 Ste-Flavie, at junction Highway 6. Proceed along Highway 6 toward Ste-Anne-des-Monts.

218.2 Road-cut (on right) and St. Lawrence shoreline (on left), south of Métis-sur-Mer.

Road-cut

CALCITE.

In limestone.

White calcite veins up to 2 inches wide cut grey limestone. The calcite fluoresces bright pink (especially bright under "short" rays).

Map (T): 22 C/9 E Mont-Joli

St. Lawrence Shoreline, Métis to L'Échouerie.

CHALCEDONY (FLINT, SILEX).

As nodules on beaches.

The nodules, measuring up to 4 inches in diameter, are irregular to rounded in form with smooth, water-worn surfaces. They are most commonly opaque and toffee-coloured; varieties include brownish yellow, light yellowish brown, greyish brown, yellowish white, light grey to charcoal grey and greyish white. They are patterned (mottled, spotted, diffusely banded, and streaked) in a combination of yellow, brown, grey, white and less commonly, reddish tones. Some of the lighter coloured varieties are slightly translucent. The nodules contain microscopic inclusions of foraminifera and sponges. The nodules are not very colourful but take a good polish and are used locally for jewellery and other ornamental purposes. They occur as loose pebbles on beaches and are distinguished by their smooth, rounded to conchoidal, chalky white to dull light brown surfaces. They are most easily found after a storm has worked them to the shore. Occurrences have been noted at numerous bays between Métis-sur-Mer and St-Maurice-de-l'Échouerie; the nodules were found to be most abundant in the vicinity of Matane, Cloridorme and L'Echouerie. The first occurrence is the shoreline opposite the road-cut at mile 218.2, just south of Métis-sur-Mer. Other localities where the flint nodules have been found will be mentioned in the text as the road-log progresses eastward.

Map (T): 22 C/9 E Mont-Joli.

Mile 220.1 Little Métis Bay, opposite church.

Shoreline Exposures

FOSSILS, PYRITE.

In shale and conglomerate.

Fossil sponges occur in dark green to black compact shale exposed at the mid-tide level on the shore of Little Métis Bay. The original siliceous material of the sponges has, in most cases, been replaced by pyrite resulting in a bronze-coloured network of spicules on surfaces of the shale. The sponges are most easily recognized on wet specimens. Tiny brachiopods, worm trails and burrows, and algae are also found in the sponge beds which are believed to be of Early Ordovician age; these fossils are also generally replaced by pyrite. Overlying the shale is a coarse conglomerate containing limestone boulders in which are found gastropods and tribolites of Cambrian age. These fossil-bearing rocks are exposed on the south shore of Little Métis Bay opposite the church (i.e. 300 yards east of the mouth of Petit-Métis River).

Refs.: 40 pp. 91-130; 63 pp. 1-7; 100 pp. 60-61.

Map (T): 22 C/9 E Mont-Joli.

Mile 228.0 Baie-des-Sables Shore

CHALCEDONY (FLINT)

Nodules were found on the beach to the left of the highway at this point.

Map (T): 22 B/12 W Sayabec.

Mile 243.0 to 246.5

Shoreline near Matane

CHALCEDONY (FLINT), EPIDOTE.

The chalcedony nodules are more plentiful on this beach than at the two previous localities mentioned. Pebbles of epidote with colourless quartz, and epidote with quartz and pink feldspar were also found on this beach. These pebbles measure 1 inch to 3 inches in diameter and can be polished for use as ornamental objects. The polished surface has an attractive mottled or streaked green appearance with colourless and pink patches. The shoreline occurrences of the chalcedony and epidote pebbles are on the west side of Matane and are easily accessible from Highway 6. A few of these pebbles were found along the shore northeast of Matane, but they are generally very small and not plentiful.

Map (T): 22 B/13 E Matane.

Mile 246.8 Matane, at junction road to Amqui.

266.8 Ruisseau-à-la-Loutre, at junction (on left) road to wharf.

Shoreline Exposures

FOSSILS.

In limestone conglomerate.

Tribolites of Cambrian age are found in limestone conglomerate blocks near the mouth of Ruisseau à la Loutre, just west of the wharf (500 yards from Highway 6). Tribolite-bearing conglomerate is exposed at another locality along the shore at a point 2 miles east of this occurrence (i.e. just off the highway at mile 270.0).

Ref.: 100 pp. 61-63.

Maps (T): 22 B/14 E Grosses Roches.
(G): 176 Lake Matapedia (4 miles to 1 inch).

Mile 284.6 Capucins

Shoreline Exposures

CALCITE.

In limestone.

Coarsely crystalline, white calcite veins measuring up to 2 inches wide occur in grey limestone blocks exposed at low tide along the shoreline adjacent to Highway 6 at Capucins. The calcite fluoresces bright pink when exposed to ultraviolet rays ("short" rays most effective).

Map (T): 22 G/2 W Cap-Chat.

Mile 303.2 Ste-Anne-des-Monts, at junction road to Parc de la Gaspésie.

Road log for side trip along Trans-Gaspésien highway from Ste-Anne-des-Monts:

Mile 0.0 Proceed south along Trans-Gaspésien highway.

11.6 North gate to Parc de la Gaspésie.

27.7 to 28.0 Rock exposures at side of road.

30.4 Bridge over Isabelle Brook.

35.7 Junction road to Murdochville.

Mile 36.3 South gate to Parc de la Gaspésie.

40.3 Junction on right road to Federal mine.

40.3 to 42.8 Berry Mountain Brook parallels highway.

Rock Exposures

OLIVINE, SPINEL, EPIDOTE, CALCITE.

As broken blocks.

Fine-grained, sugary, pale green to greenish grey olivine rock and epidote-bearing amphibolite are found as broken blocks along the side of the road. Both these rocks occur along the slopes of the surrounding mountains. The olivine rock is composed almost entirely of olivine; other minerals present are pyroxene, serpentine, chromite and magnetite. It weathers to a light brown colour. The epidote occurs as finely crystalline, irregular masses (about an inch thick) and is commonly associated with white to pink, massive calcite (fluoresces bright pink under ultraviolet rays). Most of the epidote contains streaks of amphibolite making it rather unattractive as a potential ornamental rock.

These rocks are exposed along the highway between mile 27.7 and mile 28.0.

Ref.: 2 pp. 34-38.

Maps (T): 22 B/16 E Mont Albert.
(G): 2060 Mount Albert. Out of print.

Berry Mountain Brook Occurrences (Plate IX)

PORPHYRITIC VOLCANICS.

In stream beds.

The rock consists of pinkish red to reddish orange, tiny feldspar laths and transparent quartz grains set in a dense, fine-grained, orange to brownish red and greyish to deep green matrix. Salmon-pink feldspar occurs along irregular fracture planes in some specimens. The rock takes a good polish, has an attractive speckled appearance and would be suitable for ornamental objects. Pebbles and small boulders (up to a foot in diameter) of this porphyritic rock occur in the bed of Berry Mountain Brook where they are easily recognized by their bright colour when wet. They are derived from small masses of volcanic rock on the summit and slopes of some of the adjacent mountains.

The highway parallels Berry Mountain Brook (Plate IX) from the junction of the road to the Federal mine (at mile 40.3) southward for several miles. The pebbles were noted in the stream bed for a distance of 2 1/2 miles (from

Plate IX.

Berry Mountain Brook.

mile 40.3 to mile 42.8); there are several points on this stretch of the highway from which the stream is accessible.

Ref.: 2 pp. 45-46.

Maps (T): 22 B/9 E Big Berry Mountains.
22 B/16 E Mont Albert.
(G): 2060 Mount Albert. Out of print.
1935 Part of Lemieux Township, Gaspé County (4,000 feet to 1 inch).

Federal Mine

SPHALERITE, GALENA, PYRITE, MARCASITE, CHALCOPYRITE, SMITHSONITE, HYDROZINCITE , HEMIMORPHITE, AMETHYST, DOLOMITE, CALCITE.

In breccia and in quartz veins cutting shale and limestone.

The ore minerals, sphalerite and galena, occur in a quartz-dolomite-calcite vein and are associated with small amounts of pyrite, chalcopyrite and marcasite. Sphalerite is pale yellow, transparent, and occurs as masses and individual crystals in quartz. Galena is fine grained, massive, and crystalline with cleavage surfaces up to more than two inches across. Smithsonite is found as aggregates of tiny grey crystals and as fine grained massive white patches on quartz; it fluoresces with an orange-pink colour when exposed to ultraviolet rays ("short" rays most effective). Hydrozincite forms soft, snow-white, very fine grained, irregular patches (resembling white paint) on quartz and on the ore minerals; it was also noted as a white botryoidal mass in a small cavity in quartz. It can be distinguished from similar-appearing white minerals by its bluish white fluorescence under "short" ultraviolet rays. Hemimorphite forms dull, cream-white opaque,

fine grained encrustations on quartz. The amethystine quartz is pale to lilac coloured, transparent, and crystalline; it occupies veins about an inch wide and cavities in quartz. Some of the vein material consists of successive narrow bands of amethystine quartz, white quartz, and carbonates.

The deposit was discovered in 1909 when pieces of galena float were found on the hill where the mine is now located. The Federal Zinc and Lead Company have carried out development work intermittently since 1915. The company sank two shafts (one to 257 feet) and carried out surface pitting and trenching. At present, there are a few small dumps and several buildings at the mine site. The property belongs to Federal Metals Corporation and permission to visit it must be obtained from the owners.

Access is by a road (about 1 mile long) which leaves the Trans Gaspésien highway at mile 40.3; turn right (west) at this junction, cross Berry Mountain Brook, then bear right to the gate (about 200 yards from the highway). From the gate, the road goes up the hill to the mine.

Refs.: 2 pp. 55-62; 5 pp. 92-99; 11 pp. 7-15.

Maps (T): 22 B/16 E Mont Albert.
(G): 1936 Part of Lemieux Township, Gaspé County (4,000 feet to 1 inch).

Mile 306.8 St-Joachim-de-Tourelle, at turn-off to shore.

Sea Stacks

The sea stacks are composed of greenish grey sandstone of Ordovician age and are the result of erosion by waves on shoreline rocks. At one time the sea stacks, locally known as "tourelles" (little towers) were numerous along this shore and some of the local geographical names are derived from this geological feature.

One of the sea stacks is visible from Highway 6 at mile 306.8.

Ref.: 88 pp. 1-2, 27-28.

Maps (T): 22 G/1 W Ste-Anne-des-Monts.
(G): 183 Ste-Anne-des-Monts (4 miles to 1 inch).

Mile 324.0 to 324.5.

Road-cuts

FOSSILS, PYRITE.

In slate and argillaceous chert of Ordovician age.

Graptolites are abundant in certain sections of the road-cut. Pyrite occurs as 1/2-inch nodules, and nodular aggregates up to 1 inch in diameter. The rock is exposed along steep cliffs on the south side of the highway and along the shore just west of Marsoui.

Ref.: 66 pp. 24-26.

Maps (T): 22 G/1 E Ste-Anne-des-Monts.
(G): 182 Cape Marsouin (4 miles to 1 inch).

Mile 325.0 Marsoui, at junction road to Candego mine.

Candego Mine.

GALENA, SPHALERITE, PYRITE, ARSENOPYRITE, TETRAHEDRITE, BOURNONITE, PYRRHOTITE, GOLD, SIDERITE, GOETHITE, MELANTERITE, ANGLESITE, BEUDANTITE.

In quartz carbonate veins cutting slate and limestone.

The most abundant minerals are galena, pyrite and sphalerite. Galena occurs as fine grained to crystalline masses, pyrite as pale yellow metallic, fine grained, compact or striated crystal aggregates (individual crystals up to 1 inch across). Sphalerite occurs as dark brown to almost black resinous masses. These minerals are generally in close association in a gangue of white quartz and chocolate-brown stained siderite. Cavities in the quartz are lined with colourless, slender quartz crystals up to an inch long. Chalcopyrite, tetrahedrite and arsenopyrite are closely associated with pyrite, sphalerite and galena. Pyrrhotite, bournonite, and gold occur in microscopic amounts. Yellowish to rusty brown goethite is found as earthy patches on quartz and pyrite. Melanterite forms a soft, white, powdery coating on pyrite, and cream-white anglesite forms irregular encrustations on pyrite and galena. Beudantite is present as a yellow, opaque, powdery encrustation on quartz and metallic minerals. This deposit, on the west side of Marsoui River, was prospected about 30 years ago and was worked (1947 to 1954) for lead, zinc, gold and silver by Candego Mines Limited (later Consolidated Candego Mines Limited). The deposit was worked by 7 adits and the ore was treated at the mill on the mine site. At the property there are a few large dumps and some old mine buildings. Specimens are plentiful. The mine is in a protected forest area and visitors must obtain a travel permit (free of charge) from the hotel at Marsoui.

Road log from Highway 6 (mile 325.0) at Marsoui:

Mile	0.0	Turn right (south) at hotel.
	0.1	Fork; bear right.
	0.5	Fork; bear right.
	9.8	Fork; bear left.
	11.6	Department of Lands and Forests entrance gate. Visitors register here and present travel permits to officials of the department.
	12.1	Candego mine.

Refs.: 66 pp. 32-38; 121 pp. 477-484; 137 p. 49.

Maps (T): 22 G/1 E Ste-Anne-des-Monts.
(G): 182 Cape Marsouin (4 miles to 1 inch).

Mile 347.5 Anse Pleureuse, at junction road to Murdochville. The Gaspé Copper mine at Murdochville is 25 miles from here.

390.6 Cloridorme, at turn-off to wharf.

Cloridorme Shore

CHALCEDONY (FLINT).

As nodules on beach.

Chalcedony nodules, similar to those found at Métis, are quite numerous along the St. Lawrence shore in the vicinity of the West Cloridorme wharf, about 100 yards from the highway. Collect at low tide.

Maps (T): 22 H/2 W Cloridorme.
(G): 182 Cape Marsouin (4 miles to 1 inch).

Mile 413.0 St-Maurice-de-l'Échouerie, at turn-off to shore.

L'Echouerie Shore

CHALCEDONY NODULES.

The nodules were more numerous along this beach than on any of those previously mentioned. They average about 2 inches in diameter. The shore is about 200 yards from Highway 6. Collect at low tide.

Maps (T): 22 H/1 W Petit-Cap.
(G): 181 Fox River (4 miles to 1 inch)

Mile 419.0 Rivière-au-Renard, at junction Highway 6A; continue along Highway 6.

433.0 Cap-des-Rosiers, at bridge.

433.8 Cap-des-Rosiers, at lighthouse.

Shoreline (Plate X)

FOSSILS, CALCITE.

In limestone and shale.

Trilobite fragments occur in dark granular limestone interbedded with shale containing graptolites. The fossils are of Ordovician age. These rocks are

exposed in the sea-cliff about 100 yards southeast of the mouth of the brook that is bridged by Highway 6 at mile 433.0. Graptolite-bearing shale is exposed at several places along the shore between this locality and the Cap-des-Rosiers lighthouse (Plate X), about 1,300 yards south. White calcite, in 1-to 4-inch veins cutting the shale, fluoresces pink when exposed to ultra-violet rays ("short" rays most effective).

The shoreline may be reached by following the brook for 100 yards from the highway bridge, or from the beach at mile 433.8 just south of the lighthouse. Collect at low tide.

Refs.: 39 pp. 18-20; 87 pp. 27-28; 101 p. 581.

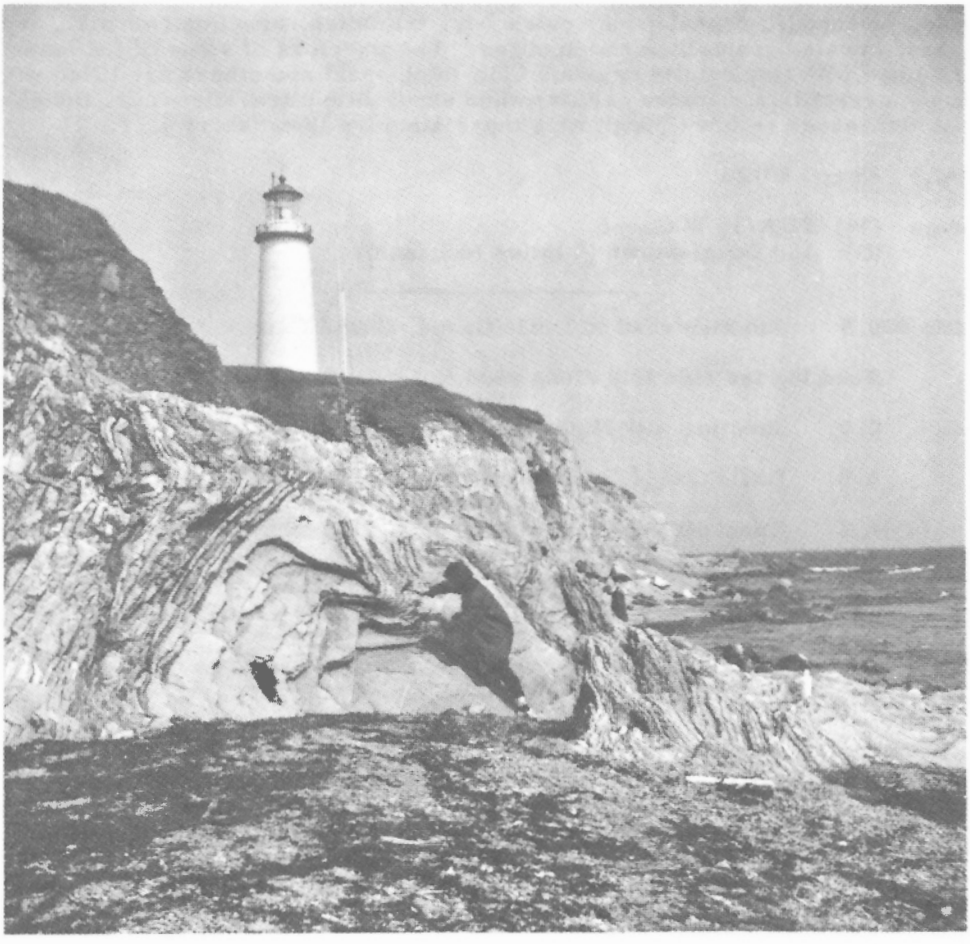


Plate X. Contorted shale and limestone beds at Cap-des-Rosiers; fossil bearing cliff rocks are exposed in background.

Maps (T): 22 A/16 E Gaspé.
(G): 180 Douglastown (4 miles to 1 inch).

Mile 435.1 Junction road to Bon-Ami Park; continue along Highway 6.

437.1-438.5 Road-cuts

FOSSILS, CALCITE.

In cherty limestone.

Fossils of Devonian age are abundant in the light greyish brown limestone of the Grande Grève formation exposed by the road-cuts along Highway 6. The fossils identified from this formation are: brachiopods, pelecypods, gastropods, pteropods, cephalopods, ostracods, trilobites, annelids (worms), bryozoans, corals, graptolites and sponges. The interiors of some of the fossils are lined with tiny calcite crystals (dog-tooth spar) and others are filled with finely crystalline massive calcite; when exposed to ultraviolet rays, the calcite fluoresces yellow ("long" rays more effective than "short").

Ref.: 87 pp. 63-73.

Maps (T): 22 A/16 W Gaspé.
(G): 180 Douglastown (4 miles to 1 inch).

Mile 439.5 Junction road to Little Gaspé, Gaspé Cape.

Road log for side trip along road to Little Gaspé and Gaspé Cape:

Mile 0.0 Junction with Highway 6; turn left (east).

0.9 Little Gaspé, at post office.

4.2 Turn-off (right) to wharf.

4.35 Little Gaspé lead mine on left.

4.4 to 7.4 Road-cuts.

10.0 Cape Gaspé lighthouse.

Little Gaspé Lead Mine

GALENA, CERUSSITE, HYDROCERUSSITE, CALCITE, SPHALERITE, CHALCOPYRITE; FOSSILS.

In veins cutting brecciated limestone.

Galena occurs as cubes up to 1 inch across in association with small amounts of sphalerite and chalcopyrite in calcite. The secondary minerals -

cerussite and hydrocerussite – form a soft cream-white (fluoresces yellow under ultraviolet rays) encrustation on galena. The calcite is white, coarsely crystalline and fluoresces a very bright pink when exposed to "short" ultraviolet rays. Fossils similar to those listed in the road-cuts on Highway 6, occur in the host rock (Grande Grève limestone). This deposit was known by the Micmac Indians long before the first attempt to mine it was made in about 1665 by the Intendant Jean Talon, who engaged a company of French miners under the direction of a Dutch engineer to develop what he hoped would be a silver mine. This is believed to be the first mining venture in Canada; it was not a success. In the mid-1800s, about 20 tons of ore were mined by a 20-foot shaft. Subsequent unsuccessful attempts at mining were made here, and near the shore at Indian Cove, about 3 miles down the road toward Gaspé Cape. The old shaft is in the woods on the north side of the road (mile 4.35) and about 20 yards above it, at a point about 75 yards east of the turn-off to the Dollard Langlais farmhouse (or, 0.15 mile beyond the turn-off to the wharf). There are very few specimens at this opening, but galena in calcite can be found in the broken limestone blocks at the side of the road below the shaft. The deposit is also exposed 20 feet above the shore in the cliff 200 yards east of the wharf. From this point an adit leads to the shaft. Ore-bearing specimens fallen from the cliff can be found on the beach at low tide in the vicinity of the adit.

Refs.: 3 p. 162; 5 pp. 105-106.

Maps (T): 22 A/16 E Gaspé.
(G): 180 Douglastown (4 miles to 1 inch).

Road-cuts, Cape Gaspé Road

FOSSILS, CALCITE.

In limestone.

The fossils found in the Devonian limestone formation exposed by the road-cuts are the same as those listed for the road-cuts along Highway 6 (mile 437.1 to 438.5). Crystalline white calcite veins (about an inch wide) in the limestone fluoresce pink under ultraviolet rays. The road-cuts are between mile 4.4 and mile 7.4 of the road log to Cape Gaspé. The fossil-bearing rock formation is also exposed in the cliff below the lighthouse at Cape Gaspé (mile 10.0).

Maps (T): 22 A/16 E Gaspé.
(G): 180 Douglastown (4 inches to 1 mile).

Mile 440.4 Junction, road to Cap-aux-Os shore and wharf.

Shoreline Exposures

PYRITE, JAROSITE, FOSSILS; JASPER.

In sandstone, shale, mudstone; as beach pebbles.

Spherical concretions, about an inch in diameter, composed of an assemblage of tiny pyrite grains and yellow, powdery jarosite cemented by fossiliferous sandstone occur in the grey sandstone cliffs. The sandstone in the concretions is finer grained, more compact and of a darker colour than the enclosing rock. Dark rusty brown iron oxide coats the surface of the concretions. Devonian plant fossils (leaves and stems), brachiopods and pelecypods occur in the sandstone. Leafy plant fossils 2 to 3 feet long have been reported from the locality. Some of the sandstone beds contain pebbles of quartz, flint, jasper, granite, quartzite and syenite. Jasper pebbles, generally 1 inch to 2 inches across, are deep red, yellow or green and are traversed by tiny veinlets of quartz and magnetite. They are found along the beach in the vicinity of the old wharf. The fossil-bearing beds occur in the cliffs at the cape (Gros-cap-aux-Os) about 500 yards west of the wharf.

About 450 yards east of the wharf, the cliffs on the west side of a brook expose more Devonian fossils; pelecypods, eurypterids and fossil fish (Cephalaspis) occur in dark grey shale beds, and fossil plants and fish (Cephalaspis; Placoderms) and eurypterids occur in the greenish grey mudstone beds. Another plant locality is about 100 yards farther east. The wharf is 0.1 mile from Highway 6 at mile 440.4. Collect at low tide.

Refs.: 87 pp. 84-87; 90 pp. 11-19; 107.

Maps (T): 22 A/16 W Gaspé.
(G): 180 Douglastown (4 miles to 1 inch).

Mile 446.0 Junction (on left) road to Penouille shore.

Penouille Iron Occurrence

HEMATITE; JASPER.

In sandstone and shale.

Greyish green sandstone containing dark brown to almost black hematite-sandstone nodules (up to 2 inches across) and reddish brown hematitic shale beds are exposed along shoreline cliffs at Penouille. The nodules are more dense than the surrounding rock and are spherical or irregularly rounded in shape. Pebble-bearing sandstone similar to the Cap-aux-Os rocks is exposed here, and dark red to reddish brown jasper pebbles are found on the beach. The jasper is dark coloured due to magnetite inclusions and not very attractive for ornamental purposes. The deposit is accessible on the east side of the access road that leads from Highway 6 (at mile 446.0) to the shore. The distance from the highway is 0.1 mile. Collect at low tide.

Ref.: 90 pp. 115-116.

Maps (T): 22 A/16 W Gaspé.
(G): 180 Douglastown (4 miles to 1 inch).

Mile 451.8 Junction Highway 6A; continue along Highway 6.

458.9 Gaspé, at intersection where Highway 6 turns left (to bridge), and rue de la Reine.

Road log from Gaspé village for side trip to Murdochville:

Mile 0.0 At intersection where Highway 6 turns left to bridge, continue straight ahead (west) along rue de la Reine.

28.3 to 30.8 Road-cuts.

32.3 Road-cuts.

46.0 Road-cuts.

52.4 Road-cuts.

59.4 Murdochville, at junction; turn left onto road to Anse Pleureuse.

60.6 Gate, on left, to mine office of Gaspé Copper Mines Limited.

Road-cuts

FOSSILS.

In grey sandstone.

Plant fossils of Devonian age are abundant in the sandstone exposed by road-cuts at the points mentioned in the road log to Murdochville. This rock is similar to the plant-bearing sandstone at Cap-aux-Os but is finer grained and is of a lighter colour.

Ref.: 87 pp. 78-84; 90 p. 40.

Maps (T): 22 A/14 E and W York Lake.
(G): 175 Headwaters Bonaventure River (4 miles to 1 inch).

Gaspé Copper Mines Limited

CHALCOPYRITE, PYRRHOTITE, BORNITE, CHALCOCITE, TENNANTITE, CUBANITE, PYRITE, GALENA, SPHALERITE, MOLYBDENITE, NATIVE BISMUTH, SCHEELITE, AZURITE, MALACHITE, LIMONITE, CHRYSOCOLLA, TENORITE, WOLLASTONITE, GARNET, DIOPSIDE, TREMOLITE, SANIDINE, SCAPOLITE.

In altered Devonian sediments.

The most abundant sulphides in the Needle Mountain orebody are chalcopyrite (the most important ore mineral of copper) and pyrrhotite. They are

intimately associated forming fine-grained aggregates. Bornite occurs as individual grains and as a mixture with chalcopyrite. Other metallic minerals occurring in smaller amounts within the orebody are chalcocite, tennantite, cubanite, pyrite, sphalerite, galena, molybdenite, and scheelite. Native bismuth (identified in polished section by W.D. McCartney, Geological Survey of Canada) occurs in chalcopyrite but is visible only microscopically. The secondary minerals are malachite, azurite and limonite. Wollastonite occurs as white fibrous masses in lime-rich rocks. Brown garnet and green diopside are associated with tremolite, scapolite, sanidine and quartz, forming a fine-grained rock that carries the ore minerals.

At the Copper Mountain deposit, chalcopyrite and pyrite are the chief metallic minerals. They occur in narrow quartz veins cutting altered and brecciated limestone, and are associated with minor amounts of chalcocite, molybdenite, sphalerite, galena, bornite, limonite, malachite, azurite, chrysocolla and tenorite (melaconite). The chrysocolla is very fine grained, compact, turquoise coloured, and commonly contains small patches of black, fine-grained tenorite; the specimens of chrysocolla are, in general, not large enough for lapidary purposes. Some of the quartz veins measure up to 4 inches wide and have vugs lined with quartz crystals. The orebody yields less than 1 per cent copper as compared with the Needle Mountain ore of 1 1/2 to 2 per cent copper.

The deposit was discovered in 1909 when a specimen of copper-bearing float was found on the York River by A.E. Miller (of Sunnybank) while he was timber cruising; a few years later his brother, Rupert Miller, located similar specimens near the outlet of York Lake about 5 miles farther up.

In 1912 the Miller family staked Copper Mountain after finding the source of the float and numerous trenches were dug. Further prospecting by Noranda Mines Limited (1938-1940) led to the discovery of richer ore in Needle Mountain, about a mile south of the original discovery. Since 1948 the deposits have been developed by Gaspé Copper Mines Limited. The Needle Mountain deposit has been worked by open pit and underground methods (adits and shafts) since 1952. The mill has operated since 1955 except for 2 months in 1957 when the mill workers went on strike. The mine is Quebec's largest producer of copper and is also a producer of gold, silver, bismuth and selenium. The Copper Mountain deposit is being prepared for production in 1967.

Tours for visitors are conducted through the surface workings on Tuesdays and Thursdays at 9:00 a.m. and 2:00 p.m. from mid-June to mid-September. Those wishing to participate should be present at the mine office just before these times.

Refs.: 1 pp. 6-12; 16 pp. 388-393; 55 pp. 425-430; 65 pp. 58-74; 89 pp. 50-55.

Maps (T): 22 A/13 E Lac Madeleine.
(G): 175 Headwaters Bonaventure River (4 miles to 1 inch).

Mile 463.6 Junction (on left) road to Sandy Beach.

465.6 Junction (on left) road to Haldimand shore.

Mile 478.6 Seal Cove shoreline on left.

Shoreline Deposits (Sandy Beach, Haldimand, Seal Cove)

JASPER, AGATES.

As pebbles on beaches.

Reddish brown jasper and yellowish to reddish brown agate (including jasper-agate) occur on these beaches. They are not plentiful but sufficient material is recovered to meet part of the local supply for jewellery-making. The access roads to the first two localities are about 1/2 mile long; the third locality is about 100 yards off the highway. Collect at low tide.

Maps (T): 22 A/16 W Gaspé.

(G): 180 Douglastown (4 miles to 1 inch).

Mile 481.1 Anse-à-Brillant, at junction road to shore.

Tar Point Shoreline

JASPER, CHALCEDONY; FOSSILS, PETROLEUM.

As beach pebbles; in sandstone.

Pebbles of deep red and yellow to brown jasper and of chalcedony (agates) in grey, yellow-brown and reddish tones can be found at low tide on the shore in the vicinity of the Anse-à-Brillant wharf and north of the wharf toward Tar Point, a distance of about 1 mile. The jasper is commonly traversed by tiny magnetite veinlets. Chalcedony pebbles, similar to those found at L'Échouerie, Cloridorme, etc., were found here too. The fossils are Devonian plants including Cordaites, Cyclostigma, Lepidodendron, Poacites, Prototaxites, and Psilophyton; they occur in the grey sandstone exposed along cliffs north of the Anse-à-Brillant wharf.

Petroleum seepages in the area have been known since 1836 and in 1860 the first test wells were drilled. An example of an oil seepage can be observed in the cliffs 1/2 to 1 mile north of the wharf. The oil is black, partly viscous, and was noticed in the cliffs and in the broken sandstone blocks on the shore. About a mile north of the wharf, there is a petroleum-bearing dyke cutting the sedimentary rocks.

The Anse-à-Brillant wharf is connected to Highway 6 by a road 0.2 mile long. Collect at low tide.

Refs.: 87 pp. 84-87, 119-125; 90 pp. 14, 40-41.

Maps (T): 22 A/9 W Percé.
(G): 180 Douglastown (4 miles to 1 inch).

Mile 489.9 Shoreline on left (for description of deposit, see Pointe St-Pierre below).

490.4 Junction, on left, road to Pointe St-Pierre Wharf.

Pointe St- Pierre Shoreline (Plates XI, XII)

JASPER, MARBLE, CHALCEDONY.

As pebbles on beach and in conglomerate.

Jasper pebbles averaging 1 inch to 2 inches in diameter in dark tones of green, mustard yellow, orange, red, brown and black are found as loose pebbles and in shoreline exposures of dark reddish brown conglomerate. Most of the pebbles are composed of more than one colour and have a mottled or streaked pattern. Pebbles of crystalline limestone averaging about 4 inches in diameter are also found along the beach. They are white to greyish white, pink, pale yellow, grey, or light brown traversed by thin veinlets of white calcite. A few pebbles of translucent to opaque chalcedony in tones of grey, yellow and brownish red, were also found on the beach. The jasper pebbles from this locality are more abundant and colourful, and show greater potential as an ornamental stone than the pebbles from other localities on the Gaspé coast.

This deposit is easily accessible at the shoreline opposite miles 489.9, 491.7, and 493.4, and in the little bay, on the west side of the Pointe St. Pierre wharf. A road 0.2 mile long leads east from Highway 6 to the wharf.

Collect at low tide.

Maps (T): 22 A/9 E Percé.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 491.7 Shoreline, on left (JASPER, MARBLE, CHALCEDONY).

493.4 Belle-Anse, shoreline on left (JASPER, etc., the deposits at these two localities are similar to the one at Pointe St. Pierre, but fewer pebbles are available).

Mile 503.3 Shoreline. Corner of the Beach (Coin-du-Banc).

JASPER, CHALCEDONY, MARBLE.

As pebbles on beach.

Chalcedony, varying from translucent banded (agate) to opaque, occurs as rounded and irregularly shaped pebbles measuring up to 4 or 5 inches across. It is commonly in shades of white, grey, pink, pale yellow, and pale brown. Most of the jasper is a brownish red or a maroon-red colour. Some pebbles are opaque, pale brownish yellow or grey, resembling chert. The marble (crystalline limestone) pebbles are numerous at this beach. They are generally well water-worn and have a dull, pitted surface, but are easily

Plate XI. Sea-eroded shoreline at Pointe St-Pierre; conglomerate in foreground cliffs contains jasper, chalcedony, marble, etc., pebbles.

Plate XII. Close-up showing conglomerate containing jasper, etc.

recognized by their relative softness and by their banded appearance. They are white, pale grey, pale yellow, light and medium brown, pink to reddish or pale green, and are generally banded or less commonly, mottled in one or more of these tones. Specimens of marble up to 10 inches in diameter are found and are used locally for making lamps, book-ends, paper-weights, penholders, etc. It is also suitable for carving. Calcite bands and veins in the marble fluoresce bright pink (especially bright under the "short" ultra-violet rays). Collectors may expect to find agates and jasper at numerous shoreline localities between Corner of the Beach and Nouvelle but not always in quantity. It is believed that the pebbles originate from the red carboniferous conglomerate rocks in this area. Collecting should be done at ebb tide and the best time is after a storm has worked up the shore. The more accessible localities between this point and Nouvelle will be noted in the road log.

Maps (T): 22 A/9 W Percé.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 509.0 Percé, at entrance (on left) to North Beach (Anse du Nord).

Shorelines: North Beach, Cap Barré, Mont-Joli, Percé Rock
see Frontispiece

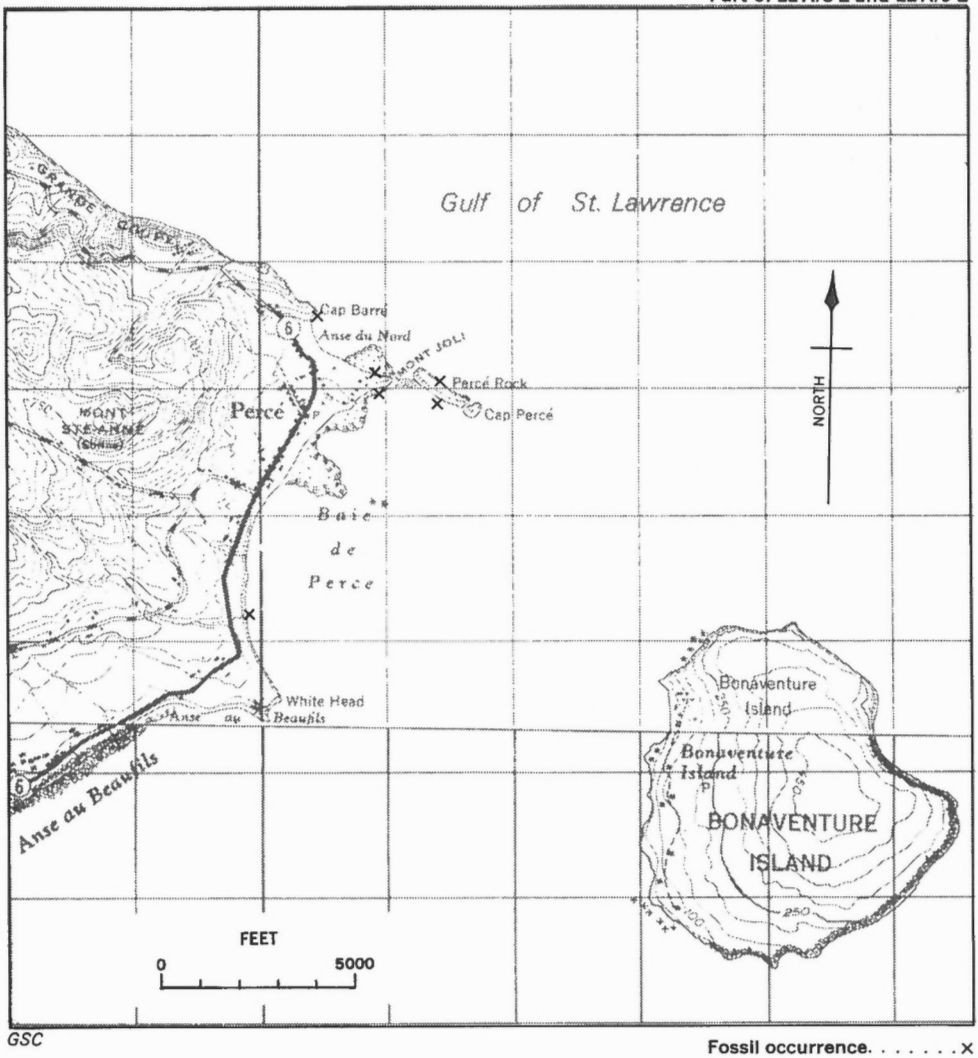
JASPER, CHALCEDONY, MARBLE; FOSSILS, CALCITE.

As pebbles on beach; in limestone and shale.

The pebbles of jasper, chalcedony (agate) and marble are similar to those found at Corner of the Beach, but are generally smaller and less plentiful. They are found along North Beach and other beaches in the area. The promontory on the north side of North Beach is Cap Barré and the one on the south side is Mont-Joli. The Cap Barré cliffs expose moderately dipping grey Devonian limestone and shale, sparsely fossiliferous (trilobites and brachiopods) and veined with plain white or white, yellow and pink banded calcite; the white calcite fluoresces yellow when exposed to ultraviolet rays ("long" or "short"). The shoreline cliffs at Mont-Joli are composed of alternating vertical beds of grey sandstone and shale containing Devonian trilobites, corals and brachiopods. The cliffs on the south side of Mont Joli expose grey limestone and shale containing Ordovician trilobites and brachiopods.

Percé Rock is connected, at ebb tide, to the extremity of Mont-Joli by a sand bar. It is composed of vertical limestone beds containing abundant Devonian fossils – trilobites, brachiopods, pelecypods and gastropods – and veins up to 6 inches wide, filled with white, yellow and reddish massive calcite and colourless to white calcite crystals. The limestone is predominantly light to medium brown tinted with yellow, orange, red and purple; the colour is believed to be due to down-wash from a layer of deep brownish red Bonaventure conglomerate (of which Bonaventure Island is composed) that at one time capped the Rock. The cliffs are steep and friable and are dangerous to climb. Numerous fossiliferous rock fragments fallen from the cliffs lie on the shoreline and can be examined at low tide. The south side of Percé Rock may be reached on foot, but a boat is needed to explore the north side.

Part of 22 A/8 E and 22 A/9 E



Map 8. Percé area.

The Rock was regarded by the early explorers as a cape: in 1527, John Rut called it Cap de Prato (after a Canon at St. Paul's, London) and in 1534 Jacques Cartier referred to it as Cap du Pré. Champlain, in 1603, named it Isle Percée in allusion to the sea-eroded, arched passages through the rock mass. In 1845, the arch of the passage near the eastern extremity was severed by a sea storm leaving the split now visible at the seaward end. Records indicate that in the 1600s there were 3 or 4 arches. One of the best vantage points to observe these erosion features is the lookout, south of village at mile 510.8.

Refs.: 6 pp. 66-68; 31 pp. 134-171; 32 pp. 95-103; 38 p. 350; 87 p. 66; 91 pp. 2-21.

Maps (T): 22 A/9 E Percé.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 510.8 Lookout, on left. The lookout is on top of White Head (Cap Blanc) and provides a view-point of Percé Rock, 1 1/2 miles to the north.

Road-cut opposite Lookout

FOSSILS.

In limestone.

Trilobites and brachiopods are found in the grey Ordovician limestone exposed on the west side of the highway and in outcrops in the vicinity of the Cap Blanc lighthouse. The shoreline cliffs beneath the lighthouse are composed of this limestone.

Ref.: 38 p. 350.

Maps (T): 22 A/9 E Percé.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 515.7 Anse-à-Beaufils, at junction road to wharf.

518.9 Cap-d'Espoir, at junction road to wharf.

Shoreline: Anse-à-Beaufils to Cap-d'Espoir

CHALCEDONY (AGATE), JASPER, MARBLE.

As pebbles on beach.

This deposit is similar to the one at Corner of the Beach, and is one of the best localities for collecting agates. The patterns are varied and the predominant colours are grey, pink, bluish grey and green; yellow, orange, and red tones are more common along the shore south of Cap-d'Espoir and on the Baie des Chaleurs beaches of Quebec and New Brunswick. Deep red and mustard yellow jaspers are common. The shore is accessible by the roads

leading to the Anse-à-Beaufils and Cap-d'Espoir wharves located about 100 yards east of the highway. The 3-mile shore from Anse-à-Beaufils to Cap-d'Espoir parallels Highway 6 and access to it can be made from several places. Collect at low tide.

Maps (T): 22 A/8 W Cap-d'Espoir.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 522.9 Ste-Thérèse-de-Gaspé, at junction road to wharf.

527.7 Grande-Rivière, at junction road to wharf.

Shoreline: Ste-Thérèse to Grande-Rivière

CHALCEDONY (AGATE), JASPER, MARBLE.

As pebbles on beach.

The translucent yellow, orange, red and pinkish brown varieties of chalcedony are more common along this shore than on those previously described. Pebbles of one colour are most common, but banded and mottled varieties are also found. Most of the pebbles found measured less than an inch across; a careful search at a favourable time (e.g. early spring) might produce larger ones. The jasper is mostly deep red coloured and the marble (crystalline limestone) is similar to that previously described at other localities.

The shoreline deposits are accessible at low tide; the Ste-Thérèse shore is 0.1 mile from the highway, and the Grande-Rivière shore is 0.3 mile. The gravel pit on the side of the highway (at mile 527.7) between these villages yields jasper and marble pebbles and possibly chalcedony.

Maps (T): 22 A/8 W Cap d'Espoir.
(G): 330A Chaleur Bay Area (4 miles to 1 inch).

Mile 537.1 Chandler, at tourist information centre and turn-off to business section.

Chandler Shoreline (Plate XIII)

HEMATITE, JASPER, CALCITE; MARBLE.

In lenses cutting greenish grey quartzite and slate; as pebbles on beach.

The lenses consist of white quartz, red to purplish-red quartz-hematite mixtures, and fine-grained masses of deep red jasper. There do not appear to be patches of pure jasper large enough for lapidary purposes. Thin streaks of fine-grained hematite occur in the quartz and in the quartz-hematite mass. Calcite is associated with the quartz and it fluoresces pink under ultraviolet rays ("long" and "short" rays). This iron-bearing rock is exposed along the shore for about 1/2 mile beginning just east of the Chandler wharf. Pebbles and water-worn boulders of marble (up to 8 or 9 inches

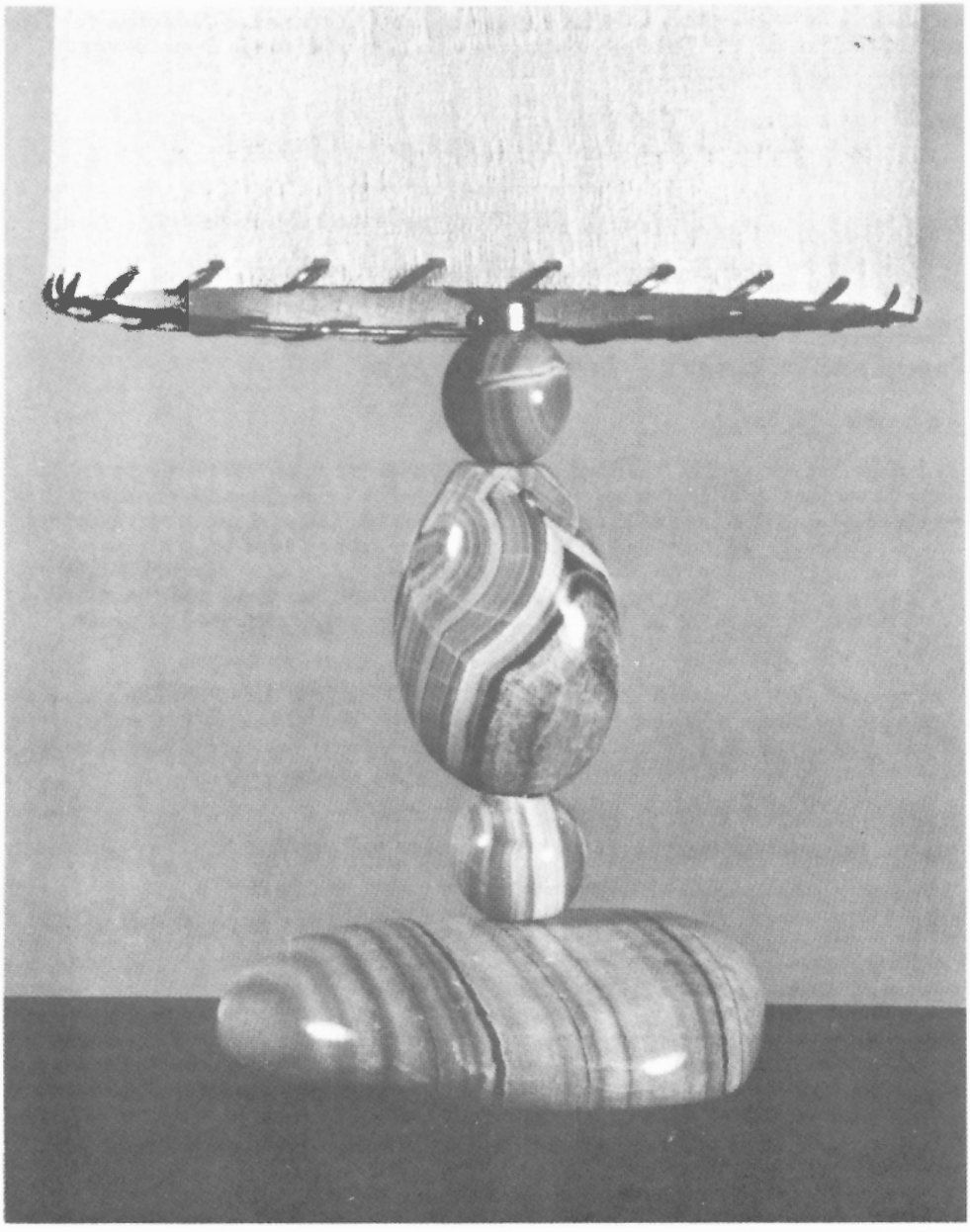


Plate XIII. Table lamp (14 inches high) made by Hector Gervais, Chandler, of polished pebbles of banded marble found along Corner of the Beach — Chandler shoreline.

across) are found along beaches at Chandler and are used locally as ornamental objects (lamps, ash-trays, penholders, etc.) Plate XIII. The marble (crystalline limestone) is generally banded or, less commonly, mottled; the most common colours are pink, light green, light brown, cream-white, grey, pale brownish yellow, and white. The larger boulders are available only in early spring, and after storms. Jasper pebbles occur on the same beaches. These pebbles and boulders may be found at low tide along the shore 1/2 to 3/4 mile east of the wharf, and on beaches south of the town.

Road log to wharf from mile 537.1:

Mile 0.0 At tourist information booth, bear left and follow rue Commercial est.

0.7 Turn left just beyond Municipal park and proceed over railway tracks.

0.8 Turn left onto LaBaie Street.

1.0 Wharf.

Ref.: 12 p. 11.

Maps (T): 22 A/7 E Chandler.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 546.6 Turn-off (left) to Anse-à-Blondel.

Copper Occurrence

CHALCOCITE, MALACHITE, PYRITE, MAGNETITE, EPIDOTE.

At contact between volcanic rocks and quartzite.

Chalcocite occurs sparingly as small fine grained patches with grains of pyrite in quartz and in green volcanic rocks. Apple green malachite forms a fine grained coating or thin crust on chalcocite, pyrite, quartz and the host rock. Fine-grained magnetite and fine, granular to platy, thin lenses of epidote occur in quartz veins. The deposit is on the north side of Anse-à-Blondel. A pit has been dug into the cliff about 20 feet above the beach, and a few broken ore-bearing blocks can be found at low tide below the opening. This is about 200 yards east of the highway at mile 546.6 and can be reached by a trail.

Ref.: 12 p. 10.

Maps (T): 22 A/7 E Chandler.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 558.4 Bridge over Rivière de l'Anse-à-la-Barbe.

558.4
to
561.6 Road-cuts

FOSSILS, CALCITE.

In limestone, shale and sandstone.

This series of road-cuts exposes Silurian rocks rich in fossils. Corals, stromatoporoids, crinoids, brachiopods, cephalopods, and trilobites have been found in the grey limestone and shale. Some of the limestone is knobby and weathers reddish or brownish grey. A fine-grained, grey, shaly sandstone contains worm burrows, gastropod trails, corals, stromatoporoids and cephalopods; these fossils are abundant in the eastern exposures near the bridge. A pink-and-white metamorphosed limestone containing numerous corals and crinoids occurs with the grey rocks, particularly in the exposures toward Port-Daniel village. This rock is more accessible at the quarry near the wharf. Pink and white, fine-grained to crystalline calcite veins cut the limestone and shale; it fluoresces very bright pink when exposed to ultraviolet rays ("short" rays most effective). In the road-cut at mile 561.6, the grey fossiliferous limestone is cut by 6-inch veins of banded calcite composed of white, grey, pink and pinkish brown bands; this calcite fluoresces yellow ("long" rays most effective). White columnal corals, several inches long, may be found here, but are more common at the wharf locality. The fossiliferous rocks seen at the road-cuts are also exposed along the shore eastward for about 6 miles from the Port-Daniel wharf.

Parts of this shore are accessible at low tide.

Ref.: 93 pp. 23-53.

Maps (T): 22 A/2 W Port Daniel.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 561.3 Junction, on left, single lane road.

Limestone Quarry

FOSSILS.

A pink and white crinoid-and-coral-bearing limestone has been quarried here. For description see next locality. From Highway 6, proceed south along the single lane road for 0.2 mile to a fork; bear right and continue 0.1 mile to the quarry at the side of a wooded hill.

Maps (T): 22 A/2 W Port Daniel
(G): 330 A Chaleur Bay Area (4 miles to 1 inch)

Plate XIV. Polished surface of pink crinoidal limestone (marble) from Port-Daniel shoreline deposit (at wharf).

Mile 561.9 Port-Daniel Est at church and junction road to wharf.

Shoreline Exposures and Quarry near wharf (Plate XIV)

FOSSILS, LIMESTONE.

This locality furnishes the metamorphosed fossiliferous Silurian limestone previously mentioned. It is a fine-grained, compact, delicately-coloured rock composed of crinoids and corals filled with white calcite and cemented by white to pink and reddish calcite; the well-defined edges of the fossils are outlined in reddish tones producing an attractive contrast. A less common variety has white to pink and reddish orange fossil fragments in a pea-green to greyish green and light greyish brown matrix; these fossils are not distinctly outlined and the polished surface has a pleasant mottled or clouded appearance (Plate XIV). Both varieties take a very good polish and are suitable for ornamental or decorative purposes.

White columnar corals several inches long are common in the limestone. The rock is exposed in the cliffs east of the Port-Daniel wharf, and was quarried here about 60 years ago for use in the pulp mill at Bathurst. Broken blocks and water-worn pebbles and boulders are plentiful on the beach and their colours and patterns are readily apparent in the water. The grey fossiliferous (corals, stromatoporoids, crinoids, brachiopods) limestone and shale occur at this locality and fossils weathered from the rock can be found along the beach at low tide. Road-cuts along the wharf road for 1/4 mile south of the church and the adjacent shore expose dark grey, partly knobby limestone containing corals and brachiopods.

Access to the wharf is by a road, 0.9 mile long, leading south from Highway 6 at the church (mile 561.9).

Refs.: 57 pp. 255-256; 93 pp. 23-63.

Maps (T): 22 A/2 W Port Daniel.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 562.5 Port-Daniel Station, at railway station on right.

Port-Daniel Barachois

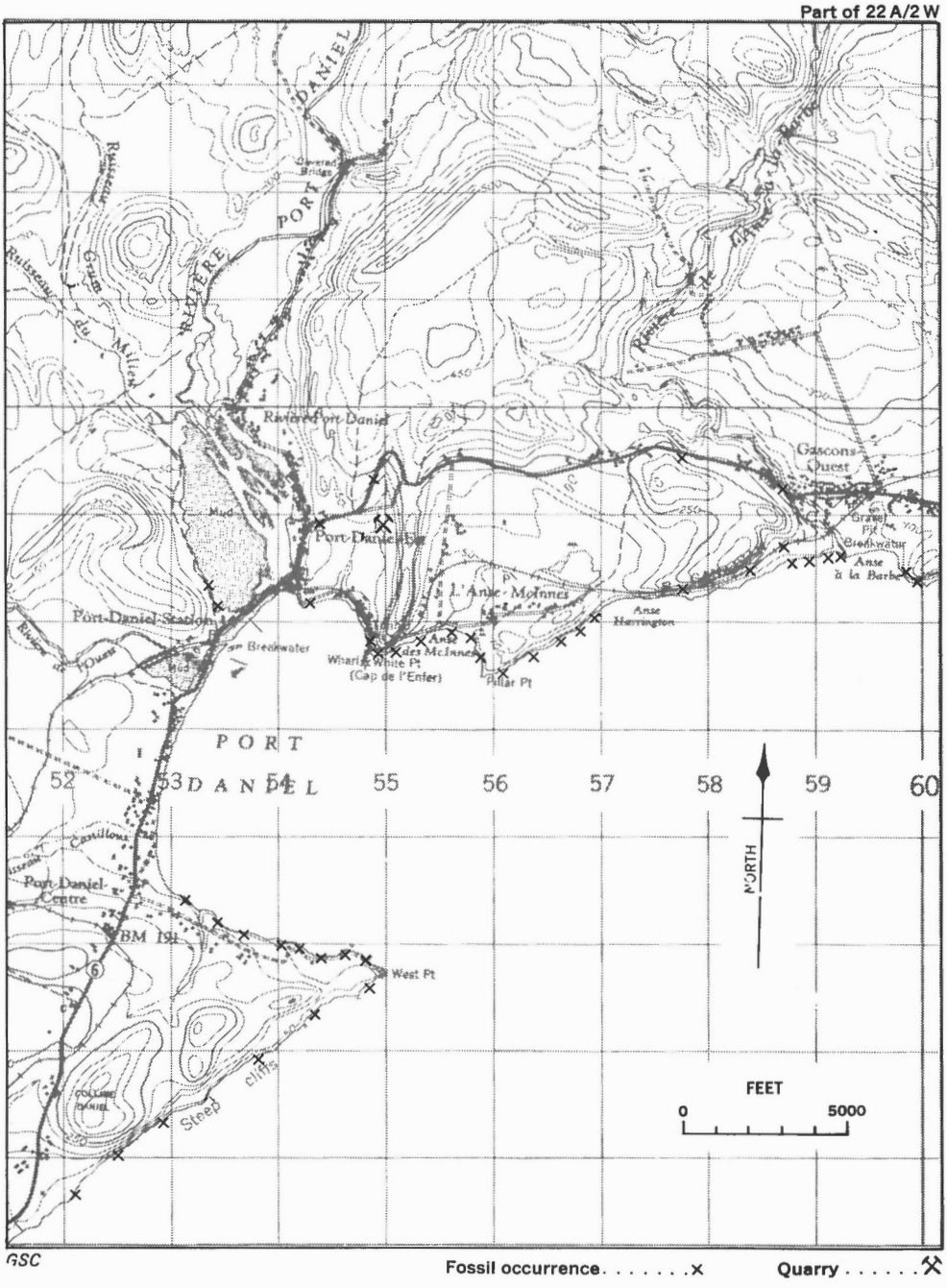
FOSSILS.

On beach.

Fossils of Silurian age are found on the southwestern shore of the mouth of Port Daniel River, about 400 yards north of the railway station. Brachiopods (up to 4 1/2 inches long), trilobites, cephalopods, and 25 species of corals have been obtained. The fossils have been weathered by springs and tides from the limestone that underlies glacial drift and alluvium. Access is by a road leading north from Highway 6 (on the north side of the railway crossing); it parallels the beach at the fossil locality.

Refs.: 93 p. 34; 110 p. 47.

Maps (T): 22 A/2 W Port Daniel.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).



Map 9. Port Daniel area.

Mile 564.1 Junction, on left, road to West Point lighthouse.

West Point Shoreline

FOSSILS

In limestone and sandstone cliffs.

Corals, stromatoporoids, crinoids, brachiopods, worm burrows and gastropod trails occur in the Silurian rocks exposed along the south shore of Port Daniel bay west of the lighthouse. The accessible localities are just off the road leading to the West Point lighthouse; it closely parallels this shore from a point 1.1 to 1.6 miles from Highway 6. Collect at low tide.

Ref.: 93 pp. 36-43.

Maps (T): 22 A/2 W Port Daniel.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 585.2 New-Carlisle.

Shoreline

CHALCEDONY, JASPER.

As beach pebbles.

Attractive red, orange-red and brownish red chalcedony, including red with white banded varieties (agate), and orange-red to deep red jasper are found at low tide along the Chaleur Bay shore at New-Carlisle. The pebbles measure up to 1 1/2 inches across and are used locally for jewellery.

Maps (T): 22 A/3 W New Carlisle.
(G): 330 A Bay of Chaleur Area (4 miles to 1 inch).

Mile 600.6 St-Siméon, at path to shore.

Shoreline

JASPER, CHALCEDONY (CARNELIAN).

As pebbles on beach (not abundant).

Maps (T): 22 A/4 E New Richmond.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 615.3 New Richmond, at junction (on left) road to wharf, just beyond railway crossing.

Black Cape Shoreline

FOSSILS, CALCITE, JASPER, CHALCEDONY.

In limestone, shale; as beach pebbles.

Corals, stromatoporoids, brachiopods and worm burrows occur in the Silurian limestone and shale cliffs exposed for about 2 miles east of the wharf. Corals are abundant on the beach at the first cove east of the wharf. White to pink crystalline calcite in veins (up to 4 inches wide) cutting the sediments fluoresces very bright pink when exposed to ultraviolet rays ("short" rays most effective). Calcite that fluoresces yellow under 'long' ultraviolet rays occurs in some of the fossils. Pebbles of red jasper and grey, yellow and reddish chalcedony are found on the beaches.

The wharf is 1/2 mile from Highway 6. Collect at low tide.

Ref.: 93 pp. 53-63.

Maps (T): 22 A/4 W New Richmond.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 620.5 Junction Trans-Gaspésien highway (to Gaspé Park, Ste-Anne-des-Monts); continue along Highway 6.

621.2 Bridge over Cascapedia River, and junction gravel road (west end of bridge).

Limestone Quarry

The limestone is fine grained, compact, mottled grey, dark red and white. It is quarried for agricultural purposes. The quarry is on the west side of the road that leads north from Highway 6 at a point just west of the bridge over the Cascapedia River; it is 2.2 miles north of the turn-off.

Maps (T): 22 A/4 W New Richmond.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 629.5 Maria, shoreline on left.

636.5 Carleton shoreline on left.

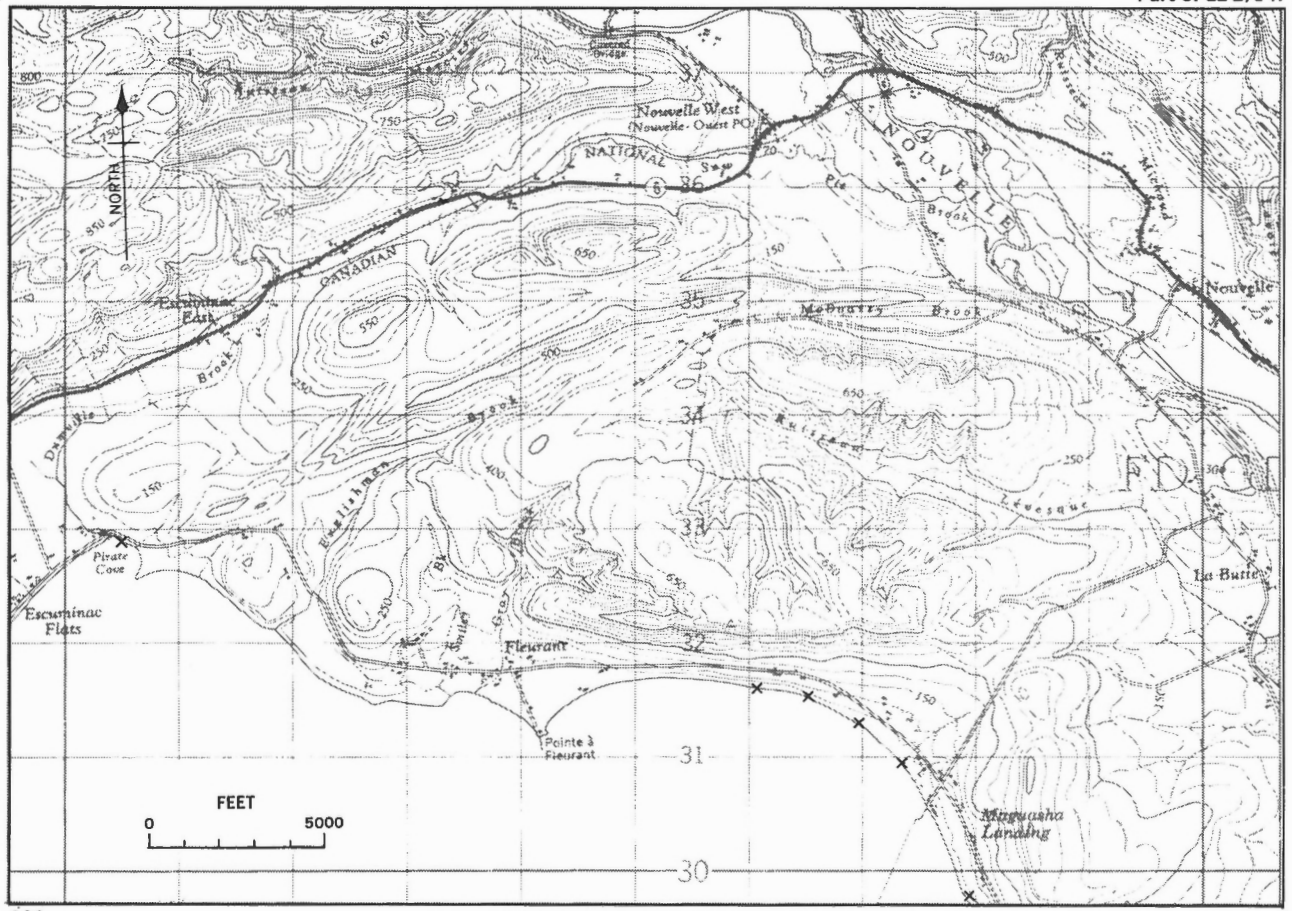
Maria and Carleton Beaches

JASPER, CHALCEDONY.

As pebbles on beaches.

Red jasper, yellow to red and reddish brown chalcedony, and a few agates are found on these shores when the tide is low.

Maps (T): 22 A/4 W New Richmond.
22 B/1 E Escuminac.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).



Fossil occurrence x

Map 10. Escuminac Bay area.

Mile 646.6 Nouvelle, at junction, road to Maguasha Landing and ferry to New Brunswick.

Shoreline, Maguasha Landing.

FOSSILS, CONCRETIONS, PYRITE.

In sandstone and shale.

Fossil fish and plants occur in the Devonian rocks exposed along the shore at Maguasha Landing. The fish are found in shale and in the rounded concretions (up to three feet in diameter) in the shale. Fish (Eusthenopteron) two to three feet long have been found in the shale beds. The fish-beds are exposed at intervals in the cliffs from 500 yards to 2,100 yards west of the ferry landing, and at a locality 1/2 mile southeast of the landing. Fossil plants, including ferns, occur in the cliffs at various localities from the landing westward for about 2,100 yards. Pyrite crystals are common in the fossil-bearing rocks.

The ferry landing is 4 miles from Highway 6. Collect at low tide.

Refs.: 6 pp. 88-89; 90 pp. 22-23, 43; 106.

Maps (T): 22 B/1 W Escuminac.
(G): 286 A Escuminac.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 654.6 Junction (on left) road to Pirate Cove, Fleurant.

Pirate Cove Shore

FOSSILS, COAL.

In shale.

Fossil plant fragments of Devonian age occur in the shale exposed at the mid-tide level in Pirate Cove just east of the mouth of Dumville Brook. The shale is interbedded with conglomerate. A 2 1/4-inch seam of coal has been reported from this locality.

Road log from Highway 6 at mile 654.6.

Mile 0.0 Proceed south along paved road to Fleurant.

0.8 Junction shore road; turn left.

1.2 Bridge over Dumville Brook. Pirate Cove is on the right. After crossing bridge walk to fossil-bearing rocks on right.

Ref.: 90 pp. 22-23, 43.

Maps (T): 22 B/1 W Escuminac.
(G): 286 A Escuminac.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 655.5 Bridge over Escuminac River.

664.6 Road-cut on right.

FOSSILS.

In grey sandstone.

Devonian plant fossil fragments were found in this road-cut.

Maps (T): 22 B/2 E Oak Bay.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 669.4 Junction, single lane road (on right) to quarry.

Volcanic Rock Quarry

STILBITE, MORDENITE, CHLORITE, CALCITE.

In volcanic rock.

Stilbite occurs as colourless to reddish white and orange-red, fine, platy aggregates in fracture planes (about 1/8 inch wide) in dark reddish black and dark brown dense volcanic rock; in places, it forms thin, waxy, orange-red patches and streaks on rock surfaces. Mordenite, as greyish white, fine, fibrous aggregates, occupies irregularly shaped cavities in the rock; it also occurs as a mixture with stilbite forming a white to orange-red coating. Pale to medium green, dull, waxy chlorite forms thin crusts on the rock. Associated with these minerals are patches, up to 1/4 inch thick, of fine-grained, massive, white calcite that fluoresces a very bright pink under ultraviolet rays ("short" rays more effective than "long").

The quarry has been opened into the south side of a low ridge facing Highway 6. Access is by a single lane road, 0.1 mile long, leading north from the highway.

Maps (T): 22 B/2 E Oak Bay.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 670.1 Junction road to Cross Point and bridge to New Brunswick.

Shoreline, Cross Point

FOSSILS.

In grey sandstone.

Devonian fossil plant fragments occur in friable sandstone and mudstone exposed along low cliffs on both sides of the bridge to Campbellton. Collect at low tide.

The foot of the bridge is 1.7 miles from Highway 6.

Ref.: 90 p. 22.

Maps (T): 22 B/2 E Oak Bay.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 671.7 Junction, road to Ste-Anne-Restigouche.

672.3 Junction, on right, single lane road to quarry.

Bordeaux Quarries and Shoreline

FOSSILS.

In grey sandstone and sandstone conglomerate.

Fossil plant fragments of Devonian age are found in the quarry and in the shoreline cliffs below it; identified species include Prototaxites, Psilophyton, Rhodea and Pachytheca. Petrified tree trunks filled with black silica showing ring structure have been found at both localities; the diameter of one trunk measured 2 feet 5 inches. Excellent specimens such as this were found when the quarry was worked about 50 years ago to supply rock for road building and ballast for the pier at Tide Head. Part of a fossil trunk is visible high in the cliff at one side of the quarry. It has a drab appearance and is not suitable for lapidary purposes. The low shoreline cliffs below the turn-off to the quarry may yield additional specimens when erosional forces reveal new exposures. Visit this shore at low tide.

The quarry is in the woods about 100 yards north of the road; it is water-filled but specimens are available from the cliff at its north end. The property belongs to Mr. Wm. Busteed whose farmhouse is on the north side of the highway 0.3 mile west of the turn-off to the quarry.

On this farm is an old French fort where the last French-English battle for the possession of Canada was fought in 1760. It is also an archaeological site where stone arrowheads and a polished yellow rhyolite axe-head believed to be of early Micmac origin have been found.

Refs.: 4 pp. 47-49; 90 pp. 22-23; 97 p. 137.

Maps (T): 22 B/2 E Oak Bay.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 672.6 Turn-off (right) to Mr. Wm. Busteed's farmhouse.

678.3 to 678.6 Road-cuts

FOSSILS

In shaly limestone.

Brachiopods, crinoid stems, corals, marine plant fragments and sponges (Hindia) were found in the grey and yellowish brown shaly limestones exposed in the road-cuts.* They are of Silurian or Devonian age.

Ref.: 15 pp. 4-7.

Maps (T): 22 B/2 W Oak Bay.
21 O/15 W Campbellton.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 683.8 Matapédia, at junction Highway 6 and 11.

684.5 Bridge over Restigouche River and New Brunswick border.

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* Fossils identified by L.M. Cumming, Geological Survey of Canada.

SECTION 3

QUEBEC BORDER - FREDERICTON

Mile 0.0 Highway 11 bridge over Restigouche River; proceed along Highway 11 toward Bathurst.

13.6 Campbellton, at intersection Water Street (Highway 11) and Subway Street (leads to bridge to Cross Point, Quebec); continue straight ahead.

28.4 Turn-off (sharp left) to Peuplier Point.

Peuplier Point-Pin Sec Point Shoreline

FOSSILS; CHALCEDONY (AGATES), JASPER.

In sandstone; as beach pebbles.

Devonian plant fragments occur in the grey sandstone exposed along shoreline cliffs between Peuplier and Pin Sec Points, a distance of about a mile. The first locality is about 300 yards west of the point where the access road reaches the beach; Pin Sec Point is about 1 mile farther west.

Pebbles found on the beach include deep red jasper, mottled or spotted with black or mustard yellow, and orange-red to deep red, translucent to opaque chalcedony; some of the chalcedony (agate) is banded with white. Jasper pebbles measuring up to 4 inches across are fairly common. The agates average about an inch in diameter. These pebbles are colourful and of a quality suitable for lapidary purposes. Access is by a rough, single lane road (about 500 yards long) leaving the highway at a point 0.7 mile east of a railway crossing. If proceeding from the east, the turn-off is just west of the CIL plant. At the end of the road, near the beach, there is a spot where three or four cars may be parked. Collect at low tide.

Ref.: 90 pp. 20-28, 44.

Maps (T): 22 B/1 W Escuminac.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

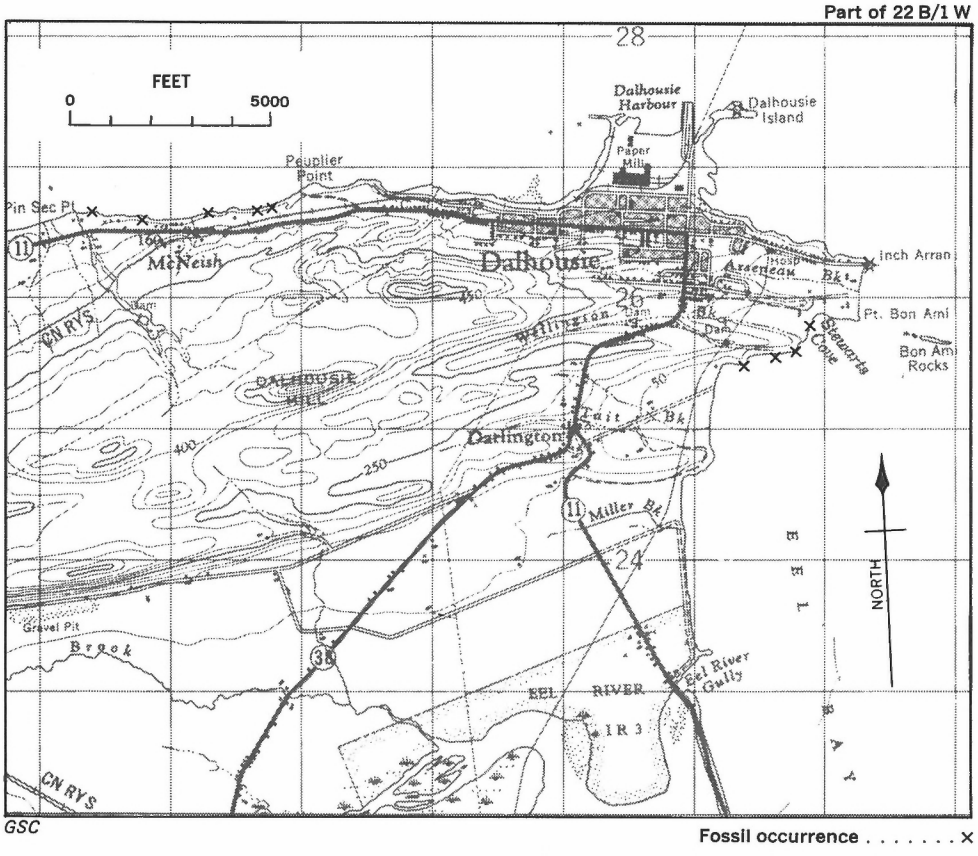
Mile 30.4 Dalhousie, at intersection Renfrew Street (Highway 11) and Goderich Street.

Inch Arran-Bon Ami Point Shorelines

STILBITE, LAUMONTITE, THOMSONITE, HEULANDITE, CHLORITE, HEMATITE, CALCITE, PHILLIPSITE, CHALCEDONY, PREHNITE; JASPER, EPIDOTE.

In volcanic rocks; as beach pebbles.

Cavities (up to 4 inches in diameter) and fractures (up to 2 inches wide) in shoreline volcanic flows and tuffs are filled with one or more of the following



Map 11. Dalhousie area.

minerals: white, compact, massive stilbite; white, fine-grained, massive to radiating thomsonite; pinkish white, massive to reddish white, fine, platy aggregates of laumontite; orange-red to brick-red, platy masses of heulandite; pale green, fine-grained and flaky masses of chlorite; colourless to greyish white chalcedony; white botryoidal quartz; and white calcite (fluoresces bright pink under "short" ultraviolet rays). Cavities filled with prehnite, and with hematite crystals associated with calcite and phillipsite have previously been reported. The volcanics are exposed along the Inch Arran and Cape Bon Ami seacliffs on the north and south sides of the Inch Arran Park beach. Pebbles of red jasper and of dull green epidote with quartz were found on the beach. On the south side of the headland, to the south of the beach, there is a pierced rock forming an arch which at high tide becomes an island. It is called the "Gateway" and is composed of reddish brown volcanic rock similar to the cliffs near the park. The Inch Arran Park beach is at the eastern end of Goderich Street, 0.8 mile from its intersection with Highway 11. Collect at low tide.

Refs.: 6 pp. 59-60, 71; 32 pp. 115-116; 78 p. 12.

Maps (T): 22 B/1 W Escuminac.
(G): 641 A Jacquet River (2 miles to 1 inch).

Mile 31.4 Dalhousie, at junction Highway 38 (352) to Balmoral; continue straight ahead.

31.5 Junction road to shore.

Stewart's (Fossil) Cove Shoreline

FOSSILS.

In limestone, shale and volcanic ash.

Devonian fossils are abundant in the steeply dipping sediments exposed along seacliffs that are up to 150 feet high. The fossils include corals, ostracods, brachiopods, gastropods, pelecypods, sponges, bryozoans, and imprints of algae. The most abundant are the corals, brachiopods and pelecypods. Loose, water-worn specimens of colonial corals measuring up to 1 foot across may be found along the beach at low tide. The fossil-bearing beds are interbedded with volcanic rocks. Access to Stewart's Cove is by a road (0.7 mile long) leading east from Highway 11 at mile 31.5. From the end of the road walk north 200 yards along the shore to the south end of the fossil-bearing cliffs. Fossils may be found from here to a beach, about 700 yards to the northeast. This beach is a continuation of the shoreline from the Inch Arran Park beach (about 700 yards to the northeast) and may alternatively be reached from that locality. Collect at low tide.

Refs.: 6 pp. 54-62; 7 pp. 17-19; 32 pp. 115-118.

Maps (T): 22 B/1 W Escuminac.
(G): 641 A Jacquet River (2 miles to 1 inch).

Mile 38.1 Bridge over Charlo River.

41.0 Junction to Pointe la Roche (Blacklands Point).

Pointe la Roche Shoreline

FOSSILS.

In limestone.

Fossils of Silurian age are abundant in the bluish grey, hard, nodular limestone exposed at low tide at Pointe la Roche. Fossils reported from this locality include corals, bryozoans, graptolites, brachiopods, crinoid stems, gastropods and trilobites. Coral reefs are common. Ripple-marks can be seen on some beds.

Access to the shore is by a single lane road, 0.6 mile long, leading north from the Highway 11 turn-off.

Ref.: 6 p. 39.

Maps (T): 21 O/16 E Charlo.
(G): 641 A Jacquet River (2 miles to 1 inch).

Mile 44.4 Bridge over Benjamin River.

46.5 Junction, on left, road to Dickie.

Razor and Dickie Coves Shorelines

FOSSILS, CALCITE.

In limestone and shale.

Silurian fossils including corals, brachiopods, gastropods, ostracods and trilobite fragments occur in the grey sedimentary rocks exposed along the shore in the two coves on the west side of Black Point. The rocks contain numerous ripple-marks and are cut by veins of white calcite that fluoresces a bright pink when exposed to ultraviolet rays ("long" or "short").

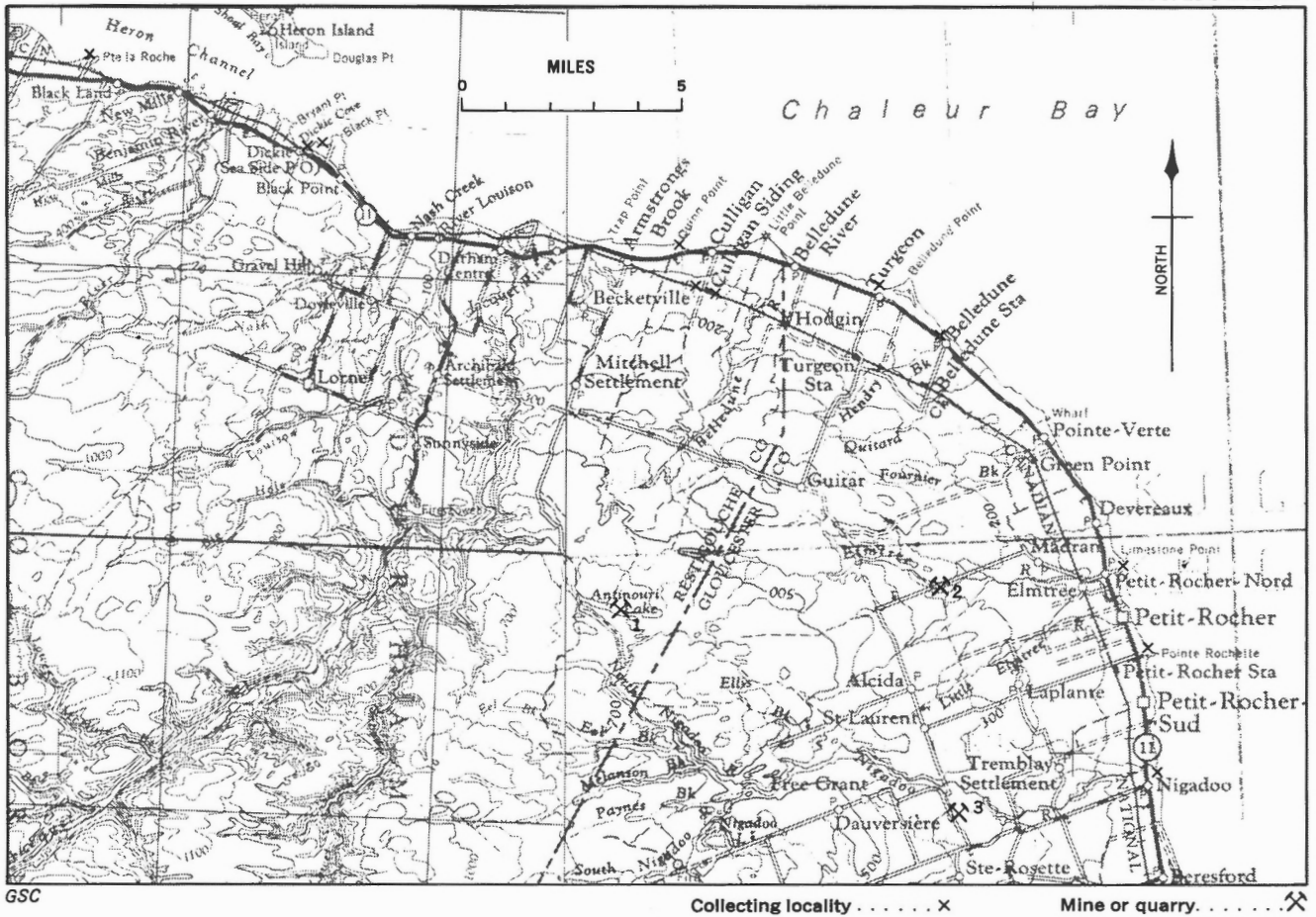
Black Point is composed of reddish brown amygdaloidal lava; the amygdules are filled with calcite.

Road log from Highway 11 at mile 46.5:

Mile 0.0 Turn left (east) onto road to Dickie; just beyond the turn-off, the road passes under the railway.

0.1 Fork; bear right.

0.8 Turn left onto single lane road to shore.



GSC

Collecting locality . . . . . ×

Mine or quarry. . . . . ⚒

Map 12. Pointe la Roche-Nigadoo area: 1. Jacquet River Granite Co. quarry; 2. Keymet mine; 3. Nigadoo River Mines Limited.

Mile 1.3 Camp-site, on left, at shore of Razor Cove. The fossiliferous rocks are exposed at intervals from this point westward (for about 1,500 yards) to the mouth of Dickie Brook on the south side of Dickie Cove. The lava exposures begin about 200 yards east of the camp-site. Collect at low tide.

Ref.: 6 pp. 37-39.

Maps (T): 21 O/16 E Charlo.
(G): 641 A Jacquet River (2 miles to 1 inch).

Mile 52.4 Bridge over Jacquet River.

54.1 Junction, on right, road to Antinouri Lake.

Jacquet River Granite Company Quarry

GRANITE.

Pink, medium-grained granite composed of orthoclase, quartz, albite and biotite is quarried for use as a building stone. It has been used for the exterior of St. George's Church in Port-Daniel, Quebec and Our Lady of Seven Sorrows church in Edmundston.

The quarry, near the north shore of Antinouri Lake, has been operated since 1951.

Road log from Highway 11 at mile 54.1:

Mile 0.0 Proceed south along paved road.

4.8 Mitchell Settlement, at crossroad; proceed straight ahead along gravel road.

10.0 Fork, at west end of Antinouri Lake; bear left.

10.8 Gate to Jacquet River Granite Company Limited property.

11.0 Quarry.

Ref.: 29 pp. 64-67.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 Tetagouche River (2 miles to 1 inch). Out of print.
330A Chaleur Bay Area (4 miles to 1 inch).

Mile 56.9 Junction, on left, road to wharf.

Shoreline from wharf to Quinn Point

FOSSILS.

In limestone and shale.

Bluish grey limestone (knobby in places) containing brachiopods, corals, crinoid columns, bryozoans, gastropods, stromatoporoids and ostracods, is exposed for about 300 yards eastward beginning at a point 300 yards east of the wharf. About 200 yards west of the wharf, beginning at a stream, fossiliferous limestone and shale beds are exposed at intervals for about 1,500 yards westward to the west side of Quinn Point. These fossils include: brachiopods, corals, bryozoans, gastropods, pelecypods, trilobite fragments and stromatoporoids. The corals and stromatoporoids are, in some beds, very large (over a foot across) and numerous; reefs are common. The fossils are most abundant at Quinn Point, about 1,400 yards west of the wharf. All fossils listed above are of Silurian age.

The wharf is 0.2 mile north of the highway from mile 56.9. Collect at low tide.

Ref.: 6 pp. 32-35.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 57.1 Junction, on right, road to Culligan station.

Railway-cuts

FOSSILS.

In limestone, conglomerate and shale.

Silurian fossils occur in the rocks exposed by railway-cuts on both sides of the Culligan station, and for about 450 yards beginning at a point 500 yards west of the station. The exposures near the station (from 90 yards west to 150 yards east of it) are of nodular limestone containing brachiopods, gastropods, and large crinoid stems. The railway-cuts west of the station expose conglomerates, shale and limestone containing corals, stromatoporoids, gastropods and brachiopods. Culligan station is 1 mile, by road, south of Highway 11 from mile 57.1.

Ref.: 6 pp. 35-37.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 61.0 Turgeon, at church; junction, on left, road to Chapel Point.

Chapel Point Shoreline

FOSSILS; EPIDOTE

In conglomerate, shale and limestone; in volcanic rock. Silurian fossils including corals, crinoid stems, stromatoporoids, brachiopods, bryozoans, and ostracods occur in the sedimentary rocks exposed along the shore beginning at Chapel Point and extending westward for about 2,500 yards. Interbedded with the sediments is a light reddish brown lava with fracture planes (about 1/2 inch wide) and irregular cavities (up to 1 inch across) containing vitreous, fine-granular epidote with colourless to white crystalline calcite. This epidote has an attractive pistachio-green colour but it does not seem to be sufficiently compact for lapidary purposes. Pebbles, up to 3 inches across, of fine-grained epidote with quartz occur on the beach; these are suitable for polishing but generally are of a rather drab, pea-green colour.

Access to this shore is by a single lane road, 0.3 mile long, leaving Highway 11 at mile 61.0. The exposures begin to the left (west) of the end of the road. Collect at low tide.

Ref.: 6 pp. 52-54.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch).
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 62.7 Junction, on left, road to Belledune camping and picnic site.

Belledune Shoreline

FOSSILS, CALCITE; JASPER, CHALCEDONY; EPIDOTE.

In limestone, conglomerate, or volcanic rock.

Corals, stromatoporoids, bryozoans, brachiopods, and crinoid stems of Silurian age occur in reddish, sandy limestone beds exposed along the Chaleur Bay shore on both sides of the mouth of Hendry Brook and along the brook. The limestone is cut by veins (averaging 1 inch wide) of crystalline calcite that fluoresces a very bright pink when exposed to ultraviolet rays ("short" rays most effective). Water-worn fragments (up to 4 inches across) of deep orange-red jasper cut by tiny veinlets of colourless calcite, and colourless to greyish and reddish chalcedony occur on the beach; they are derived from the conglomerate exposed between Belledune and Green Point. Fine-granular epidote occurs with calcite and quartz in veins (about 1/2 inch wide) and in cavities in volcanic rocks exposed along the shore about 1,000 yards south of the mouth of Hendry Brook. Access to the locality is via the Belledune camping grounds which is on the north side of Hendry Brook, about 200 yards east of the highway. The brook is bridged by the highway just south of the turn-off to the camp site. Collect at low tide.

Refs.: 6 pp. 43-44; 125 pp. 38-42.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 65.9 Pointe Verte, at junction (on left) road to Green Point wharf.

Green Point Shoreline

JASPER, EPIDOTE.

As beach pebbles.

The jasper is mottled in tones of orange-red and deep wine red, and is traversed by tiny veinlets of colourless calcite. The pebbles (measuring up to 5 inches across) are very fine grained and attractively coloured, and could be used for ornamental purposes. They are plentiful on the beach and in the conglomerate exposed along the shore in the vicinity of the wharf. Epidote-quartz pebbles are less common and much smaller; they are generally impure and drab coloured.

The wharf is 0.3 mile, by road, east of the highway at mile 65.9. Collect at low tide.

Ref.: 6 pp. 43-44.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 70.0 Crossroad; road on right leads to Madran; road on left leads to Limestone Point.

Limestone Point Shoreline

FOSSILS, CALCITE.

In limestone shale and sandstone.

Silurian fossils including corals, brachiopods, cephalopods and crinoid stems may be found in the sedimentary rocks at Limestone Point and at intervals along the shore south toward the mouth of the Elmtree River. Corals are the most abundant fossils. The rocks are cut by veins (up to 2 inches wide) of white calcite that fluoresces a very vivid pink under ultraviolet rays ("short" rays most effective). The rocks south of Limestone Point are exposed only at low tide.

Access is via a single lane road, 0.3 mile long, leading east from the Highway at mile 70.0.

Ref.: 6 pp. 39-42.

Maps (T): 21 P/13 E Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Keymet Mine

SPHALERITE, CHALCOPYRITE, GALENA, PYRITE, PYRRHOTITE, CALCITE, QUARTZ, FLUORITE.

In brecciated fault zone.

The ore consists of pyrite, chalcopyrite, sphalerite (dark brown), argentiferous galena and pyrrhotite in a quartz-calcite gangue containing some fluorite. The metallic minerals occur as coarse grains and as small masses.

The deposit, known since 1880, has been developed from time to time since 1882. From 1952 to 1956 it was worked by Keymet Mines Limited; a shaft was sunk to 1,229 feet and a mill was operated on the site. The deposit was worked for zinc, copper, lead and silver. The mine is on the north side of the Elmtree River, about 150 yards east of the Petit Rocher-Madran road bridge.

Road log from Highway 11 at mile 70.0:

Mile 0.0 At crossroad, turn right (west) onto road to Madran.

2.0 Junction, bear left.

4.3 Turn-off, left, to mine. The shaft is about 30 yards south of the road at this point.

Refs.: 6 pp. 129-130; 7 p. 37; 79 pp. 492-494; 112 pp. 6-7, 43-63.

Maps (T): 21 P/13 W Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 72.0 Junction, on left, road to Pointe Rochette wharf.

Pointe Rochette Shoreline

FOSSILS; JASPER, EPIDOTE.

In limestone; as pebbles on beach and in conglomerate.

Silurian corals, brachiopods, pelecypods, and gastropods occur in the limestone beds exposed along the shore at a locality 500 yards north of the wharf. Corals are also found in red limestone about 300 yards north of the wharf. Deep reddish brown conglomerate containing jasper and epidote pebbles and volcanic boulders is exposed on the west side of the wharf. Jasper pebbles up to 5 inches across, similar to those found at Green Point, are common as loose pebbles along the beach. Quartz-epidote pebbles are not as common, but vitreous granular epidote with crystalline calcite occupy fractures (about 1/2 inch wide) and numerous small cavities in the grey and reddish grey volcanic boulders. Corals and brachiopods are found sparsely in the shaly sandstone and limestone beds exposed along the shore at low tide between the

Pointe Rochette wharf and the mouth of the Nigadoo River, about 2 1/2 miles south. Water-worn volcanic pebbles and boulders containing crystalline epidote are common. In general, the epidote is not sufficiently compact for lapidary purposes. The wharf is 0.4 mile by road east of the highway at mile 72.0. Collect at low tide.

Ref.: 6 p. 42.

Maps (T): 21 P/13 E Pointe Verte.
(G): 640 A Tetagouche River (2 miles to 1 inch). Out of print.
330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 74.7 Bridge over Nigadoo River.

75.2 Nigadoo, at crossroad; road on left, leads to shore; road on right to Nicholas Denys.

Nigadoo Shoreline

EPIDOTE; FOSSILS.

In volcanic rock; in sandstone and limestone.

Finely crystalline, vitreous epidote is associated with colourless to white calcite in irregularly shaped cavities up to 1 inch across in grey to reddish grey volcanic pebbles and small boulders on the shore. In some pebbles the epidote comprises about 25 per cent of the specimen; in most specimens it is rather friable and not suitable for lapidary purposes. The pebbles may be found on the beach at low tide. Silurian corals and brachiopods occur sparingly in the sedimentary rocks exposed at low tide along the beach. Access to the shoreline is by a single lane road, 0.4 mile long, leading east from the crossroad at Nigadoo (mile 75.2).

Ref.: 6 p. 42.

Maps (T): 21 P/13 E Bathurst.
(G): 1-1957 Bathurst-Newcastle (2 miles to 1 inch).

Road log for side trip to Nigadoo Mines Limited and Sturgeon River mine via Nigadoo-Nicholas Denys road from mile 75.2:

Mile 0.0 Nigadoo, at crossroads; turn right (west) onto road to Nicholas Denys.

3.2 Junction Robertville road; turn right.

4.6 Junction on right gravel road to Nigadoo Mines Limited; continue straight ahead for Sturgeon River mine.

9.1 Nicholas Denys, at crossroad; continue straight ahead.

10.8 Junction, on left, single lane road to Sturgeon River mine.

Nigadoo River Mines Limited.

GALENA, SPHALERITE, CHALCOPYRITE, PYRITE, ARSENOPYRITE, PYRRHOTITE, TETRAHEDRITE, MARCASITE, CALCITE.

In fault zone in porphyry and in argillite.

The principal ore minerals are galena, sphalerite and chalcopyrite. These minerals are closely associated with pyrite, pyrrhotite and arsenopyrite, and small amounts of tetrahedrite and marcasite forming a coarse-grained, compact mass.

Calcite is present as a minor gangue mineral. The porphyry is suitable for use as an ornamental stone; it consists of a greenish white to light green, fine-grained matrix containing colourless, vitreous, quartz eyes and rounded to irregularly shaped phenocrysts (averaging 1/8 inch across) of chalk white feldspar, olive-green mica and orange-red siderite mixed with calcite and quartz. The green phenocrysts predominate. Tiny dark grey to black sulphide grains are scattered through the matrix composed of quartz, feldspar, mica and calcite. The rock takes a good polish and has a very attractive speckled appearance.

This deposit contains silver, lead, zinc, copper, with some cadmium and bismuth, and was discovered by Anthonian Mining Corporation in 1953 when the Bathurst-Newcastle district experienced a staking rush following the discovery of the Brunswick No. 6 orebody. A combination of geophysical and geochemical methods were utilized in locating the orebody. In 1956 shaft sinking was begun by Nigadoo Mines Limited, and in 1958 the first one was treated at the Keymet mine. Work was suspended from 1958 to 1964 when the present company resumed operations.

Road log from mile 4.6 of Nigadoo-Nicholas Denys road:

Mile	0.0	Turn right (north) onto gravel road.
	1.1	Junction mine road; turn right (east).
	1.2	Mine office. Permission to visit the property must be obtained from the office.

Refs.: 34 p. 99; 82 p. 159; 105 pp. 1-10; 111 pp. 150-155; 137 p. 220.

Maps (T): 21 P/12 W Bathurst.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Sturgeon River Mine

GALENA, PYRITE, CHALCOPYRITE, SPHALERITE, PYRRHOTITE, ARSENOPYRITE, ROZENITE, GOETHITE, ANALCITE, CALCITE.

In a fault zone in siliceous argillite.

Fine- to coarse-granular galena occurs with fine-granular, massive pyrite, chalcopyrite, sphalerite, pyrrhotite and arsenopyrite. Rozenite forms snow-white, granular, irregular patches on the sulphides and on the host rock. Goethite forms yellow-brown powdery coatings and encrustations on the sulphides. A crystal of analcite was found at the deposit (personal communication: J.L. Davies). The calcite associated with the orebody fluoresces a vivid pink when exposed to ultraviolet rays.

The silver-lead-zinc deposits of this area have been known since the 1890-s and have been explored intermittently for the last 70 years. Recent investigations using geophysical and general prospecting methods began in 1949, and in 1956 a shaft was sunk to 550 feet and an up-to-date mining plant installed by Sturgeon River Mines Limited. Operations were suspended and the plant closed in 1957. The road leading south from the Nigadoo-Nicholas Denys road at mile 10.8, leads directly to the deposit (a distance of 1.3 miles). Specimens may be obtained from the small dumps at the end of the road near the shaft. The mine plant and buildings have been dismantled.

Refs.: 7 pp. 36-37; 82 pp. 157-159.

Maps (T): 21 P/12 W Bathurst.
(G): 1-1957 Bathurst-Newcastle (2 miles to 1 inch).

Mile 82.3 Highway bridge over Tetagouche River.

82.7 Junction, on right, road to South and North Tetagouche.

Tetagouche Falls Manganese Occurrence

MANGANITE, PYROLUSITE, GARNET, KAOLINITE, HEMATITE.

With quartz in argillite.

Manganite is the principal manganese mineral at this deposit. It forms fine-grained masses in veinlets up to 1/4 inch wide, and fibrous to platy masses and radiating aggregates in cavities about an inch across. Fine-grained pyrolusite and dull pink, powdery patches of garnet mixed with quartz are less common. Soft, white, granular kaolinite and fine-grained hematite form irregular patches on quartz.

The deposit was worked briefly prior to 1843; this was probably the first mining venture in the province. It was worked from pits, adits and a shaft, mostly on the south bank of the Tetagouche River just below the falls. A few specimens may be found along a steep path that passes by some of the old inaccessible workings.

Road log from Highway 11 at mile 82.7:

Mile 0.0 Proceed west along road to South and North Tetagouche.

0.2 Junction; proceed straight ahead along road to South Tetagouche.

Mile 2.2 Junction, road to Ste. Anne; continue straight ahead.

7.2 Junction single lane road to Tetagouche Falls; turn right.

7.3 Clearing; park here. From here a path leads down the steep bank of Tetagouche River. About midway between a spring and the river, there is an adit with manganese-bearing quartz fragments below it.

Refs.: 124 pp. 8-12; 125 p. 77.

Maps (T): 21 P/12 W Bathurst.
(G): 1-1957 Bathurst-Newcastle area (2 miles to 1 inch).

Mile 84.7 Bathurst, at intersection Main (Highway 11) and King Streets.

Road log for side trip along Highway 331 to localities south of Bathurst:

Mile 0.0 Intersection Main and King Streets; proceed south along King Street (Highway 331).

0.6 Intersection York Street; continue along King Street.

1.4 Fork; bear left proceeding up the hill.

4.4 Junction, on left, road to Nepisiguit granite quarry.

5.1 Junction on left, gravel road to Pabineau Falls.

11.7 Junction, on left, road to Key Anacon mine.

13.9 Clearing on left. Granite blocks (for description of rock see Nepisiguit quarry).

16.0 Junction, on left, gravel road to Grand Falls (to Brunswick No. 6 and Austin Brook mines).

20.5 Brunswick No. 12 mine.

Nepisiguit Granite Quarry

GRANITE.

The coarse, pinkish grey granite consists of pink and white feldspar, quartz and dark mica. Examples of its use as a building stone can be seen in numerous buildings in Bathurst, including the Msgr. C.A. Leblanc High School, Sacred Heart Cathedral and the Court-house. It was first used about a hundred years ago for the construction of bridges and approaches for the railway in the Chaleur Bay area.

The quarry, on the west bank of the Nepisiguit River, is now water-filled, but large blocks of granite can be seen at its edge. Access is by a single

lane road, 0.3 mile long, leading east from Highway 331 at mile 4.4 (just in front of bridge over railway).

Ref.: 29 pp. 4-6.

Maps (T): 21 P/12 E Bathurst.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Pabineau Falls

GRANITE, APLITE.

Coarse, semi-porphyritic, pink to reddish granite containing feldspar crystals up to an inch long is exposed along the bed of the Nepisiguit River at Pabineau Falls. Along the west bank, just south of the foot bridge, the granite is cut by two pink, fine-grained aplite dykes cut by white to colourless quartz veins. This granite is part of the same granite mass that was quarried near Bathurst.

Road log from Highway 331 at mile 5.1:

Mile 0.0 Leave highway and proceed south along gravel road.

3.6 Junction single lane road; turn left.

3.7 Pabineau Falls. This is a very pleasant picnic site.

Ref.: 7 p. 22.

Maps (T): 21 P/12 E Bathurst.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Key Anacon Mine

GALENA, SPHALERITE, PYRITE, CHALCOPYRITE, PYRRHOTITE, ARSENOPYRITE, TETRAHEDRITE, MARCASITE, COVELLITE, CHALCOCITE, CHALCANTHITE, ANTLERITE, SIDEROTIL, ROZENITE.

With quartz and carbonates in shear zone in metamorphosed volcanics and sediments.

The metallic minerals occur as fine-grained, banded, compact, masses of which pyrite, galena, sphalerite, and chalcopyrite are the most abundant constituents. The main deposit, on the east side of the Nepisiguit River, is where most of the development work has been done. A 1,500-foot shaft and mining plant are located there.

The deposit on the west side of the river has been known for about 100 years and was first investigated as a copper prospect. Small pits expose lenses and disseminations of fine-grained pyrite, chalcopyrite and pyrrhotite in quartz and schist. Secondary copper and iron sulphates occur as coatings, encrustations and irregular patches on both the sulphides and the host rock.

Transparent, granular, powder-blue to robin's egg blue chalcanthite and bluish white, fine-grained to powdery rozenite are the most common; transparent, emerald green, granular and/or botryoidal antlerite is less common. The deposit on the east side of the river was discovered by geophysical methods in 1953.

Development work from 1954 to 1957 included the sinking of a shaft and installation of mine equipment and buildings. Work was suspended until 1965 when underground exploration was resumed by Key Anacon Mines Limited.

Road log from Highway 331 at mile 11.7:

Mile 0.0 Turn left (east) onto gravel road.

3.2 Bridge over Nepisiguit River. From west side of bridge, a path leads south for 100 yards to one pit on the river bank; another pit, where the secondary sulphates were found, is in the woods about 20 yards directly west of the first pit.

3.7 Key Anacon Mines Limited, main deposit.

Refs.: 25 pp. 1529-1532; 82 pp. 156-161; 105 pp. 7-14; 137 p. 169.

Maps (T): 21 P/5 E Nepisiguit Falls.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Brunswick No. 6 Mine

PYRITE, SPHALERITE, GALENA, PYRRHOTITE, CHALCOPYRITE, ARSENOPYRITE, BORNITE, TETRAHEDRITE, MAGNETITE, HEMATITE, STANNITE, BOULANGERITE, CASSITERITE, DOMEYKITE, COVELLITE, CHALCOCITE, MARCASITE, NATIVE SILVER, NATIVE COPPER, ENARGITE, CUBANITE, GOLD; LIMONITE, BEUDANTITE, ANGLESITE, CERUSSITE, PYROMORPHITE, BARITE, ROZENITE, SZOMOLNOKITE, ROEMERITE, COPIAPITE, SCORODITE, JAROSITE, WOODHOUSEITE, QUARTZ, CALCITE, CHLORITE, SERICITE.

In augen schist and iron formation; in gossan.

The ore is fine grained compact, massive, and consists principally of pyrite, the most abundant sulphide, with galena, sphalerite (both yellow and dark brown varieties), chalcopyrite and pyrrhotite. Arsenopyrite, bornite and tetrahedrite are present in smaller amounts. Magnetite occurs as a constituent of the iron formation and as grains with hematite (specularite and martite) in the sulphide body. Other minerals reported to occur in the orebody, but generally visible only under the microscope, are stannite, boulangerite, cassiterite, domeykite, covellite, chalcocite, marcasite, native silver and copper, enargite, cubanite and gold. Quartz, calcite, chlorite and sericite are the gangue minerals.

An extensive gossan forms a layer, up to 6 feet thick, between the deposit and the overburden. Most of it was removed when mining operations

commenced. The gossan is composed mostly of limonite and quartz with secondary iron and lead minerals. Limonite occurs as pseudomorphs (after pyrite, magnetite, hematite and chlorite); as boxworks; as clinkery, colloform, ochreous or earthy masses and coatings; and as needle-like crystals in vugs. Quartz is commonly associated with earthy limonite. Other minerals found in the gossan are: anglesite, as tiny crystals in cavities, or as pseudomorphs after galena, or in granular to compact masses and concentric bands with galena; beudantite, as globular aggregates and fine-grained coatings or as encrustations; barite as colourless to white, yellow or light brown crystals; rozenite, as soft, white, powdery to snow-white botryoidal encrustations associated with szomolnokite and sulphides; szomolnokite, as white, microscopic, hair-like tufts and as yellowish white to pale orange-yellow, powdery encrustations on sulphides; roemerite, as soft pink powdery aggregates with szomolnokite; copiapite, as pale yellow to canary-yellow, vitreous, fine-granular to powdery coatings on sulphides. Other minerals reported to occur in the gossan are scorodite, jarosite, woodhouseite, pyromorphite and cerussite.

This was the first major base metal deposit (lead, copper, zinc, silver) found in New Brunswick. Prior to this discovery, in 1952, the area just south of the present mine was investigated for pyrite as a source of sulphur which then was in short supply; the pyrite body was known for many years to be associated with the old Austin Brook iron deposit. The identification of galena-sphalerite mineralization (closely resembling the specular hematite-magnetite ore) from the pyrite zone was made by A.B. Baldwin in 1952, while engaged in graduate studies at the University of New Brunswick. This information led to further drilling and geophysical prospecting by the M.J. Boylen interests, and ultimately to the discovery of the large orebody, now known as the Brunswick No. 6 deposit. The announcement of the discovery in January 1953 resulted in an unprecedented staking rush in the area, and to the discovery of other deposits. The property has since been developed by Brunswick Mining and Smelting Corporation Limited, using open-pit methods.

Due to mining operations the property is not accessible to the casual visitor.

Road log from Highway 331 at Mile 16.0:

Mile	0.0	Turn left onto road to Grand Falls.
	0.4	Junction, on right, new road to Brunswick No. 12 mine; continue straight ahead.
	1.1	Junction, on left, road to Grand Falls and Austin Brook iron mines; continue straight ahead.
	2.1	Brunswick No. 6 mine.

Refs.: 24 pp. 11-17; 33 pp. 91-92; 73 pp. 167-177; 105 pp. 7-9, 12-13; 137 p. 52.

Maps (T): 21 P/5 W Nepisiguit Falls.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Austin Brook (Bathurst) Iron Mine

MAGNETITE, HEMATITE, SIDERITE, PYRITE, SPHALERITE, LEPIDOCROCITE, BARITE, CHLORITE, JASPER.

In quartz and chlorite schist.

The ore consists of fine to coarsely banded magnetite with hematite, chlorite, chert and siderite, and of fine, platy hematite (specularite) with jasper. Magnetite is generally fine grained and massive but small octahedra are found in the chlorite schist. Fine-grained pyrite occurs with magnetite and hematite. The jasper forms bands and lenses containing very fine hematite disseminations but is not suitable for lapidary purposes. Lepidocrocite in the form of dull black, tiny, mammillary and botryoidal masses, is associated with colourless to pale yellow, transparent fine-granular sphalerite. Colourless to white platy clusters (up to 1 inch across) of barite form on magnetite-hematite-pyrite specimens. This deposit was discovered by William Hussey of Bathurst at the turn of the century and was worked briefly from 1907 to 1913 and from 1942 to 1943. Ore specimens are available from the iron-bearing rocks in the cliffs surrounding the water-filled pit, and from the dumps at the edge of the pit.

Road log from Highway 331 at mile 16.0:

Mile	0.0	Proceed along road to Grand Falls.
	1.1	Junction road to Brunswick No. 6 mine; bear left, continuing on road to Grand Falls.
	3.3	Junction in front of Nepisiguit River; turn right onto road paralleling the river.
	4.9	Power station on right; continue straight ahead and cross Austin Brook.
	5.1	Dump on left; continue straight ahead to pit.
	5.2	Fork at top of hill where automobile may be parked; follow right fork for 50 yards to the pit.

Refs.: 24 pp. 7-9; 82 pp. 2-4; 125 pp. 78-87.

Maps (T): 21 P/5 W Nepisiguit Falls.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Brunswick No. 12 (Anacon-Leadridge) Mine (Plate XV)

The ore at this mine is similar to the Brunswick No. 6 deposit. This orebody was discovered in 1953 by drilling after a geophysical survey disclosed the presence of an anomaly. The Brunswick Mining and Smelting Corporation Limited has since developed it from two shafts, and production began in 1964. A mill has been installed at the mine to prepare the ore for refining at the new Belledune Point smelter. Due to mining operations, this property

is not open to the casual visitor. Highway 331 leads directly to the mine; it is 6 miles from the Brunswick No. 6 mine.

Refs.: 73 pp. 173-175; 82 p. 159; 105 pp. 7-9, 13.

Maps (T): 21 P/5 W Nepisiguit Falls.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Mile 86.1 Bathurst (east) at junction Highway 11 and 8; the main road log continues along Highway 8 to Fredericton.

Road log for side trip along Highway 11 to localities east of Bathurst:

Mile	0.0	From junction Highways 8 and 11, proceed east along No. 11.
	14.8	Junction, on left, single lane road to Clifton shoreline.
	15.7	Clifton school on left.
	17.1	Junction, on left, road to Stonehaven (Grindstone) Point wharf.
	22.9	Junction Highway 35; continue straight ahead.
	28.6	Junction, on right, road to Grand-Anse Peat Moss Company Limited property.
	30.2	Junction, Highway 348; continue along Highway 11.
	52.2	Junction Highway 13; turn left onto Highway 13.
	55.0	Junction; turn left onto road to Shippegan.
	57.9 to 59.5	Pokemouche Peat Bog on right.
	59.5	Fafard Peat Moss Company Limited plant on right (see Plate XV).
	63.7	Shippegan, at junction; turn left.
	67.2 to 67.4	Lameque Peat Bog on right, (Atlantic Peat Moss Company Limited).
	68.6	Junction road to Pigeon Hill; turn right.
	74.6	Uncultivated peat bogs on both sides of the road.
	77.4	Junction; turn right following road to Pigeon Hill.
	78.8	Pigeon Hill, at school and post office (on left).

Plate XV. Cutting in peat bog; the excavated moss is placed in racks to dry. Fafard Peat Moss Company Limited.

Mile 79.0 Pigeon Hill, at junction, road to shore (opposite church).

Clifton-Stonehaven Shoreline

FOSSILS, GALENA, BARITE, CALCITE.

In sandstone.

Fossil plants of Pennsylvanian age are associated with coal seams in grey sandstone cliffs between Clifton and Stonehaven. White calcite containing patches of pink platy barite and fine-granular galena, occurs in fractures (about 1/4 inch wide) in sandstone exposures near the Stonehaven wharf. The calcite fluoresces very bright pink under ultraviolet rays ("short" rays most effective). Patches (about 1/4 inch across) of fine-grained bluish grey metallic galena and spherical concretions (averaging 1 inch in diameter) composed of very fine-grained, iron-stained sandstone occur in the sandstone. Quarries near the shore at Clifton and Stonehaven have been operated for the production of grindstones and scythestones; the Clifton quarry was in

operation until about 10 years ago. The shoreline at Clifton is 0.1 mile north of Highway 11; a road 0.3 mile long, connects Highway 11 with the Stonehaven wharf. Collect at low tide.

Refs.: 6 pp. 95, 132-133; 90 pp. 29-30, 45.

Maps (T): 21 P/11 W Burnville.
21 P/14 Grande-Anse.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Peat Deposits

Some of the largest peat deposits in Canada occur in New Brunswick; extensive deposits (about 5 feet deep) are worked at Grande-Anse, Pokemouche-Inkerman area and Shippegan-Lameque area. These deposits became economically important during World War II when the U.S. supply from Europe was curtailed. The Grande-Anse Peat Moss Company Limited began operations in 1961; the plant and bog is 0.2 mile south of Highway 11 at mile 28.6. The other operators in New Brunswick, Fafard Peat Moss Company Limited and Atlantic Peat Moss Company Limited, have been in production since the early 1940's.

Refs.: 75 pp. 43, 50-52; 122 pp. 1-4, 16-19.

Maps (T): 21 P/14 E Grande-Anse.
21 P/10 E and W Tracadie.
21 P/15 E Caraquet.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Pigeon Hill Copper Occurrence (Plate XVI)

FOSSILS, CHALCOCITE, MALACHITE, CONNELLITE.

In sandstone.

Pennsylvanian fossil plants at this locality have been converted to coal and partly replaced by copper minerals. Bright green malachite is relatively common as fine grained, irregular, encrustations and patches on the plant remains; connellite, as tiny aggregates of blue microscopic flakes, occurs sparingly with malachite.

The copper-bearing plant beds (about 6 inches thick) are exposed in the low sandstone cliffs at Pigeon Hill (Plate XVI). A road, 0.1 mile long, leads east from the main road opposite the church to the shore. From the end of this road walk south 100 yards to the deposit. This is accessible at low tide only.

Maps (T): 21 P/15 E Caraquet.
(G): 330 A Chaleur Bay Area (4 miles to 1 inch).

Mile 86.1 Junction Highway 11 and 8 at Bathurst. Follow Highway 8 toward Fredericton.

107.5 Road-cut

FOSSILS.

In sandstone.

Pennsylvanian plant remains occur in the light brown sandstone exposed on the west side of Highway 8, just north of the highway bridge over the Tabusintac River.

Plate XVI. Shoreline cliffs at Pigeon Hill copper occurrences.

Ref.: 18 pp. 48, 64.

Map (T): 21 P/6 W Tabusintac River.

Mile 107.6 Bridge over Tabusintac River.

131.4 Junction Highway 11; turn right continuing along Highway 8 toward Newcastle.

136.3 Newcastle, at intersection King George East (Highway 8) and Prince William (Highway 331) Streets (at Court-house).

Heath Steele Mine

PYRITE, GALENA, SPHALERITE, PYRRHOTITE, CHALCOPYRITE, ARSENOPYRITE, MAGNETITE, MARCASITE, HEMATITE, BISMUTHINITE, TETRAHEDRITE-TENNANTITE, CHALCOCITE, GRAPHITE, COVELLITE, FREIBERGITE, NATIVE BISMUTH, LIMONITE, JAROSITE, ANGLESITE.

In chloritic quartz-sericite schist and cherty iron formation.

The ore is massive, fine grained, banded and is similar to the Brunswick No. 6 and No. 12 deposits. Pyrite, the most abundant sulphide, is associated with lesser amounts of galena, sphalerite, pyrrhotite and chalcopyrite. The other metallic minerals occur in minor to microscopic amounts. Prior to mining operations the orebody was covered by a layer of limonite gossan (up to 50 feet thick) containing secondary jarosite, anglesite, and other minerals such as those found in the Brunswick No. 6 deposit. Sooty chalcocite occurred between the gossan and orebody.

The deposit was discovered in 1954 by American Metal Company Limited using airborne electromagnetic surveys. Heath Steele Mines Limited commenced development in 1955; production began in 1957. The deposit is worked for lead, zinc, copper and silver from open pits and shafts and is treated at the mill on the mine-site. Due to mining operations, the property is not accessible to collectors.

Access to the mine from Newcastle is via Highway 331. It is 33 miles from the intersection of King George and Prince William Streets.

Refs.: 41 pp. 14-21; 69 pp. 54-59; 105 pp. 7-9, 13-14.

Maps (T): 21 O/8 E California Lake.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Wedge Mine

PYRITE, SPHALERITE, CHALCOPYRITE, GALENA, PYRRHOTITE, TENNANTITE.

With minor quartz and carbonate, at rhyolite-graphite schist contact.

The ore is fine to medium grained massive, and contains 70 to 80 per cent pyrite associated with varying amounts of sphalerite, chalcopyrite, argentiferous galena, pyrrhotite and minor tennantite. The property belongs to Cominco Limited which began explorations in the area as a result of the discovery of orebodies at Brunswick No. 6 and No. 12 and Heath Steele deposits. The Wedge orebody was found in 1956 and by 1960 a mining camp was established and a shaft was completed to a depth of about 1,150 feet. Production began in 1962 making this the first copper producer in the province. The ore is treated at the Heath Steele mill.

The mine is on the north side of the Nepisiguit River and is connected to the Heath Steele mine by a 10 mile gravel road. Due to mining operations, it is not accessible to collectors.

Refs.: 46 pp. 290-296; 69 pp. 21-29.

Maps (T): 21 O/8 E California Lake.
(G): 1-1957 Bathurst-Newcastle Area (2 miles to 1 inch).

Mile 136.5 Newcastle, at junction Highway 12; continue along Highway 8.

215.5 Bridge over creek, and trail on right.

Cross Creek Coal Occurrence

FOSSILS, COAL, PYRITE.

In sandstone.

Pennsylvanian fossil plants are associated with a coal seam exposed on the east side of Cross Creek; pyrite nodules occur in the sandstone above and below the coal seam.

To reach the occurrence, proceed west along a partly overgrown trail (leaving Highway 8 on the north side of bridge at mile 215.5) for 600 yards to Cross Creek; turn right (north) and proceed along east side of creek for 750 yards to the occurrence.

Refs.: 18 pp. 9, 21-64; 99.

Maps (T): 21 J/7 E Napadogan.
(G): 11-1958 Napadogan.

Mile 219.9 Nashwaak Bridge, at junction Highway 25A (107) to Cross Creek, Stanley.

Road log for side trip to Cross Creek fossil occurrence and Burnt Hill mine:

Mile 0.0 Proceed west along Highway 25A (107).

Mile 5.1 Junction, on right, gravel road to Cross Creek Station; for Burnt Hill mine, proceed straight ahead.

8.1 Stanley, at junction Highway 25 (283); turn right onto Highway 25 (283) to Cross Creek village.

10.4 Cross Creek village, at junction road to Napadogan; continue straight ahead along Highway 25 (283).

13.5 Junction, gravel road to Maple Grove Station; turn left (west).

18.5 Maple Grove Station; cross railway and proceed to Miramichi Lumber Company gate to register at attendant's office. Proceed through gate onto single lane gravel road.

34.1 Junction, on left, road to Department of Fisheries warden's camp; bear right along mine road.

34.7 Junction road to mine; turn right.

34.8 Burnt Hill mine.

Cross Creek Station Occurrence

FOSSILS.

In sandstone.

Plant fossils of Pennsylvanian age occur in sandstone exposed in the bed of Cross Creek at the falls.

Access to occurrence: leave Highway 25A (107) at mile 5.1 and proceed east 2.5 miles to junction single lane road leading to railway station on left. Follow trail north for 150 yards to small railway buildings; turn left and descend to bed of Cross Creek for fossils.

Refs.: 18 p. 64; 99.

Maps (T): 21 J/7 E Napadogan.
(G): 11-1958 Napadogan.

Burnt Hill Tungsten Mine

WOLFRAMITE, PYRRHOTITE, MOLYBDENITE, ARSENOPYRITE, PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, NATIVE BISMUTH, CASSITERITE, SCHEELITE, QUARTZ, TOPAZ, BERYL, FLUORITE, CHLORITE, CALCITE, APATITE, ORTHOCLASE, MUSCOVITE, JAROSITE, ROZENITE.

In quartz veins cutting schist, phyllite, quartzite and quartz-biotite rocks.

The ore mineral, wolframite, occurs as shiny jet black (brown when weathered) individual prisms up to 2 inches across, as coarse bladed crystal

aggregates, and in massive form. Of the other metallic minerals, pyrrhotite (dark brown, massive), molybdenite (platy masses), arsenopyrite (crystalline and massive), and pyrite (cubes and irregular masses) are the most abundant. Lesser amounts of massive chalcopyrite, crystalline and massive sphalerite, fine-grained galena generally with native bismuth, light-brown crystalline cassiterite, and minute amounts of scheelite have also been found.

Non-metallic minerals include: vitreous, milky, massive, quartz; crystals of quartz up to 2 inches long; massive, nearly square, often striated, prismatic crystals (up to 1 inch wide) of translucent to turbid, white, yellow, dull green and smoky to grey topaz; light green, transparent, slender crystals (generally 1/4 inch wide and 1/2 inch to 2 inches long) and radiating crystal aggregates of beryl; massive and crystalline, colourless, purple or green (less commonly pink, blue, yellow or white) fluorite; dark green, flaky or scaly masses of chlorite; pearly-white foliated, brownish white platy, and massive white calcite; colourless to white, small, platy, aggregates of orthoclase crystals; masses and crystals of apatite (fluoresce deep yellow under "short" ultraviolet rays); and scaly to flaky masses of muscovite. These minerals are generally associated with each other and with the metallic minerals. Many of them occur in vugs in quartz, e.g. fluorite and/or quartz crystals coated with crystals of pyrite and chlorite; and topaz and quartz crystals, in places studded with cassiterite crystals. The pink fluorite (chlorophane) is phosphorescent and fluorescent (bright green) under "short" ultraviolet rays; when heated it phosphoresces brilliant aquamarine. Two secondary sulphates were identified: jarosite, as yellow, powdery encrustations on sulphides and on the host rock, and rozenite as white, powdery patches and coatings on pyrrhotite.

Gem quality topaz has been reported from the deposit, but this variety is uncommon; most of the topaz and beryl contains tiny wolframite inclusions resulting in a turbid appearance.

Molybdenite was known to occur in the Burnt Hill Brook area since 1868 and the property was staked for molybdenite in 1908 by Samuel Freize of Boisetown. Two years later it was found to contain wolframite as well. During World War I, Acadia Tungsten Mines Limited worked the deposit by means of a shaft. It remained idle until 1953 when Burnt Hill Tungsten Mines Limited began development; the mine and mill were operated briefly in the period 1955-56. The property is currently held by Burnt Hill Tungsten and Metallurgical Limited. Some mine buildings and large dumps remain at the site. In 1965, a five dollar fee was charged to the public by the Miramichi Lumber Company for the use of its private road; this was collected at the Company's gate at Maple Grove Station.

Refs.: 117 pp. 3-11, 58-63; 118 pp. 149-168.

Maps (T): 21 J/10 W Hayesville.
(G): 6-1963 Hayesville.

Mile 243.7 Barkers Point, at junction Highway 10.

Minto Coalfields

COAL, FOSSILS, PYRITE, MARCASITE.

In sandstone, shale, siltstone, conglomerate.

The coal is a high-volatile, bituminous variety; the seam averaging 18 to 24 inches thick occurs near the surface over large areas. Associated with it are fossil plants of Pennsylvanian age. Small elongated concretions of marcasite and of pyrite occur in the sandstone beds, and fine-grained pyrite partially replaces the fossil plants. The Minto coalfield is currently the only coal producer in the province and it was the first deposit on the Atlantic seaboard of North America to be developed for export trade; records indicate that coal was exported to New England in 1693. Since then mining in the area has been almost continuous. At present, open pit and underground operations are conducted by numerous companies in the communities of Coal Creek, Rothwell, Chipman and North Minto. The Minto coal area is accessible via Highway 10; it is about 34 miles from Fredericton.

Ref.: 92 pp. 14-19, 31-35.

Maps (T): 21 J/1 E Minto.
21 I/14 W Chipman.
(G): 1005 A Coal Deposits, Minto-Chipman.

Mile 245.8 Fredericton, at west end of Princess Margaret bridge; proceed to the business section.

Road log for side trip to localities off Highway 2 west of Fredericton.

Mile 0.0 Fredericton, at intersection Queen and Carleton Streets; proceed northwest along Queen Street.

3.8 Junction, Highway No. 2; proceed along this road toward Woodstock.

18.5 Junction, on left, road to Lake George, Harvey.

34.0 Pokiok; junction, on right, road to Southampton.

53.7 Junction, on left, Dugan road.

55.9 Junction, on right, Highway 103; proceed along Highway 103 to Woodstock.

60.1 Woodstock; junction, on left, Highway 5; continue along No. 103.

60.9 Woodstock; junction, on right, road to Island Park.

62.8 Woodstock; junction, on left, Highway 275 (42) to Jacksonville, Centreville.

Lake George Antimony Mine

STIBNITE, NATIVE ANTIMONY, VALENTINITE, KERMESITE, BINDHEIMITE.

In quartz-carbonate veins cutting slate and quartzite. Stibnite – the principal ore mineral – forms grey, metallic (iridescent, when tarnished) fine-grained masses; platy aggregates; tiny crystals in cavities; radiating bladed aggregates; striated columnar masses; and rounded crystalline masses. It is associated with small amounts of native antimony which occurs as bluish grey, metallic, fine granular to compact masses and as platy and rounded crystalline aggregates. When the deposit was being mined, spectacular specimens of the ore minerals were found: rounded to elongated masses (weighing 20 to 50 pounds) and radiating platy masses (with individual plates measuring up to 4 inches long) of native antimony; and large bladed aggregates (with individual blades measuring up to 6 inches long) of stibnite. Other antimony minerals associated with the metallic minerals are: kermesite, in the form of deep red to nearly black, small, tufted, radiating aggregates in cavities, and as finely granular patches; valentinite, as tiny, white, granular masses and radiating tabular crystal aggregates; bindheimite, as canary yellow to yellowish orange, hair-like or fine fibrous patches and encrustations on quartz and quartzite. Tiny smoky quartz crystals occupy small cavities in massive quartz. Specimens of stibnite were displayed at the Paris (1878) and London (1886) international exhibitions.

The deposit was worked at intervals from its discovery in 1863 to the mid 1880's; several shafts were dug and a smelter installed. Numerous attempts at mining and smelting have since been made; the most recent exploration was done in 1964-65 by Consolidated Durham Mines and Resources Limited.

A large dump and remnants of smelting operations can be seen on the property now.

Road log from mile 18.5:

Mile	0.0	Leave Highway 2 and turn left onto gravel road to Lake George.
	3.0	Junction, on right, single lane road to mine; turn right.
	3.15	Mine.

Refs.: 60 pp. 39-40; 71 pp. 275-279; 120 pp. 26-32; 129 p. 66.

Maps (T): 21 G/14 E Canterbury.
(G): 37-1959 Woodstock-Fredericton (2 miles to 1 inch).

Waterville Limestone Quarry

MARBLE, CALCITE, GOETHITE, FOSSILS.

In crystalline limestone associated with slate and argillite.

The crystalline limestone (marble) is mostly fine grained, grey or bluish grey, commonly banded with darker grey. Occurring in smaller quantities is a pink to rose-coloured variety which is suitable for ornamental purposes; it is uniformly coloured and has an attractive, delicate appearance. Dark coloured country rock is generally associated with it, but pure specimens measuring about 6 inches by 4 inches can be obtained. Pure white massive calcite is common; it fluoresces bright pink when exposed to ultraviolet rays ("long" or "short" rays). The limestone also contains small earthy masses of yellowish to brown goethite.

This deposit was first described in a Geological Survey of Canada report in 1899; crinoids, corals, and bryozoa were reported to occur in the limestone. The quarry was worked briefly for agricultural purposes in the 1930 s and in the 1940 s. It is now water-filled, but numerous broken blocks of limestone lie along the periphery of the quarry. The old lime-burning plant is adjacent to the quarry.

Road log from Highway 2 at mile 34.0:

Mile	0.0	Pokiok; turn right onto Hawkshaw bridge.
	0.4	Southampton, at junction; turn right onto road to Millville.
	2.7	Cullerton, at crossroad in front of bridge; turn left.
	4.6	Junction; turn right onto road to Temperance Vale.
	7.2	Junction; turn left continuing on road to Temperance Vale.
	9.2	Junction just beyond bridge; turn left onto Centre Waterville road.
	12.8	Limestone quarry on right.

Refs.: 28 p. 20; 123 pp. 37-39.

Maps (T): 21 J/3 W Millville.
(G): 53-32 Millville.

Oak Mountain Gold Occurrence

Native gold.

In quartz.

Native gold has been reported to occur in milky quartz. The deposit is on the wooded slope of Oak Mountain and was explored by pits many years ago.

Road log from Highway 2 at mile 53.7:

Mile	0.0	Turn left (west) onto Dugan road.
	1.1	Pink granite outcrops on right.

Mile 3.6 Junction; turn left.

5.6 Crossroad at schoolhouse; continue straight ahead.

6.1 Railway crossing.

6.3 Junction, on right, farm lane; turn right and proceed 100 yards to farm buildings. The old pits are in the wooded hill behind the barn.

Ref.: 10.

Maps (T): 21 J/4 E Woodstock.
(G): 53-33 Woodstock.

Plymouth Iron Mine

HEMATITE, MAGNETITE, PSILOMELANE, MANGANOUS MANGANITE, RHODOCHROSITE, PYRITE.

In slate.

The hematite, magnetite and manganese minerals occur as very fine disseminations and thin layers in the slate, and, less commonly, as films or tiny patches on quartz. The hematite-bearing slate is fine grained, compact, brick-red to reddish brown and contains films of fine-grained black manganous manganese. It takes a fairly good polish and may have possibilities as an ornamental stone (cuff-links, paper-weights, etc.); two varieties can be obtained – a solid orange-red stone, and one that is orange-red, irregularly and/or diffusely banded with thin black lines. The manganese-bearing slate is finely banded, pitch black with greasy to lustrous surfaces; very fine-grained magnetite is associated with this slate. Pink rhodochrosite and white quartz, in veins about 1 1/2 inches wide, are commonly coated with lustrous psilomelane. Pyrite, as cubes (averaging 1/8 inch across) and irregular patches, occurs in the black slate.

This deposit, as well as the iron-manganese deposits in the Jacksonville area (Moody Hill, Iron Ore Hill, Palmer's mines) have been known for many years and were worked intermittently between 1848 and 1884; about 70,000 tons of ore were treated at a smelter and foundry located on the St. John River terraces on the south side of the mouth of Lanes Creek (almost directly opposite the junction of Highways 275 and 2). In 1863 the ore was used in the manufacture of mail-plating for the construction of gun boats by the British navy. Interest in these deposits was revived when Stratmat Limited explored them in the 1950's for manganese. Estimates indicated that the ore averaged 13 per cent iron and 9 per cent manganese. The Plymouth iron mine consists of a small open pit surrounded by small dumps.

Road log from Woodstock, at junction Highways 103 and 5:

Mile 0.0 Proceed west along Highway 5 toward Houlton.

4.8 Junction road to Plymouth; turn right.

Mile 5.9 Junction road on right; continue straight ahead.

6.3 Junction trail on right(opposite red farmhouse); proceed along this trail for 200 yards to the mine.

Refs.: 28 pp. 18-20; 35 p. 101; 53 pp. 97-104.

Maps (T): 21 J/4 E Woodstock.
(G): 37-1959 Woodstock-Fredericton (2 miles to 1 inch).

Dominion No. 1 Mine

GALENA, SPHALERITE, PYRITE, JAROSITE, QUARTZ, CHLORITE.

At contact of argillite and quartzite.

Cleavable and fine-grained masses of argentiferous galena are associated with smaller amounts of dark brown sphalerite and massive and crystalline (individual crystals about 1/4 inch across) pyrite. Yellow, powdery encrustations of jarosite occur on quartz and pyrite. Fine-grained, translucent, green chlorite is associated with quartz.

The deposit was operated briefly in the 1920's for lead and silver. The workings consisted of a shaft and trenches that are now water-filled and caved. There is a small dump near the shaft.

Road log from Woodstock at mile 60.9:

Mile 0.0 Turn right (east) onto road to Island Park.

0.5 Junction Southampton-Mortonville road at end of bridge; turn right.

2.1 Turn left onto single lane road leading to the Carl Robinson farm.

2.5 Farmhouse. From the barn, proceed east along a partly overgrown single lane road for 500 yards to the mine at the edge of a wooded area.

Ref.: 5 pp. 70-71.

Maps (T): 21 J/4 E Woodstock.
(G): 53-33 Woodstock.
37-1959 Woodstock-Fredericton (2 miles to 1 inch).

Barite Occurrence

BARITE, GALENA.

In argillite.

White to greyish white massive barite containing small amounts of galena occurs as fragments about 6 inches across in a topographic depression on the Saunders farm. It was discovered in 1958 when a Geological Survey of Canada field party was engaged in surficial mapping. A few specimens may be found in the vicinity of some shallow pits at the farm.

Road log from Woodstock at mile 60.9:

Mile	0.0	Proceed east along road to Island Park.
	0.5	Junction Southampton-Mortonville road; turn left (north).
	1.8	Junction, on right, road to Mortonville, Waterville, etc.; turn right.
	4.2	Junction single lane road on left (just beyond the Russell Saunders farmhouse); turn left.
	4.7	Pits on right near road.

Ref.: 77 p. 21.

Maps (T): 21 J/4 E Woodstock.
(G): 37-1959 Woodstock-Fredericton (2 miles to 1 inch).

Stickney Iron Occurrence

HEMATITE, EPIDOTE.

In siliceous iron formation.

The iron-bearing rock consists of a deep reddish to purplish brown, fine-grained, siliceous matrix containing orange-red to brick-red irregular streaks and masses of fine-grained hematite; it is traversed by pistachio green epidote stringers. It takes a good polish and specimens having a fairly high proportion of hematite and epidote are colourful and could possibly be used for ornamental objects. Blocks and broken fragments of the rock are found at the side of a road near Stickney.

Road log from Woodstock at mile 60.9:

Mile	0.0	Proceed east along road to Island Park.
	0.5	Junction; turn left onto Southampton-Mortonville road.
	12.5	Hartland, at junction Highway 2; continue straight ahead.
	20.1	Stickney, at junction gravel road in front of bridge; turn right.
	20.3	Fork; bear left.
	22.6	Junction; turn left.

Mile 23.2 Junction Lansdowne-Oakland road; turn left.

23.3 Broken blocks of iron-bearing rock on right. Similar exposures are found in this general area.

Maps (T): 21 J/5 E Florenceville.
(G): 37-1959 Woodstock-Fredericton (2 miles to 1 inch).

Jacksonville Iron Deposits

HEMATITE, MANGANOUS MANGANITE, PSILOMELANE, RHODOCHROSITE, PYRITE.

In slate.

These iron-manganese deposits are similar to the Plymouth deposit. The ore was discovered in about 1836 when Dr. Ch. T. Jackson of the Geological Survey of Maine traced the iron deposit from the Aroostook region of Maine to the Woodstock area. The deposits were worked by a series of open pits which are now overgrown and/or caved. Iron ore specimens were exhibited at the Philadelphia (1876), London (1886) and Paris (1900) international exhibitions. Ore specimens including the orange-red hematite slate are available at the workings; the Moody Hill deposit yields more specimens than the Iron Ore Hill or Palmer's deposits.

Road log from Woodstock at mile 62.8:

Mile 0.0 Turn left onto Highway 275 (42) to Jacksonville, Centreville.

1.8 Turn-off to Trans-Canada Highway North; continue straight ahead.

3.1 Junction single lane road on left. To reach Moody Hill pits, turn left and proceed 1.0 mile to a clearing on right side of road; the pits are on both sides of the clearing and in the woods. To reach the Iron Ore Hill pits, continue straight ahead along Highway 275 (42).

4.4 Junction, on left, road to Lindsay. To reach Iron Ore Hill pits, turn left and proceed 0.8 mile to the R. Opie farmhouse on left side of road. The pits and small dumps are in a wooded slope about 100 yards east of the road (i.e. on the right side) opposite the Opie farm buildings. This deposit belongs to Mr. R. Opie. To reach the old Palmer's mine continue straight ahead along Highway 275 (42).

6.3 Junction road to Waterville; continue straight ahead.

6.5 Junction, farm lane on left, just beyond church. There is a small pit on a hillside behind the barn, about 100 yards from the highway. This deposit is on the Bob McFarlane farm and was formerly known as Palmer's mine.

Refs.: 28 pp. 18-20; 35 p. 101; 53 pp. 97-104; 128 p. 15; 129 p. 28; 130 p. 127.

Maps (T): 21 J/4 E Woodstock.
(G): 53-33 Woodstock.
37-1959 Woodstock-Fredericton (2 miles to 1 inch).

ADDRESSES

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* The Director,
Geological Survey of Canada,
Department of Energy. Mines and Resources.
601 Booth Street,
Ottawa 4, Ontario.

Quebec Department of Natural Resources,
Parliament Buildings,
Quebec City, Quebec.

For topographic maps (50 cents per sheet):

* The Director,
Surveys and Mapping Branch,
Department of Energy, Mines and Resources.
615 Booth Street,
Ottawa 4, Ontario.

For tide and current tables (30 cents per copy):

* The Dominion Hydrographer,
Canadian Hydrographic Service,
Marine Sciences Branch,
Department of Energy, Mines and Resources,
615 Booth Street,
Ottawa 4, Ontario.

* Prepayment is required for all orders; cheques should be made payable to the Receiver General of Canada.

For road maps and travel information:

The Canadian Government Travel Bureau,
Department of Trade and Commerce,
150 Kent Street,
Ottawa, Ontario.

New Brunswick Travel Bureau,
P.O. Box 1030,
Fredericton, New Brunswick.

Quebec Department of Tourism, Fish and Game,
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GLOSSARY

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

Allophane. Amorphous silica-alumina gel. H=3. Pale blue, green, brown, yellow or colourless encrustations or powdery masses, also stalactitic or mammillary. Vitreous to waxy. Decomposition product of aluminous silicates such as feldspar.

Alluvium. Detrital deposit including gravel, sand, clay and mud formed by the operation of streams and rivers.

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

Amygdaloidal lava. Fine-grained lava (basalt) having cavities (amygdules) which may be filled with quartz, calcite, chlorite, zeolites, etc.

Analcite. $NaAlSi_2O_6 \cdot H_2O$. H=5-5 1/2. Colourless, white, yellowish or greenish, vitreous, transparent, trapezohedral crystals or massive granular. Distinguished from garnet by its inferior hardness. Often associated with other zeolites.

Anglesite. $PbSO_4$. H=2 1/2-3. Colourless to white, greyish, yellowish or bluish, tabular or prismatic crystals, or granular. Adamantine to resinous lustre. Characterized by high specific gravity (6.36 to 6.38) and adamantine lustre. Effervesces in nitric acid. Secondary mineral generally formed from galena. Ore of lead.

Anthophyllite. $(Mg, Fe)_7Si_8O_{22}(OH)_2$. H=5 1/2-6. Orthorhombic variety of amphibole. Brown, tinted with grey, yellow, green. Lamellar, fibrous or prismatic aggregates; may resemble fibrous asbestos except that fibres are generally brittle. Used in boiler coverings and fire-proof paints because of its heat resistant property.

Antigorite. $Mg_3Si_2O_5(OH)_4$. H=2 1/2. Green translucent variety of serpentine having lamellar structure.

Antimony. Sb. H=3-3 1/2. Light grey metallic, massive, granular, lamellar or radiating. Occurs with other antimony minerals. Used as component of lead alloys for manufacture of storage batteries, cable coverings, solders, bearing metal; also for flame-proofing textiles, paints and ceramics.

Antlerite. $Cu_3SO_4(OH)_4$. H=3 1/2. Emerald to dark green, tabular, prismatic or acicular microscopic crystals. Vitreous lustre. Secondary copper mineral found in arid regions. Associated with other secondary minerals; not readily distinguishable from these minerals in hand specimen. Ore of copper.

Apatite. $Ca_5(PO_4)_3(F, Cl, OH)$. H=5. Green to blue, colourless, brown, or 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, dolomite by lack of effervescence in HCl, and from diopside and olivine by its inferior hardness. Used in manufacture of fertilizers and in production of detergents.

Aplite. A light coloured pink to red fine-grained dyke rock composed mainly of feldspar and quartz.

Aragonite. $CaCO_3$. H=3 1/2-4. Colourless to white or grey and less commonly, yellow, blue, green, violet, rose-red. As 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.

Argillite. A clayey sedimentary rock without a slaty cleavage or shaly fracture.

Arkose. A sedimentary rock composed of sand-sized feldspar grains with minor quartz grains.

Arsenopyrite. FeAsS. H=5 1/2-6. Light to dark grey metallic striated prisms with characteristic wedge-shaped cross-section; also massive. Tarnished to bronze colour. Ore of arsenic; may contain gold or silver.

Artinite. $Mg_2(CO_3)(OH)_2 \cdot 3H_2O$. H=2 1/2. White acicular crystals; fibrous aggregates forming botryoidal, spherical masses and cross-fibre veinlets. Transparent with vitreous, silky or satin lustre. Occurs in serpentine. Distinguished from calcite by its form and lustre.

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 manufacture of asbestos cement sheeting, shingles, roofing and floor tiles, millboard, thermal insulating paper, pipe-covering, clutch and brake components, reinforcing in plastics, etc.

Ash (volcanic). Uncemented volcanic debris resembling ashes.

Augite syenite. A relatively coarse-textured igneous rock composed mainly of feldspar and pyroxene (augite) with little or no quartz. Used as a building stone.

Azurite. $Cu_3(CO_3)_2(OH)_2$. H=3 1/2-4. Azure blue to inky blue tabular or prismatic crystals; also massive, earthy, stalactitic with radial or columnar structure. Vitreous, transparent. Secondary copper mineral generally associated with malachite and other secondary copper minerals. Effervesces in acids. Ore of copper.

Barite. $BaSO_4$. H=3-3 1/2. White, pink, yellowish, or 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.

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 distinguishable from it in hand specimen.

Beryl. $Be_3Al_2Si_6O_{18}$. H=8. White, yellow, green, blue hexagonal prisms, or massive with conchoidal or uneven fracture. Vitreous; transparent to translucent. Distinguished from apatite by superior hardness, from topaz by its lack of perfect cleavage; massive variety distinguished from quartz by density test (beryl has higher density). Ore of beryllium which has numerous uses in the nuclear energy, space, aircraft, electronic and scientific equipment industries; used as alloying agent with copper, nickel, iron, aluminum and magnesium.

Beudantite. $PbFe_3(AsO_4)(SO_4)(OH_6)$. H=3 1/2-4 1/2. Dark green, brown, black rhombohedral crystals; also yellow earthy or botryoidal masses. Vitreous, resinous to dull lustre. Secondary mineral occurring in iron and lead deposits. Difficult to distinguish in hand specimen from other yellowish secondary minerals.

Bindheimite. $Pb_2Sb_2O_6(O,OH)$. H=4-4 1/2. Yellow to brown, white to grey or greenish powdery to earthy encrustations; also nodular. Secondary mineral found in antimony-lead deposits. Difficult to identify except by X-ray methods.

Bismuth. Bi. H=2-2 1/2. 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.

Boulangerite. $Pb_5Sb_4S_{11}$. H=2 1/2-3. Dark bluish grey, metallic, striated, elongated prismatic to acicular crystals; also fibrous, plumose aggregates. Fibrous cleavage is distinguishing characteristic. Ore of antimony.

Bournonite. $PbCuSbS_3$. H=2 1/2-3. Steel-grey to blackish grey metallic (often brilliant) striated short prismatic crystals; generally massive, granular. Difficult to distinguish from other sulphosalts in hand specimen. Ore of lead, copper and antimony.

Breccia. Rock composed of angular fragments. Breccias often are attractively patterned and coloured; when polished they can be used for ornamental pieces, table tops, paper-weights, etc.

Brochantite. $Cu_4(SO_4)(OH)_6$. H=3 1/2-4. Vitreous emerald green acicular crystal aggregates; massive, granular. Secondary mineral formed by the oxidation of copper minerals. Distinguished from malachite by lack of effervescence in HCl.

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

Carnelian. The red to reddish brown or reddish yellow variety of chalcedony. Used as a gemstone.

Cassiterite. SnO_2. H=6-7. Yellow to brown prismatic crystals; twinning common. Also radially fibrous, botryoidal, or concretionary masses; granular. Adamantine, splendent lustre. White to brownish or greyish streak. Distinguished from other light coloured non-metallic minerals by its high specific gravity (6.99); from wolframite by its superior hardness. Ore of tin. Concentrically banded variety used as ornamental stone.

Cerussite. $PbCO_3$. H=3-3 1/2. Transparent white, grey, or brownish tabular crystals with adamantine lustre; also massive. High specific gravity (6.5) and lustre are distinguishing features. Secondary mineral formed by oxidation of lead minerals. Fluoresces in shades of yellow in ultraviolet light. Ore of lead.

Chalcanthite. $CuSO_4 \cdot 5H_2O$. H=2 1/2. Sky-blue to powder-blue, short prismatic crystals, granular masses; also stalactic or reniform. Vitreous and generally translucent. Metallic taste and solubility in water distinguishes it from azurite. Associated with other secondary sulphates of copper and iron. Ore of copper.

Chalcedony. SiO_2. H=7. Translucent cryptocrystalline variety of quartz. Colourless, grey, bluish, yellow, brown, reddish. Formed from aqueous solutions. Attractively coloured chalcedony is used for ornamental objects and jewellery.

Chalcocite. Cu_2S. H=2 1/2-3. Dark grey to black metallic; massive. Tarnishes to iridescent blue, purple, etc. Also referred to as vitreous copper or sulphurette of copper. Ore of copper.

Chalcopyrite. $CuFeS_2$. H=3 1/2-4. Brass yellow, massive. Iridescent tarnish. Brass colour is distinguishing feature. Also called copper pyrite. Ore of copper.

Chert. Massive, opaque variety of chalcedony; generally drab-coloured (grey, greyish white, yellowish grey or brown).

Chlorite. Hydrous silicate of Al, Fe, Mg. H=2-2 1/2. Transparent, green flaky aggregates. Distinguished from mica by its colour and by the fact that its flakes are not elastic.

Chloritoid. $(Mg, Fe'')_2Al_4Si_2O_{10}(OH_4)$. H=6 1/2. Grey, greenish grey to black tabular crystals; also scaly, platy or foliated. Lamellar varieties resemble mica or chlorite but are distinguished by their hardness and brittleness. Occurs in metamorphosed sediments.

Chlorophane. A variety of fluorite that phosphoresces bright green when heated.

Chromite. $(Mg, Fe)Cr_2O_4$. H=5 1/2. Black metallic, octahedral crystals (rare); generally massive. Distinguished from magnetite by its weak magnetism and brown streak. Commonly associated with serpentine. Ore of chromium.

Chrysocolla. $CuSiO_3 \cdot 2H_2O$. H=2-4. Blue to blue-green earthy, botryoidal, or fine-grained massive. Conchoidal fracture. Secondary mineral found in oxidized zones of copper-bearing veins. Often associated with quartz or chalcedony, producing attractive patterns suitable for use as jewellery and ornamental objects. Minor ore of copper.

Chrysotile. Fibrous variety of serpentine (asbestos).

Colerainite. Member of chlorite group. Colourless to white thin hexagonal plates forming rosettes and botryoidal aggregates. Pearly lustre. Associated with serpentine.

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. Sedimentary rock formed of rounded pebbles or gravel.

Connellite. $Cu_{19}(SO_4)Cl_4(OH)_{32} \cdot 3H_2O(?)$. H=3. Light azure-blue, translucent, acicular crystals. Vitreous lustre. Distinguished from azurite by lack of effervescence in HCl and paler colour.

Copiapite. $(Fe, Mg)Fe_4'''(SO_4)_6(OH)_2 \cdot 20H_2O$. H=2 1/2-3. Pale yellow to orange-yellow and greenish yellow granular or scaly aggregates; also tabular crystals. Transparent to translucent. Vitreous to pearly lustre. Secondary mineral formed from oxidation of sulphides, especially pyrite. Yellow colour is characteristic.

Covellite. CuS. H=1 1/2-2. Inky-blue iridescent in shades of brass yellow, purple, coppery red; generally massive; crystals (hexagonal plates) rare. Metallic lustre. Distinguished from chalcocite and bornite by its perfect cleavage and colour.

Cubanite. $CuFe_2S_3$. H=3 1/2. Brass- to bronze-yellow tabular crystals or massive. Distinguished from chalcopyrite by its strong magnetism. Associated with other copper-iron sulphides. Rare mineral.

Cyanotrichite. $Cu_4Al_2(SO_4)(OH)_{12}.\ ^2H_2O$. Sky-blue to azure-blue minute acicular crystals commonly tufted; also extremely fine, plush or wool-like aggregates. Silky lustre. Secondary mineral found sparingly in copper deposits. Rare mineral.

Devilline. $Cu_4Ca(SO_4)_2(OH)_6.\ 3H_2O$. H=2 1/2. Bright green to bluish green transparent platy crystals forming rosettes or tiny masses. Associated with azurite, malachite, on copper-bearing rocks; not readily distinguishable from other copper minerals in hand specimen.

Diabase. Dark coloured igneous rock composed mostly of lath-shaped plagioclase crystals and of pyroxene. Used as a building, ornamental, and monument stone.

Diopside. $CaMgSi_2O_6$. H=6. White to green monoclinic variety of pyroxene.

Domeykite. Cu_3As. H=3-3 1/2. Light grey to steel-grey metallic massive; also reniform and botryoidal. Yellowish, brown, or iridescent when tarnished. Ore of copper.

Dunite. Fine-grained, dull grey-black iron-magnesian ultrabasic igneous rock.

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

Enargite. Cu_3AsS_4. H=3. Greyish to iron-black metallic (dull when tarnished) prismatic or tabular crystals; also massive or granular. When twinned it forms star-shaped cyclic trillings. Associated with pyrite, galena, sphalerite and copper sulphides. Good cleavage is characteristic. Ore of copper.

Epidote. $HCa_2(Al, Fe)_3Si_3O_{13}$. H=6-7. Yellowish green massive or fibrous aggregates. Vitreous lustre. Often associated with quartz and pink feldspar, producing attractive mottled or veined patterns. Takes good polish and can be used for jewellery and other ornamental objects.

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.

Flint. Yellowish grey or brown, dark grey to black opaque variety of chalcedony. Used by primitive people for tools.

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

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

Freibergite. Silver-bearing variety of tetrahedrite-tennantite group.

Galena. PbS. H=2 1/2. Dark grey metallic, cubic crystals; also massive with excellent cubic cleavage. Heavy (S.G.=7.58). Ore of lead; may contain silver.

Garnet. Silicate of Al, Mg, Fe, Mn, Ca. H=6 1/2-7 1/2. Transparent red dodecahedral crystals or massive; also yellow, brown, green. Clear garnet is used as a gemstone. Also used as abrasive. Distinguished by its crystal form.

Gersdorffite. (Ni, Fe, Co)AsS. H=5 1/2. Light grey metallic to steel-grey (grey to greyish black when tarnished) cubes, octahedrons, pyritohedrons; or massive. Distinguished from pyrite by its colour and inferior hardness. Minor ore of nickel.

Goethite. $HFeO_2$. H=5-5 1/2. Dark brown to yellowish brown earthy, botryoidal, bladed or massive. Has characteristic yellowish brown streak. Weathering product of iron-rich minerals. Ore of iron.

Gold. Au. H=2 1/2-3. Yellow metallic irregular masses, plates, scales, nuggets. Rarely as crystals. Distinguished from other yellow metallic minerals by its softness, malleability, high specific gravity (19.3). Precious metal. Placer gold refers to gold dust, flakes, scales, nuggets occurring in alluvium.

Gossan. Rusty weathered zone in rocks. Characterized by an abundance of alteration products of iron-bearing minerals (limonite, goethite).

Granite. Grey to reddish coloured relatively coarse grained igneous rock composed mainly of feldspar with quartz.

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 lubricant, 'lead' pencils, refractories.

Gudmundite. FeSbS. H=6. Silver, white to steel-grey metallic, elongated striated prismatic crystals; also massive, lamellar. Pale bronze when tarnished. Not readily distinguishable from other grey metallic sulphides in hand specimen.

Gypsum. $CaSO_4 \cdot 2H_2O$. H=2. White, grey, light brown; granular massive. Also fibrous (satin spar); colourless, transparent tabular crystals (selenite). Distinguished from anhydrite by its softness. Occurs in sedimentary rocks. Alabaster (fine grained, translucent massive) and satin spar are used for carving into ornamental objects; the latter is chatoyant on the polished surface.

Heazlewoodite. Ni_3S_2. H=4. Yellow metallic massive granular; also as platy aggregates. Distinguished from pyrite by its inferior hardness. Rare mineral.

Hematite. Fe_2O_3. H=5 1/2-6 1/2. Reddish brown to black massive, botryoidal, earthy; also foliated or micaceous with high metallic lustre (specularite). Characteristic red streak. Ore of iron; also used as pigment.

Hemimorphite (Calamine). $Zn_4Si_2O_7(OH)_2 \cdot H_2O$. H=5. White, brownish pale blue or green thin tabular crystals; also massive, stalactitic or mammillary. Vitreous lustre. Associated with smithsonite in zinc deposits; distinguished from it by lack of effervescence in HCl and superior hardness. Minor ore of zinc.

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

Hisingerite. Hydrated iron silicate. H=3. Black to brownish black amorphous, compact, massive with conchoidal fracture. Greasy to dull lustre.

Hydrocerussite. $Pb_3(CO_3)_2(OH)_2$. H=3 1/2. Colourless to white or grey tiny hexagonal scales and plates. Transparent to translucent with adamantine or pearly lustre. Associated with cerussite from which it is not readily distinguished.

Hydromagnesite. $Mg_4(OH)_2(CO_3)_3 \cdot 3H_2O$. H=3 1/2. Colourless to white transparent acicular or bladed crystal aggregates forming tufts, rosettes or encrustations; also massive. Vitreous, silky or pearly lustre. Occurs in serpentine, brucite, magnesite deposits. Effervescent in acids. Distinguished from calcite by crystal form.

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

Hydrozincite. $Zn_5(OH)_6(CO_3)_2$. H=2-2 1/2. White to grey, yellowish, brownish, pinkish, fine-grained, compact to earthy or gel-like masses; also stalactic, reniform, pisolitic, concentrically banded or radially fibrous structures; flat blade-like crystals. Dull, silky or pearly lustre. Fluoresces pale blue or lilac in ultraviolet light. Secondary mineral found in oxidized zones in zinc deposits.

Iron formation. Metamorphosed sediment containing iron minerals and silica.

Jarosite. $KFe_3(SO_4)_2(OH)_6$. H=2 1/2-3 1/2. Yellow to brown, pulverulent coating associated with iron-bearing rocks and with coal. Distinguished from iron oxides by giving off SO_2 when heated.

Jasper. Red, yellow, brown, green, opaque variety of chalcedony. Used as a gem and ornamental stone.

Kaolinite. $Al_4Si_4O_{10}(OH)_8$. H=2. Chalk-white or tinted with grey, yellow or brown dull earthy masses. Clay mineral formed chiefly by decomposition of feldspars. Becomes plastic when wet. Used as a filler in paper and in manufacture of ceramics.

Kermesite. Sb_2S_2O. H=1-1 1/2. Cherry-red hair-like or tufted radiating aggregates of lath-shaped crystals. Translucent with adamantine to semi-metallic lustre. Sectile. Alteration product of stibnite. Colour and habit are characteristic. Minor ore of antimony.

Langite. $Cu_4(SO_4)(OH)_6$. H=2 1/2-3. Transparent blue, tiny crystals forming aggregates on copper-bearing rocks. Vitreous to silky lustre. Formed by oxidation of copper sulphides. Difficult to distinguish from other copper sulphates in hand specimen.

Laumontite. $CaAl_2Si_4O_{12}.4H_2O$. H=4. White to pink or reddish white vitreous to pearly prismatic crystal aggregates; also friable, chalky due to dehydration. Characteristic alteration distinguishes it from other zeolites.

Lepidocrocite. FeO(OH). H=5. Reddish brown submetallic scaly or fibrous masses. Characteristic orange streak. Associated with goethite as oxidation product of iron minerals.

Limestone. Soft white or grey 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 acid. Crystalline limestone (marble) is a limestone that has been metamorphosed and is used as a building and ornamental stone. Shell limestone (coquina) is a porous rock composed mainly of shell fragments.

Limonite. Field term referring to natural hydrous iron oxides whose true identity is unknown. Yellow-brown to dark brown earthy, porous, ochreous masses; also stalactitic or botryoidal. Secondary product of iron minerals.

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 refactory bricks, cements, flooring; for making magnesium metal.

Malachite. $Cu_2CO_3(OH)_2$. H=3 1/2-4. 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.

Manganite. MnO(OH). H=4. Steel-grey to iron-black metallic prismatic (striated) crystal aggregates; also columnar, fibrous, stalactic, finely granular. Not readily distinguishable from other dark manganese minerals in hand specimen. Ore of manganese.

Manganous manganite. A mineral name proposed for the compound δ MnO_2 that occurs in nature as black to bluish black, submetallic to dull, fine grained powdery coating associated with other manganese minerals and hematite. May be identical to birnessite.

Marble. See limestone.

Marcasite. FeS_2. H=6-6 1/2. Pale bronze to grey metallic radiating, stalactitic, globular or fibrous forms. Yellowish to dark brown tarnish. Transforms to pyrite from which it is difficult to distinguish in the hand specimen.

Melanterite. $FeSO_4 \cdot 7H_2O$. H=2. Greenish white to green and blue massive, pulverulent; also stalactitic, concretionary, fibrous or capillary; short prismatic crystals (less common). Vitreous to dull lustre. Metallic, astringent taste. Soluble in water. Secondary mineral associated with pyrite and marcasite deposits.

Millerite. NiS. H=3-3 1/2. Pale brass-yellow, slender, elongated, striated crystals; acicular radiating or hair-like aggregates. Grey iridescent tarnish. Distinguished from pyrite by its crystal form, and inferior hardness. Ore of nickel.

Molybdenite. MoS_2. H=1-1 1/2. Dark grey metallic (bluish tinged) tabular, foliated, scaly aggregates; also massive. Sectile with greasy feel. Distinguished from graphite by its bluish lead-grey colour and by its streak (greenish on porcelain, and bluish grey on paper). Ore of molybdenum.

Mordenite. $(Ca, Na_2, K_2)_4Al_8Si_{40}O_{96} \cdot 28H_2O$. H=3-4. White, pink or reddish tabular crystals; also as spheres or nodules with compact fibrous structure. When crystalline, not easily distinguished from other zeolites.

Mudstone. Hardened mud-like sediment composed chiefly of clay minerals.

Nordmarkite. A quartz-bearing syenite. Used as building and ornamental stone.

Olivine. $(Mg, Fe)_2SiO_4$. H=6 1/2. Olive green vitreous granular masses or rounded grains; also yellowish to brownish, black. Distinguished from quartz by having a cleavage; from other silicates by its olive-green colour. Used in manufacture of refractory bricks; transparent variety (peridot) is used as a gemstone.

Orthoclase. Pink to white monoclinic variety of potash feldspar.

Peat. Dark brown decomposition product of mosses and plants in marshy areas. Used as fertilizer, soil conditioner, insulating material, packing material, etc.

Pegmatite. A very coarse-grained dyke rock.

Peridotite. An igneous rock consisting almost entirely of olivine and pyroxene with little or no plagioclase feldspar.

Phenocryst. Distinct crystal in a fine-grained igneous rock which then is referred to as a porphyry.

Phillipsite. $(K_2, Na_2, Ca)Al_2Si_4O_{12}.4\ 1/2\ H_2O$. H=4-4 1/2. White, radiating aggregates of prism-shaped crystals with pyramidal terminations. Translucent to opaque, vitreous. Associated with other zeolites in basalt.

Phosphorescence. Property of certain substances to continue to glow after being heated or after exposure to ultraviolet rays.

Phyllite. A metamorphic rock having a sheen on cleavage surfaces.

Picrolite. A non-flexible fibrous variety of antigorite.

Placers. Sand or gravel deposits containing gold and/or other mineral particles; generally refers to deposits in paying quantities.

Porphyry. An igneous rock having distinct crystals (phenocrysts) in a finer grained groundmass or matrix. Often used as ornamental stone.

Prehnite. $Ca_2, Al_2, Si_3, O_{10}(OH)_2$. H=6 1/2. Pale green to white or grey, vitreous, massive, globular, stalactitic, or tabular aggregates. Transparent to translucent. Distinguished from quartz by its uneven fracture; from beryl by its inferior hardness; from zeolites by its habit and superior hardness.

Psilomelane. $BaMn''Mn_8O_{16}(OH)_4$. H=5-6. Black massive, botryoidal, stalactitic or earthy. Dull to submetallic lustre. Black streak. Associated with other manganese minerals, from which it is distinguished by superior hardness, black streak, and amorphous appearance. Ore of manganese.

Pyrite. FeS_2. H=6-6 1/2. Pale brass-yellow (iridescent when tarnished) metallic crystals (cubes, pyritohedrons, octahedrons) or massive granular. Distinguished from other sulphides by its colour, crystal form, and superior hardness. Contains other metals and becomes ore of copper, gold, etc. Source of sulphur.

Pyroaurite. $Mg_6Fe_2(OH)_{16}.CO_3.4H_2O$. H=2 1/2. Colourless, yellowish, bluish green, or white flaky with pearly or waxy lustre. Crushes to talc-like powder. Effervesces in HCl acid.

Pyrolusite. MnO_2. H=6-6 1/2 (crystals), 2-6 (massive). Light to dark grey metallic (may have bluish tint) columnar, fibrous or divergent masses; also reniform, concretionary, granular to powdery and dendritic (on fracture surfaces). Soils fingers easily and marks paper. Ore of manganese.

Pyromorphite. $Pb_5(PO_4)_3Cl$. H=3 1/2-4. Green, yellow to brown prismatic crystals; also rounded barrel-shaped or spindle-shaped forms, subparallel crystal (prismatic) aggregates; globular, reniform or granular. Resinous to subadamantine lustre. Crystal form, lustre, and high specific gravity (7.04) are distinguishing features. Soluble in acids. Secondary mineral formed in oxidized galena deposits.

Pyrrhotite. $Fe_{1-x}S$. H=4. Brownish bronze-massive granular. Black streak. Magnetic; this property distinguishes it from other bronze-coloured sulphides.

Quartzite. A quartz-rich rock formed by the metamorphism of a sandstone. Used as a building and monumental stone, and, if colour is pleasing, as an ornamental stone; high purity quartzite is used in the glass industry.

Reefs, coral. A rock structure built by corals.

Retgersite. $NiSO_4 \cdot 6H_2O$. H=2 1/2. Apple green to emerald green fibrous crusts, veinlets; tufts or finely granular encrustations. Vitreous to dull lustre. Bitter, metallic taste. Soluble in water. Secondary mineral occurring in oxidized zones of nickel-bearing minerals.

Rhodochrosite. $MnCO_3$. H=4. Pink to rose, less commonly yellowish to brown; massive granular to compact; also columnar, globular, botryoidal; crystals (rhombohedral) uncommon. Vitreous, transparent. Distinguished from rhodonite (H=6) by its inferior hardness. Ore of manganese.

Rhyolite. Fine-grained volcanic rock with composition similar to granite.

Roemerite. $Fe''Fe_2'''(SO_4)_4 \cdot 14H_2O$. H=3-3 1/2. Yellow to rust- or violet-brown, pink, powdery, granular, crystalline (tabular) encrustations; also stalactitic. Oily to vitreous; translucent. Saline, astringent taste. Formed from oxidation of pyrite. Not easily distinguished in hand specimen from other iron sulphates.

Rozenite. $FeSO_4 \cdot 4H_2O$. Snow-white, greenish white, finely granular, botryoidal or globular encrustations. Metallic astringent taste. Difficult to distinguish in hand specimen from other iron sulphates with which it is associated.

Rutile. TiO_2. H=6-6 1/2. Brownish red to black, striated, prismatic or acicular crystals; massive. Crystals are often twinned, forming elbow-shapes. Adamantine lustre. Resembles cassiterite, but not as heavy and has light brown streak (cassiterite has white streak). Ore of titanium.

Sanidine. Colourless, glassy, monoclinic variety of potash feldspar.

Sandstone. Sedimentary rock composed of sand-sized particles (mainly quartz).

Scapolite. $(Na, Ca)_4[(Al, Si)_4O_8]_3(Cl, CO_3)$. H=6. White to grey, and less commonly pink, yellow, bluish, greenish; prismatic and pyramidal crystals; also massive, granular with splintery woody appearance. Vitreous, pearly to resinous lustre. Distinguished from feldspar by its square prismatic form, its prismatic cleavage, its splintery appearance on cleavage surfaces. May fluoresce under ultraviolet rays. Clear varieties used as gemstone.

Scheelite. $CaWO_4$. H=4 1/2-5. White, yellow, brownish; transparent to translucent massive. High specific gravity (about 6). Usually fluoresces; this property is used as a method of 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 1/2-4. Commonly greyish green to greyish brown, yellowish; also colourless, violet or bluish. Aggregates and crusts of tabular, prismatic or pyramidal crystals; also massive, porous, dense to earthy. Vitreous (crystals) to subresinous (massive). Soluble in acids. Secondary mineral formed in gossans.

Sea-stack. A pillar-like, columnar rock in the sea separated from a rock mass by wave erosion.

Senarmontite. Sb_2O_3. H=2-2 1/2. Colourless to greyish white, transparent; crystalline (octahedral) or granular massive; forms crusts. Resinous to subadamantine lustre. Soluble in HCl. Secondary mineral formed by oxidation of antimony minerals. Minor ore of antimony.

Sericite. Very fine-grained muscovite with silky or pearly lustre.

Serpentine. $Mg_6(Si_4O_{10})(OH)_8$. H=2-5. Usually massive with waxy lustre. Translucent to opaque in shades of yellow-green to deep green, also bluish, red, brown, black. Often mottled, banded, or veined. Asbestos is the fibrous variety. Formed by alteration of olivine, pyroxene, amphibole, or other magnesium silicates. Found in metamorphic and igneous rocks. Used as ornamental building stone (verde antique) and for cutting and/or carving into ornamental objects (ash trays, book ends, etc.).

Serpentinite. An ultrabasic rock consisting almost entirely of serpentine minerals.

Shale. Fine-grained sedimentary rock composed of clay minerals.

Siderite. $FeCO_3$. H=3 1/2-4. 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. Difficult to distinguish in hand specimen from other iron sulphates.

Silex. An obsolete term for flint. It is, however, used in the Gaspé for grey to brown chalcedony pebbles found in the area.

Sjogrenite. $Mg_6Fe_2(OH)_{16}.CO_3.4H_2O$. H=2 1/2. Thin transparent, tiny hexagonal plates (flexible); colourless to yellowish or brownish white. Glistening, vitreous or pearly lustre. Rare mineral associated with pyroaurite.

Slate. Fine-grained metamorphic rock characterized by a susceptibility to split into thin sheets.

Smithsonite. $ZnCO_3$. H=4-4 1/2. Greyish white to grey, greenish or bluish; also yellow to brown. Generally botryoidal, reniform, stalactic, granular, porous masses; also indistinct rhombohedral crystalline aggregates. Vitreous lustre. Has high specific gravity (4.4). Effervesces in acids. May fluoresce bluish white under ultraviolet rays. Associated with zinc deposits.

Soapstone. Metamorphic rock composed chiefly of talc; has massive fibrous texture and unctuous feel.

Specularite. Black variety of hematite having high metallic lustre.

Sphalerite. ZnS. H=3 1/2-4. Yellow, brown, or black, granular to cleavable massive; also botryoidal. Resinous to submetallic. Honey-brown streak. Ore of zinc.

Spinel. $MgAl_2O_4$. H=7 1/2-8. Dark green, brown, black, deep blue or green; octahedral crystals, grains, or massive with conchoidal fracture. Vitreous lustre. Distinguished from magnetite and chromite by its superior hardness and lack of magnetic property.

Stannite. Cu_2FeSnS_4. H=4. Light to dark grey metallic (bluish tarnish) striated crystals (pseudotetrahedral or pseudododecahedral); also massive granular. Associated with other sulphides and sulphosalts; not readily distinguished from them in hand specimen. Minor ore of tin.

Stibiconite. $Sb_3O_6(OH)$? H=4 1/2-5. Canary yellow to pale yellow, vitreous, granular to powdery encrustations; also radiating, fibrous aggregates (pseudomorphs after stibnite), botryoidal or in concentric shells. Secondary mineral formed by oxidation of stibnite and other antimony minerals. Yellow colour distinguishes it from other secondary antimony oxides. Minor ore of antimony.

Stibnite. Sb_2S_3. H=2. Lead grey, metallic (bluish iridescent tarnish), striated, prismatic crystals; also acicular crystal aggregates, radiating columnar, bladed masses, and granular. Soluble in hydrochloric acid. Most important ore of antimony.

Stilbite. $CaAl_2Si_7O_{18}.7H_2O$. H=4. Colourless, white or pink, platy crystal aggregates, commonly forming sheaf-like aggregates. Vitreous, pearly lustre, transparent. Characterized by its sheaf-like form. Associated with other zeolites.

Syenite. An igneous rock composed mainly of feldspar with little or no quartz. Used as building stone.

Szomolnokite. $FeSO_4.H_2O$. H=2 1/2. White to pinkish white, fine, hair-like aggregates or finely granular encrustations; also botryoidal, globular crusts. Vitreous lustre. Metallic taste. Associated with pyrite and with other iron sulphates from which it is not readily distinguishable in the hand specimen.

Talc. $Mg_3(Si_4O_{10})(OH)_2$. H=1. Grey, white, or various shades of green. Fine grained massive, 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.

Tennantite. See tetrahedrite series.

Tenorite. CuO. H=3 1/2. Steel-grey to black, metallic, platy, lath-like, scaly aggregates; also black, submetallic, earthy, or compact masses with conchoidal fracture (melaconite). Associated with other copper minerals; melaconite occurs in oxidized portion of copper deposits. Ore of copper.

Tetrahedrite-tennantite series. $Cu_{12}Sb_4S_3$ - $Cu_{12}As_4S_{13}$. H=3-4 1/2. (tennantite harder). Flint-grey to iron-black, metallic, tetrahedral crystals; also massive, granular to compact. Brown, black or deep red streak. Tennantite is less common than tetrahedrite. Ore of copper; also contains values in silver, antimony.

Thomsonite. $(Ca, Na_2)Al_2Si_2O_8.2\ 1/2\ H_2O$. H=5-5 1/2. Snow-white, pinkish white to reddish, or pale green radiating, columnar, or fibrous masses; also compact. Vitreous to pearly lustre. Transparent to translucent. Associated with other zeolites. Massive variety used as gemstone.

Titanite (sphene). $CaTiSiO_5$. 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.

Topaz. $Al_2SiO_4(OH, F)_2$. H=8. Colourless, white, pale blue, yellow, brown, grey, green prismatic crystals with perfect basal cleavage; also massive granular. Vitreous, transparent. Distinguished by its crystal habit, cleavage and hardness. Used as gemstone.

Tremolite. Complex Ca, Mg silicate. H=5-6. White, grey; striated, prismatic crystals, bladed crystal aggregates, fibrous; perfect cleavage. Usually occurs in metamorphic rocks. Fibrous variety is used for asbestos; clear crystals are sometimes cut and polished as a gem curiosity.

Valentinite. Sb_2O_3. H=2 1/2-3. 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 other secondary antimony oxides resulting from oxidation of metallic antimony minerals.

Vesuvianite (Idocrase). Basic calcium aluminum silicate. H=7. Yellow to brown or green, apple-green, lilac, transparent, prismatic or pyramidal crystals with vitreous lustre; also massive, granular, compact or pulverulent. Distinguished from other silicates by its tetragonal crystal form; massive variety distinguished by its ready fusibility and intumescence in blowpipe flame. May be used as a gemstone.

Violarite. Ni_2FeS_4. H=4 1/2-5 1/2. Violet-grey, metallic, massive, granular to compact. Rare mineral occurring in nickel ores.

Wolframite. $(Fe, Mn)WO_4$. H=4-4 1/2. Dark brown to black, short prismatic crystals (striated), commonly flattened; also groups of subparallel 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 of tungsten.

Wollastonite. $CaSiO_3$. H=5. White to greyish white, compact, cleavable, or fibrous masses with splintery or woody structure. Vitreous to silky lustre. May fluoresce under ultraviolet rays. Distinguished from tremolite (H=6) and sillimanite (H=7) by inferior hardness and by solubility in HCl. Used in ceramics and paints.

Woodhouseite. $CaAl_3(PO_4)(SO_4)(OH)_6$. H=4 1/2. Purple, flesh-coloured, white, or colourless, tiny, pseudo-cubic crystal (striated) aggregates. Vitreous, transparent. Rare mineral.

Zircon. $ZrSiO_4$. H=7 1/2. Reddish to greyish brown tetragonal prisms terminated by pyramids; also colourless, green, grey. May form knee shaped twins. Vitreous to adamantine lustre. May be radioactive. Distinguished by its crystal form, hardness, and colour. Ore of zirconium and hafnium. Used in moulding sand, ceramics and refractory industries; transparent varieties used as gemstone.

Zoisite. $Ca_2Al_3Si_3O_{12}(OH)$. H=6 1/2. Grey to brownish grey, or yellowish brown, mauvish pink or apple-green aggregates of long prismatic crystals (striated); also compact fibrous to columnar masses. Vitreous to pearly; transparent to translucent. Pink variety known as thulite. Massive varieties not readily distinguished from amphiboles in hand specimen.

THE 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
Cl - chlorine
Co - cobalt
Cr - chromium
Cu - copper
F - fluorine
Fe - iron
H - hydrogen
K - potassium
Mg - magnesium
Mn - manganese
Mo - molybdenum
Na - sodium
Ni - nickel
O - oxygen
P - phosphorus
Pb - lead
S - sulphur
Sb - antimony
Se - selenium
Si - silicon
Sn - tin
Ti - titanium
W - tungsten
Zn - zinc
Zr - zirconium

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