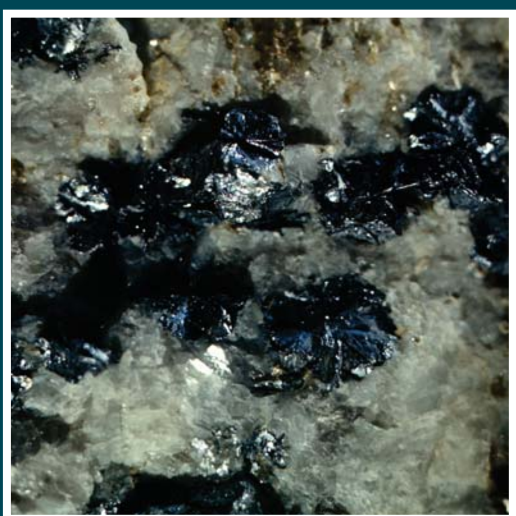
ROCKS AND MINERALS
FOR THE COLLECTOR

Geological Survey of Canada
Miscellaneous Report 77

Kirkland Lake – Rouyn-Noranda – Val-d'Or, Ontario and Quebec



Ann P. Sabina

2003

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Cover illustration

Beryl crystal in quartz, Lacorne mine. The crystal is 39 mm long and 18 mm wide. National Mineral Collection specimen no. 014046. Photograph by G. Lemieux, Geological Survey of Canada. KGS 2359J

Molybdenite crystal in quartz, Moly Hill mine. The crystal is 33 mm across. National Mineral Collection specimen no. 33402. Photograph by G. Lemieux, Geological Survey of Canada. KGS 2360B

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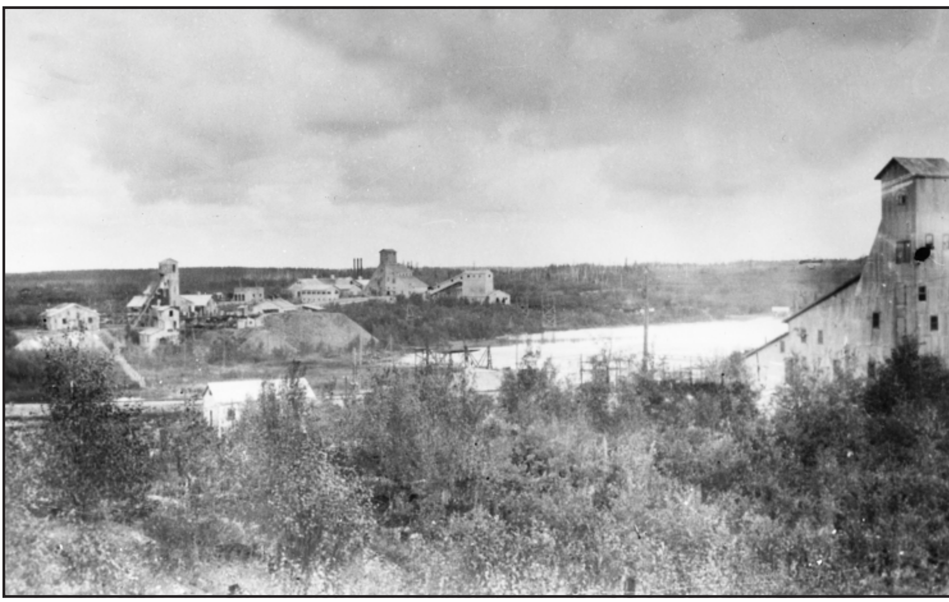

Frontispiece: Kirkland Lake mines, October 1918. National Archives of Canada PA 13675

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Abstract

Occurrences of minerals and rocks are described for localities between Kirkland Lake, Ontario, and Val-d'Or, Quebec. The Kirkland Lake–Rouyn-Noranda–Val-d'Or area lies within the mineralized belt of Precambrian rocks extending from Timmins to and beyond Val-d'Or. The collecting area includes the Kirkland Lake gold mines, and the gold and gold-copper mines in the Rouyn-Noranda–Val-d'Or area. The area also contains deposits of lead-zinc, iron, nickel, copper, bismuth, molybdenum, and asbestos, and occurrences of beryl, spodumene, and pollucite. Minerals and rocks suitable for lapidary purposes include jasper, serpentine, gabbro, rhyolite, feldspar porphyry, and chrome-muscovite (fuschite) rock.

Inactive mines and prospects constitute most of the collecting localities. Roadcuts furnish additional sites. In general, operating mines are not open to collectors. Some famous old mines, no longer accessible, are included for historical interest.

Résumé

Le présent rapport décrit les venues de minéraux et de roches à des emplacements situés entre Kirkland Lake (Ontario) et Val-d'Or (Québec). La région de Kirkland Lake–Rouyn-Noranda–Val-d'Or se trouve au sein de la ceinture minéralisée de roches précambriennes qui débute à Timmins pour se terminer au-delà de Val-d'Or. La région de cueillette comprend les mines d'or de Kirkland Lake ainsi que les mines d'or et d'or-cuivre de la région de Rouyn-Noranda–Val-d'Or. Elle comporte également des gisements de plomb-zinc, de fer, de nickel, de cuivre, de bismuth, de molybdène et d'amiante, ainsi que des venues de béryl, de spodumène et de pollucite. Parmi les minéraux et les roches utilisables à des fins lapidaires, mentionnons le jaspe, la serpentine, le gabbro, la rhyolite, le porphyre feldspathique et la roche à muscovite chromifère (fuschite).

La plupart des sites sur l'itinéraire du collectionneur sont des mines inexploitées et des prospects. Les tranchées de route constituent des sites d'intérêt supplémentaires. En général, les mines en exploitation ne sont pas accessibles aux collectionneurs. Certaines anciennes mines célèbres ne sont plus accessibles, mais elles apparaissent sur l'itinéraire à titre d'information historique.

ROCKS AND MINERALS FOR THE COLLECTOR: KIRKLAND LAKE–ROUYN-NORANDA–VAL-D'OR, ONTARIO AND QUEBEC

INTRODUCTION

This guidebook describes mineral, rock, and fossil occurrences between Kirkland Lake, Ontario, and Val-d'Or, Quebec. It is a revision of Geological Survey of Canada Paper 73-30 published in 1974. Occurrences in adjacent parts of Ontario and Quebec are described in the Geological Survey of Canada guidebook series of Rocks and Minerals for the Collector covering the following areas: Cobalt–Belleterre–Timmins, Ontario and Quebec (GSC Miscellaneous Report 57); Ottawa to North Bay, Ontario, and Gatineau to Waltham, Quebec (GSC Miscellaneous Report 48).

Most occurrences are accessible by automobile from the main highways and from secondary roads branching from them. A short hike is needed to reach some localities. Directions to each of the occurrences are given in the text and are designed for use with official provincial road maps. Mineral occurrence maps included in the text show the locations of most occurrences. Additional details can be obtained from the appropriate topographic and geological maps indicated for each occurrence. These maps are available from the agencies listed on page 211.

Most inactive mines have not been operated for many years. Entering shafts, adits, and other workings is dangerous and should be avoided. Collecting in operating mines is at the discretion of the operator and may not be permitted; these mines are included in this guidebook as points of interest to collectors and students. Most occurrences are on private property or are held by claims. This guidebook does not authorize access or imply permission to visit them. Permission must be obtained from the owner, and the rights of property owners must be respected at all times.

The collecting localities were investigated in 1972 by the author with the assistance of Frances Gombos. The field investigation and report were facilitated by information received from H.L. Lovell, Ontario Geological Survey, Kirkland Lake; Ross Szwec, Cambior Inc., Val-d'Or; Chantal Dussault, ministère des Ressources naturelles, Val-d'Or; Louis Moyd and George W. Robinson, Canadian Museum of Nature; H. Gary Ansell and Richard K. Herd, Geological Survey of Canada. The laboratory identification of minerals by X-ray diffraction was done by Gordon J. Pringle, Geological Survey of Canada. This assistance is gratefully acknowledged.

COLLECTING ALONG THE ROUTE

The main collecting route begins just west of Kirkland Lake, Ontario, and proceeds east along Highway 66 in Ontario, continuing along Highway 117 in Quebec through Rouyn-Noranda and ending just east of Val-d'Or. Leading from the main route are side trips along highways 101 and 111 to Normétal, Highway 395 to Preissac, Highway 109 to Matagami, Highway 111 to Amos, Highway 397 to La Morandière, and Highway 113 to Madeleine Lake. Kilometre distances along the main route are shown in bold print in the text and in the main road log beginning on page 5. The main collecting route and principal side trips are shown in Figure 1.

Information on each locality is listed systematically as follows: name of the mine, quarry, or occurrence; minerals and/or rocks found (shown in capital letters); mode of occurrence; brief description of the minerals or rocks, mining history, and special features of interest to collectors; location and access; publication references (indicated by a number listed in the 'References'

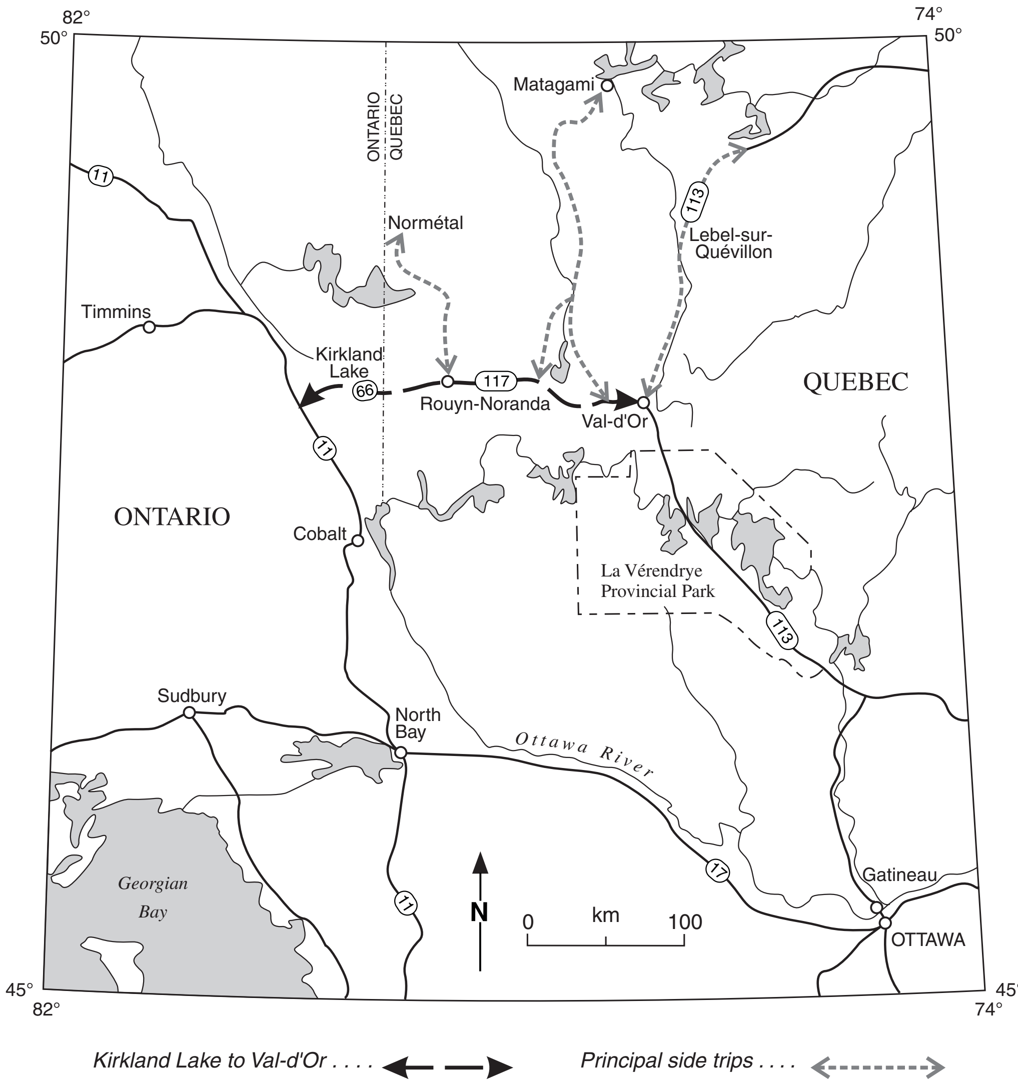


Figure 1. Map showing the collecting route.

section); references to maps of the National Topographic System (T) and to geological maps (G) of the Geological Survey of Canada (GSC), the Ontario Geological Survey (OGS), and Quebec's ministère des Ressources naturelles (MRNQ).

UNITS OF MEASUREMENT

Units of measurement obtained from publications referred to in the text have been converted from the Imperial system to the International System (SI). The following conversions were used:

1 inch = 2.54 cm	1 ounce (Troy) = 31.103 g
1 foot = 0.305 m	1 ton (short) = 0.907 t
1 mile = 1.609 km	1 pound (avoirdupois) = 0.453 kg
1 acre = 0.40469 ha	1 oz (Troy)/ton(short) = 34.285 g/t

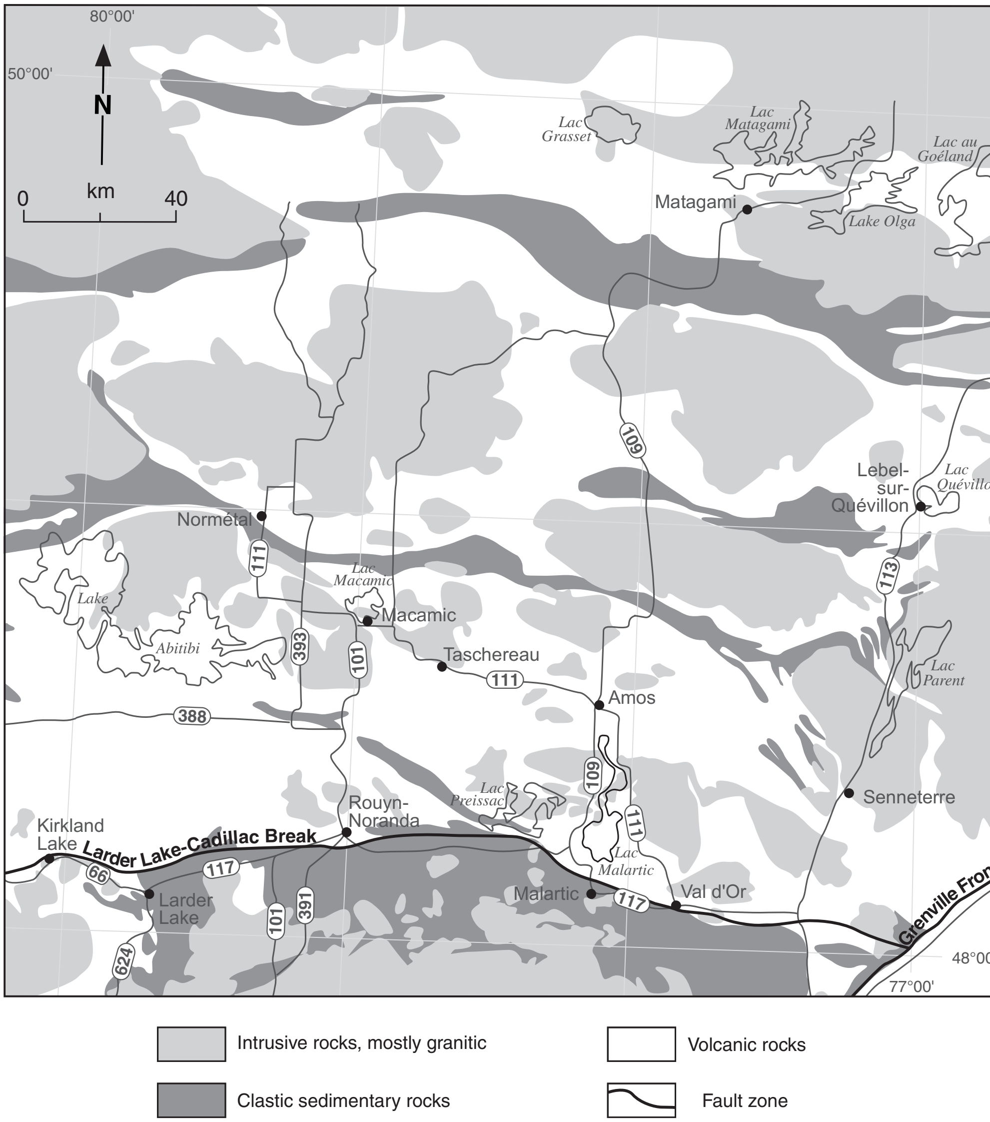


Figure 2. Geological map of the collecting area.

EARLY PROSPECTING IN THE AREA

Long before the first claims were staked for gold, Hudson's Bay Company officials and trappers reported pieces of native gold shown to them by local Amerindians who found them while hunting in northwestern Quebec. Prospecting in the area began when prospectors, attempting to duplicate their earlier success at Cobalt, Ontario, extended their efforts northward. They were rewarded in 1906 with the discovery of native gold at Larder Lake, Ontario, and at Opasatica Lake, Quebec.

The spectacular discovery of native gold in the Porcupine district in 1909 attracted the gold-seekers in that direction, and prospecting was relatively inactive in the Kirkland Lake area until the rush of 1912–1913. About a decade later, following the discovery of gold-copper ore at

Table 1. Rock formations referred to in the text.

AGE (millions of years)	ERA		PERIOD	ROCKS FORMED	WHERE TO SEE THEM
	Cenozoic		Quaternary	Gravel, sand, clay, till	Lakeshores, stream beds, eskers
			Tertiary	Not represented in collecting area	
65	Mesozoic			Kimberlite	Upper Canada mine
250	Paleozoic			Not represented in collecting area	
544	Precambrian era	Proterozoic		Gabbro	Canada Black Granite quarry
				Diabase	Powell Rouyn, Quemont mines
2500		Archean		Granodiorite	Fontana, Sullivan, Siscoe, Bevcon mines
				Granite	Elder, Eldrich mines
				Diorite	Aldermac, Norbenite Malartic, Louvicourt, Goldfield mines
				Alaskite	Mooshla mine
				Pegmatite	Preissac-Lacorne area molybdenite mines; beryl and lithium mines
				Peridotite	Marbridge mine
				Amphibolite	Highway 112 roadcut
				Syenite, syenite porphyry	Lucky Cross, Argonaut, Kirkland Rand mines, highways 112 and 650 roadcuts
				Conglomerate	Kirkland Rand, Toburn, Granada, O'Brien mines
				Greywacke	Duvan, Granada, Kirkland Lake gold mines
				Agglomerate	Upper Canada, Aldermac, New Hosco, Barvue mines
				Rhyolite	Lyndhurst, Hunter, Noranda gold-copper mines
				Volcanic rocks, lava	Swastika gold mines, Argonaut and Kerr mines
				Andesite	Norbec, Newbec, Vendome, Bouscadillac mines
				Trachyte	Kirkland Lake gold mines
				Sericite schist	New Fomaque, Manitou-Barvue, Aumaque mines
				Iron-formation, chert	Adams mine

what is now Rouyn-Noranda, northwestern Quebec became the scene of the greatest prospecting rush in its history.

A BRIEF GEOLOGICAL HISTORY

The entire collecting area is within the Canadian Shield — an immense body of Precambrian rocks occupying more than half of Canada and part of the northern United States. This part of the Canadian Shield consists of greenstone belts and granitic plutons making up the Superior Structural Province, formed by volcanism, sedimentation, plutonism, and deformation in Precambrian time. The great metallic mineral resources of the Kirkland Lake–Rouyn-Noranda–Val-d'Or region are contained within the igneous, metamorphic, and volcanic rocks formed by these geological processes.

At the close of the Precambrian era, a long period of erosion reduced the Canadian Shield to a nearly featureless plain and set the stage for uplift, inundation, and deposition that took place during the long Paleozoic era that followed. Great thicknesses of sediments were deposited by Paleozoic seas over much of the Canadian Shield, and still remain along its margins.

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

The geological history with examples of rocks formed is summarized in Table 1.

THE MAIN ROAD LOG: ONTARIO HIGHWAY 66 AND QUEBEC HIGHWAY 117

The main road log proceeds along Highway 66 in Ontario and Highway 117 in Quebec. It begins at the junction of highways 66 and 11, about 10 km west of Kirkland Lake, and ends at the junction of highways 117 and 113, about 30 km east of Val-d'Or. The kilometre distances along highways 66 and 117 are shown in bold type.

km	**0**	Junction, highways 66 and 11; the road log proceeds east along Highway 66.
km	**1.1**	*Roadcuts* expose Timiskaming conglomerate containing red jasper pebbles and boulders of granitic and volcanic rocks.
km	**2.2**	Junction, single-lane road leading north to the Baldwin (Kelmac) mine (p. 12).
km	**3.5**	*Roadcut* exposes rusty weathered volcanic rock containing grains, crystals, and radiating aggregates of pyrite. The rock is coated with powdery brownish-yellow goethite.
km	**6.5**	Junction, road leading south to Culver Park and the Swastika (Crescent Kirkland) mine (p. 14).
km	**7.6**	Junction, road leading south to the Lucky Cross (Golden Gate) mine (p. 14).

km	**9.0**	Junction, Highway 112. Highway 112 provides access to the Adams mine (p. 15), the Boston molybdenite occurrence (p. 17), the Boston Creek gold mine (p. 19), the Barry-Hollinger (Patricia) mine (p. 19), the Boston-McRae mine (p. 20), the Planet Gold mine (p. 21), the Miller Independence mine (p. 22), the Kennedy-Boston mine (p. 23), and the Cathroy Larder (Yama) mine (p. 23).
km	**9.6**	*Roadcuts* expose Timiskaming conglomerate containing pebbles of red to purplish-red jasper and green, grey, and black chert. The pebbles are up to 8 cm in diameter. The conglomerate also contains pebbles and boulders of porphyritic rocks.
km	**11.9**	Junction, Goldthorpe Road leading northwest to the Macassa mine (p. 24).
km	**12.2**	Kirkland Lake gold mine (p. 26), on the north side of Highway 66 (Government Road).
km	**12.7**	Kirkland Lake. Teck-Hughes mine (p. 27), on both sides of Highway 66 (Government Road). The original southern shore of Kirkland Lake paralleled Government Road (Highway 66) from the Teck-Hughes mine to Duncan Avenue.
km	**13.4**	Site of the Lake Shore mine (p. 28), on the north side of Highway 66 (Government Road).
km	**14.2**	Kirkland Lake, Prospect Street and Highway 66 (Government Road). Prospect Street leads to the Kirkland Rand (Ontario Kirkland, Hudson Rand) mine (p. 29).
km	**14.3**	Kirkland Lake, Duncan Avenue and Highway 66 (Government Road). Duncan Avenue leads to the Tundra quarry (p. 30) and to the site of the Wright-Hargreaves mine (p. 30).
km	**15.0**	Kirkland Lake, at the site of the Sylvanite mine (p. 31) on the north side of Highway 66 (Government Road).
km	**15.3**	Toburn (Tough-Oakes, Burnside) mine (p. 32), on the north side of Highway 66 (Government Road).
km	**15.6**	*Historic site*, on the north side of Highway 66. The site commemorates the Kirkland Lake gold camp.
km	**16.8**	Junction, road leading south to the Glenora mine (p. 33).
km	**17.2**	Junction, road leading north to the Continental mine shaft No. 1 (p . 34).
km	**18.1**	Junction, road leading north to the Continental mine shaft No. 2 (p. 34).
km	**20.3**	King Kirkland village, junction of a road leading south to the Kirkroyale (Conroyal) mine (p. 34) and the King Kirkland mine (p. 36).
km	**21.1**	Junction, road leading north to the Bidgood Kirkland mine (p. 36) and the Moffat-Hall mine (p. 37).
km	**23.3**	Railway crossing.
km	**23.8**	Morris (Wood) Kirkland mine (p. 38), on the south side of Highway 66.

km	**28.2**	Junction, Highway 672 leading to the Northland mine (p. 38) and to *Esker Lakes Provincial Park*. Within the park are a number of clear lakes occupying depressions in a mantle of gravel and sand that resulted from glacial action in Pleistocene time. About 800 m south of the park gate, the road enters the Arctic watershed; all streams from that point northward flow into Hudson Bay and streams south of that point flow into the Lake Superior–St. Lawrence River system.
km	**29.6**	Junction, Upper Canada Road leading northeast to the Upper Canada mine (p. 40) and to the Argonaut (Upper Beaver, Huronia) mine (p. 41).
km	**30.7**	Anoki mine (p. 41), on the north side of Highway 66.
km	**31.1**	Junction, road leading east to the Queenston (McBean) mine (p. 42).
km	**37.0**	Bridge over Misema River. A *roadcut* on the east side of the bridge exposes a conspicuous green carbonate rock containing bright green chrome muscovite (fuchsite) disseminated in quartz; the mica-bearing quartz takes a good polish and can be used as an ornamental stone.
km	**41.3**	Larder Lake, junction of Highway 624. Highway 624 provides access to the Raven River (Harris-Maxwell) mine (p. 42), the Martin-Bird mine (p. 43), and the Manley-O'Reilly (Manor) mine (p. 45).
km	**41.9**	Junction, road leading east to the Laguerre mine (p. 46).
Km	**43.6**	Junction, single-lane road leading northwest to the Omega mine (p. 46).
km	**44.8**	Fernland mine (p. 47), on the south side of Highway 66.
km	**45.9**	Cheminis mine (p. 47), on the north side of Highway 66.
km	**50.2**	Barber-Larder mine (p. 48), on the south side of Highway 66.
km	**51.5**	Junction, single-lane road leading north to the Armistice mine (p. 48).
km	**52.3**	Junction, road to Virginiatown and the Kerr (Kerr-Addison) mine (p. 50).
km	**53.0**	Kerr (Kerr-Addison) mine on the south side of Highway 66.
km	**53.7**	Junction, road leading south to the Chesterville mine (p. 51).
km	**55.1**	Junction, road leading north to Cheminis and to the Russian Kid (Bordulac) mine (p. 51).
km	**58.3**	Ontario–Quebec border; the road log continues eastward along Highway 117 to Val-d'Or.
km	**58.4**	*Cheminis Hill*, on the south side of Highway 117. This steep-walled, flat-topped monadnock hill, the most prominent topographic feature in the area, rises from an elevation of 335 m to 507 m above sea level. It is underlain by Precambrian sedimentary rocks including quartzite, arkose, breccia, conglomerate, and a slate-like rock. The name 'Cheminis' is derived from the term 'big island' used by the Amerindians who claimed that the hill was visible from such distant points as Lake Abitibi and Lake Temagami.
km	**74.2**	Junction, road leading northwest to Fortune Lake and to the Lake Fortune mine (p. 53).

km	**77.7**	Junction, Highway 101. Collecting localities in the Belleterre area may be reached via Highway 101; they are described in *Rocks and Minerals for the Collector: Cobalt–Belleterre–Timmins, Ontario and Quebec* (GSC Miscellaneous Report 57).
km	**79.9**	Arntfield, junction of the road leading north to the Arntfield mine (p. 55), the Francoeur (Wasamac No. 2) mine (p. 55), and the Robb-Montbray mine (p. 56).
km	**81.7**	Junction, road on left leading north to a gravel pit and to the Aldermac mine (p. 57).
km	**83.6**	Junction, road leading northwest to the Aldermac mine (p. 57).
km	**84.2**	Junction, road leading east to the Wasa Lake (Wasamac No. 1) mine (p. 58) and the Wingait mine (p. 59).
km	**91.1**	Évain, junction of a road leading north to the Elder (Peel-Elder) mine (p. 60), the Quesabe mine (p. 61), and the Eldrich (Pierre Beauchemin) mine (p. 62), and a road leading south to the Durbar (Huronian Belt) mine (p. 63), the Riverside (Bazooka) mine (p. 65), and the Canada Black Granite quarry (p. 65).
km	**96.9**	Junction, Highway 101 north. Highway 101 north provides access to the Don Rouyn mine (p. 69), the Silidor mine (p. 69), the Powell Rouyn mine (p. 70), the Pontiac Rouyn (Anglo Rouyn) mine (p. 71), the Marlon Rouyn (New Marlon) mine (p. 72), the Quemont mine (p. 72), the Joliet mine (p. 73), the Donalda (Kerralda) mine (p. 74), the D'Eldona (Delbridge) mine (p. 75), the MacDonald (Gallen) mine (p. 75), the Millenbach mine (p. 76), the Amulet mine (p. 77), the Corbet mine (p. 78), the Norbec (Lake Dufault) mine (p. 78), the Waite-Ackerman-Montgomery (Old Waite) mine (p. 79), the Vauze mine (p. 80), the Ansil mine (p. 81), the Fabie Bay (New Insco) mine (p. 81), the Newbec mine (p. 82), the Mobrun (Bouchard-Hébert) mine (p. 83), the Harvie (Archean) mine (p. 83), the LeRoy (Roybell, Claremont) mine (p. 84), the Vezina (Thurbois) mine (p. 85), the Duquesne mine (p. 86), the Central Duparquet mine (p. 87), the Beattie-Donchester mine (p. 87), the Roquemaure jasper occurrence (p. 89), the Hunter mine (p. 90), the Lyndhurst mine (p. 91), the Duvan mine (p. 92), the Normetal (Abana) mine (p. 92), and the Casa-Berardi (Golden Pond) mines (p. 94).
km	**98.1**	Rouyn-Noranda, junction of Highway 117 (Rideau Boulevard) and Richelieu Street leading east to Mouska Park and the Chadbourne mine (p. 95).
km	**98.4**	Rouyn-Noranda, junction of Highway 117 (Rideau Boulevard) and Senator Road leading west to the Senator Rouyn mine (p. 96).
km	**99.1**	Rouyn-Noranda, junction of Highway 117 (Rideau Boulevard) and Québec Boulevard leading south. Québec Boulevard provides access to the Abbeville mine (p. 98), the Stadacona mine (p. 98), the Astoria mine (p. 99), and the Granada mine (p. 100).
km	**109.5**	Junction, road leading south to McWatters and to the McWatters mine (p. 101) and the Adanac mine (p. 102).
km	**111.6**	Junction, road leading north to the Rouyn-Merger mine (p. 104).

km	**119.7**	Junction, road leading north to the Heva mine (p. 104).
km	**123.2**	Junction, road leading north to the Hosco mine (p. 105).
km	**129.3**	Junction, road leading north to the Arrowhead mine (p. 105).
km	**133.2**	Junction, trail leading south to the Calder-Bousquet mine (p. 106).
km	**135.2**	Junction, road leading north to Saint-Norbert-de-Mont-Brun and to the Doyon (Silverstack) mine (p. 106), the Mooshla mine (p. 108), and the Mouska (Mic Mac) mine (p. 109).
km	**135.9**	Junction, road leading south to the Norgold and Doreva mines (p. 110).
km	**146.0**	Bouscadillac mine (p. 111), on the north side of Highway 117.
km	**146.1**	Junction, Highway 395. Highway 395 provides access to the LaRonde (Dumagami) mine (p. 111), the Bousquet No. 1 and Bousquet No. 2 mines (p. 113), the Cadillac Moly (Anglo American) mine (p. 114), the Preissac (Indian) mine (p. 116), and the Height of Land mine (p. 117).
km	**147.7**	Thompson Cadillac mine (p. 118), on the north side of Highway 117.
km	**149.4**	Junction, road leading north to the O'Brien mine (p. 120).
km	**150.0**	Cadillac, junction of a road leading north to the Kewagama mine (p. 120).
km	**152.6**	Junction, road leading north to the Central Cadillac and Wood Cadillac mines (p. 121).
km	**154.3**	Pandora (Amm) mine (p. 122), on the south side of Highway 117.
km	**155.7**	Junction, road leading south to the Pandora (Amm) mine (p. 122).
km	**156.9**	Pandora (Amm) mine (p. 122), on the north side of Highway 117.
km	**157.5**	Tonawanda mine (p. 123), on the north side of Highway 117.
km	**159.0**	Junction, trail leading south to the Lapa Cadillac mine (p. 123).
km	**163.4**	Rivière-Héva, junction of Highway 109. Highway 109 provides access to the Moly Hill mine (p. 124), the Marbridge mine (p. 126), the La Motte (Authier, Colombe) lithium occurrence (p. 127), the Jay (Amos) mine (p. 128), the Nortrac mine (p. 130), the Fontana mine (p. 130), the Claverny mine (p. 131), the Duvay mine (p. 132), the Goldvue mine (p. 133), the Trinity mine (p. 134), the Sleeping Giant mine (p. 134), the Abitibi Asbestos mine (p. 135), the Eagle (Agnico-Eagle) mine (p. 136), the Joutel Copper mine (p. 136), the Mines de Poirier mine (p. 138), the Selbaie (Detour) mine (p. 139), the Orchan mine (p. 140), the Bell Allard mine (p. 141), the Mattagami Lake mine (p. 143), the Isle-Dieu mine (p. 144), the New Hosco mine (p. 145), the Norita mine (p. 146), the Garon Lake mine (p. 147), and the Radiore No. 2 mine (p. 148).
km	**168.1**	Junction, road leading south to the West Malartic mine (p. 148).
km	**179.4**	Malartic, junction of Highway 117 and Abitibi Avenue leading south to the Canadian Malartic mine (p. 149).
km	**181.2**	Junction, road leading south to the Sladen Malartic mine (p. 151) and a road leading north to the Barnat mine (p. 152).

km	**181.8**	Junction, road leading south to the East Malartic mine (p. 152).
km	**185.2**	Junction, road leading south to the Rand Malartic mine (p. 153).
km	**186.3**	Junction, road leading north to the Camflo mine (p. 153).
km	**188.7**	Junction, road leading south to the Malartic Gold Fields mine (p. 154).
km	**191.0**	Junction, road leading to the Marbenor Malartic (Marban) mine (p. 155), the Callahan mine (p. 155), the Norlartic and Kierens mines (p. 156), and the Malartic Hygrade mine (p. 157).
km	**195.5**	Junction, road leading north to the Kiena mine (p. 158).
km	**196.6**	Elmac Malartic (Crossroads) mine (p. 159), on the south side of Highway 117.
km	**196.8**	Junction, road leading south to the Quebec Explorers mine (p. 160).
km	**197.5**	Junction, road leading north to the Shawkey mine (p. 161).
km	**199.7**	Junction, road leading south to the Goldex mine (p. 162).
km	**199.8**	Junction, road leading north to the Gale (Mine School) mine (p. 162).
km	**201.9**	Junction, road leading south to the Joubi mine (p. 163).
km	**202.2**	Val-d'Or, junction of Highway 117 (Tetrault Boulevard) and 3^{e} Avenue (to Val-d'Or town centre). The road log continues along Highway 117.
km	**204.2**	Val-d'Or, junction of Highway 117 (Tetrault Boulevard) and Highway 111. Highway 111 provides access to the Sullivan mine (p. 164), the Siscoe mine (p. 165), the Lacorne mine (p. 166), the Massberyl occurrence (p. 168), the Valor Lithium occurrence (p. 169), and the Quebec Lithium mine (p. 170).
km	**207.0**	Val-d'Or, junction of Highway 117 (Tetrault Boulevard) and Highway 397. Highway 397 provides access to the Vendome (Mogador) mine (p. 171), the Venus mine (p. 173), the Randall-Fisher mine (p. 174), the Barvue (Abcourt) mine (p. 175), and the Bolduc mine (p. 176).
km	**209.5**	Val-d'Or, junction of Highway 117 (Tetrault Boulevard) and 3^{e} Avenue (to Val d'Or town centre). The road log continues east along Highway 117.
km	**209.7**	Junction, road leading north to the Sigma (Sigma No. 1) mine (p. 176).
km	**210.4**	Junction, road leading south to the Lamaque mine (p. 177).
km	**213.3**	Junction, road leading south to the Aumaque mine (p. 179).
km	**214.7**	Junction, road leading south to the East Sullivan mine (p. 179) and the Orenada mine (p. 180).
km	**215.0**	Junction, road leading north to the Bidlamaque mine (p. 181), the Dumont (Payore) mine (p. 182), and the Ferderber mine (p. 183).
km	**220.3**	Junction, road leading south to the Manitou-Barvue (Golden Manitou) mine (p. 183).
km	**223.0**	Junction, road leading south to the Manitou-Barvue (Golden Manitou) mine (p. 183).

km	**224.0**	Colombière, junction of a road leading south to the Rainville (Dunraine) mine (p. 184), the Louvicourt Goldfield (Simkar) mine (p. 185), and the Akasaba (Obaska) mine (p. 186).
km	**225.3**	Junction, road leading north to the Beacon (D'Or Val) mine (p. 187).
km	**226.2**	Junction, road leading north to the Bussières (Cournor) mine, (p. 188), the New Pascalis (Lucien C. Béliveau) mine (p. 188), the Pascalis mine (p. 189), the Perron and Beaufor mines (p. 191), and the Senor (Resenor) mine (p. 192).
km	**228.0**	Junction, road leading north to the Louvem mine (p. 193) and the Louvicourt mine (p. 194).
km	**229.8**	Junction, road leading south to the Vicour (Sigma No. 2) mine (p. 195).
km	**235.0**	Junction, road leading south to the Buffadison mine (p. 195).
km	**235.5**	Bevcourt mine (p. 195), on the south side of Highway 117.
km	**237.3**	Junction, Highway 113. Highway 117 south of this junction provides access to the Chimo mine (p. 197). Highway 113 provides access to the Regcourt mine (p. 198), the Smith Tiblemont mine (p. 199), the Tiblemont Island mine (p. 201), the Wood-Etcheverry mine (p. 201), the South Tiblemont mine (p. 202), the Bruell mine (p. 203), the Avocalon (Aurora) mine (p. 204), the Blair-Martyn mine (p. 204), the Croinor Pershing mine (p. 205), the Grevet (Langlois) mine (p. 206), the Flordin (Florence River) mine (p. 207), the Cameron Lake occurrence (p. 209), and the Lake Rose mine (p. 209).

KIRKLAND LAKE–LARDER LAKE AREA

The Kirkland Lake–Larder Lake area is at the western end of the Larder Lake-Cadillac Break, a gold-bearing geological fault zone. The host rocks are early Precambrian volcanic, sedimentary, and intrusive rocks containing native gold, gold tellurides, and sulphides. Seven mines shared the 6 km Kirkland Lake ore zone, which occupied a fault commonly referred to as the 'Main Break'. The contiguous mines from west to east are the Macassa, Kirkland Lake Gold, Teck-Hughes, Lake Shore, Wright-Hargreaves, Sylvanite, and Toburn mines. These mines produced the bulk of gold from the Kirkland Lake camp.

Prospecting for gold in northeastern Ontario began in 1902 in the area just north of the Cathroy Larder mine, west of the Misema River. Reports indicate that Tonene, an Amerindian within whose hunting ground Larder Lake was located, guided prospectors to the gold showings. Dr. R. Reddick of Winchester, Ontario, and Dr. William Addison and H.L. Kerr staked the first claims in the Larder Lake area in the summer of 1906. These claims became part of the Kerr (Kerr-Addison) mine. A stampede of gold-seekers headed to Larder Lake in the autumn of 1906, and during the following winter, Larder Lake became the scene of the first gold rush in northeastern Ontario. Some 4000 claims were speedily staked, and over 40 companies with a capitalization of nearly $100 000 000 were hastily formed to develop the claims. Exploration in the following summer failed to disclose economic gold ore: the district became discredited, capital was withdrawn, and the few properties that merited exploitation suffered a setback that retarded their development for 30 years.

With the completion of the railway northward to Dane in 1906, prospectors penetrated the surrounding area and found gold-bearing veins at Otto Lake, near Swastika. The successful developments in the Porcupine camp and the start of production at Swastika renewed interest in

Kirkland Lake where lapsed claims were restaked. Bill Wright staked the first visible gold showing in July 1911 on the property that became the Wright-Hargreaves mine. Other claims that later became important producers were staked in 1911 and in 1912. The discovery and subsequent shipment of spectacular high-grade gold ore in 1912 from the Tough-Oakes property intensified the prospecting rush in the Kirkland Lake area; the event caused the greatest prospecting excitement since the Porcupine discoveries. The first mine to produce was the Toburn mine in 1912. By 1933, there were nine gold producers in Kirkland Lake. While the town flourished, the lake of the same name was gradually filled with mine tailings and had almost completely disappeared by 1930.

Gold production in the Kirkland Lake camp peaked in 1932 when 48 224 256 g of gold valued at $23 782 313 were recovered from nine mines. Production in the Larder Lake camp peaked in 1960 when recovery amounted to 18 420 565 g of gold valued at $20 106 684. In 1997, only the Macassa mine and the Lakeshore mine tailings reclamation were in production in the Kirkland Lake–Larder Lake area.

Descriptions are given for mines and occurrences accessible from Highway 66. The workings of some of the mines within the town of Kirkland Lake have been sealed leaving no evidence of former operations; the descriptions are included in this guidebook for historical interest.

Refs.: 40 p. 203; 62 p. 59; 147 p. 55; 163 p. 14; 197 p. 5–7; 231; 232 p. 9–10, 16, 21, 98; 267 p. 688–696; 295 p. 9; 307 p. 1–6; 321 p. 43–150; 342 p. 5; 402 p. 166; 407 p. 95, 126; 429 p. 99–100, 108–109.

Maps (T): 32 D/SW Rouyn–Larder Lake
42 A/SE Kirkland Lake
(G): 2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Baldwin (Kelmac) mine

NATIVE GOLD, PYRITE, MOLYBDENITE, CHALCOPYRITE

In altered conglomerate, greywacke, and andesite

Native gold was associated with pyrite in quartz and quartz-carbonate veins in a sheared contact of Timiskaming conglomerate and greywacke, and Keewatin andesite. Molybdenite and chalcopyrite have been reported from the deposit.

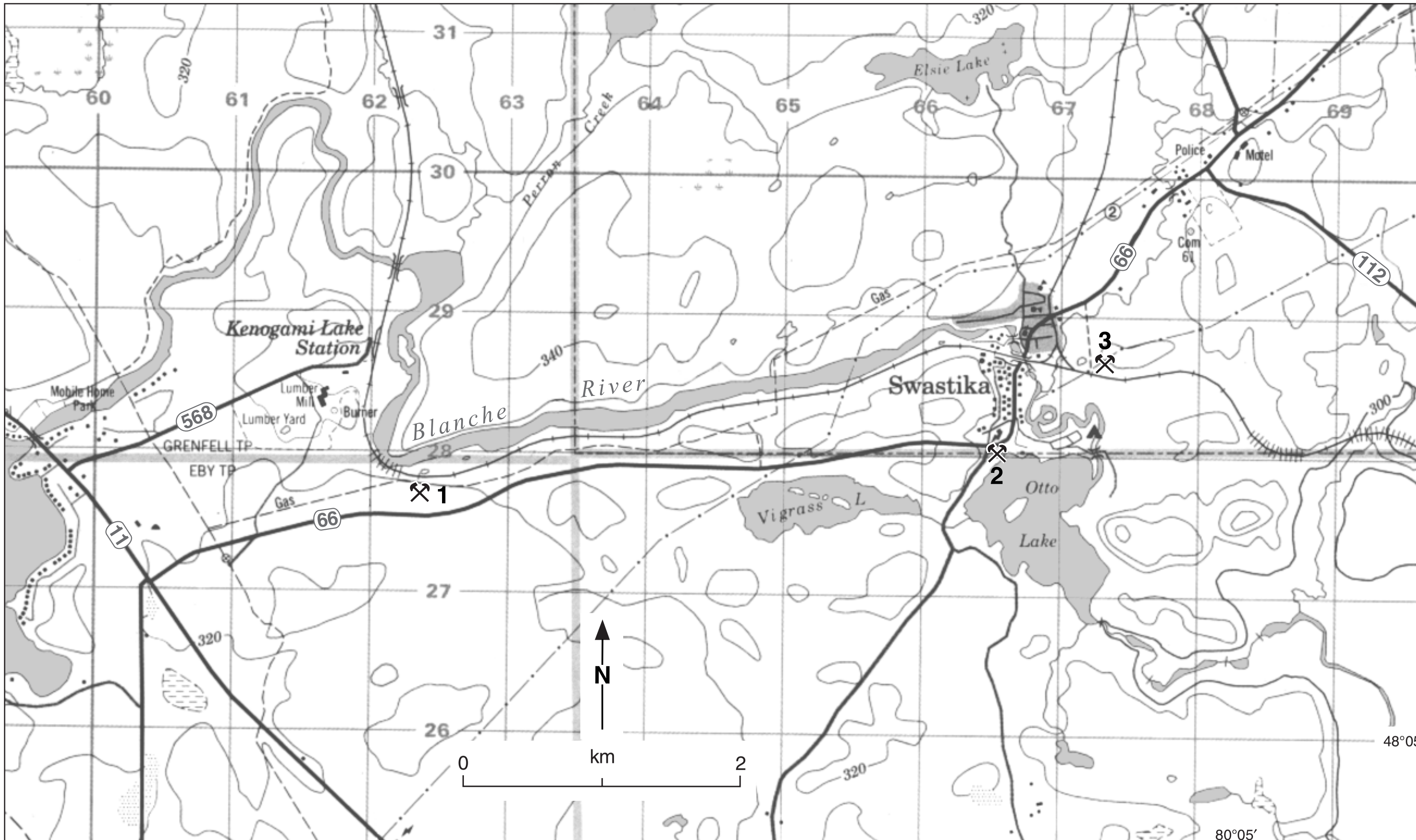
Prospector Baldwin discovered gold on this property in 1911. Baldwin Gold Mining Company Limited did the original underground exploration via a 61 m shaft in 1917–1919. Baldwin Kirkland Gold Mines Limited deepened the shaft to 127 m in 1929. Lucky Kirkland Gold Mines Limited examined the property and sampled it in 1934. The mine yielded 1337 g of gold valued at $1247 from 73.5 t of ore. In 1946, Baldwin Consolidated Mines Limited dewatered the mine and did some underground investigation.

The Baldwin (Kelmac) mine is about 11 km southwest of Kirkland Lake and 0.3 km north of Highway 66 at **km 2.2** (*see* p. 5). *See* Map 1 on page 13.

Refs.: 96 p. 52; 116 p. 129–130; 196 p. 18–20; 307 p. 13–14; 343 p. 36–37; 410 p. 114; 412 p. 155; 415 p. 159.

Maps (T): 42 A/1 Kirkland Lake
(G): 2239 Ebby–Otto area, Timiskaming District (OGS, 1:31 680)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Part of 42 A/1



1. Baldwin (Kelmac) mine 2. Swastika (Crescent Kirkland) mine 3. Lucky Cross (Golden Gate) mine

Map 1. Swastika.

Swastika (Crescent Kirkland) mine

NATIVE GOLD, PYRITE, GALENA, MOLYBDENITE

In lava and diorite

Native gold occurred as visible gold along fractures in quartz veins. Pyrite was the most abundant metallic mineral; galena and molybdenite were present in minor amounts.

In 1906, Bill and Jim Dusty, prospectors for Tavistock Mining Partnership of Tavistock, Ontario, discovered gold-bearing quartz veins on the west shore of Otto Lake. Swastika Mining Company Limited sank a shaft to 18 m on the discovery vein in 1908, but underground exploration failed to disclose any veins of importance. The rich gold-bearing veins were found farther north in 1910 following a program of surface exploration. Mining and milling began in the same year; the mill was the first gold mill operated in northeastern Ontario. Production between 1910 and 1913 amounted to 17 884 g of gold and 1960 g of silver, valued at $11 457. The production shaft was 128 m deep. In 1936, Crescent Kirkland Gold Mines Limited acquired the property and did some underground exploration.

The mine came into production again in 1941–1942 when Golden Gate Mining Company Limited renewed operations from the main shaft and an adit on the shore of Otto Lake, south of the shaft. Gold was mined from small rich veins near the surface. From 1946 to 1949, Kirkland Golden Gate Mines Limited worked the deposit and deepened the shaft to 206 m. Production between 1941 and 1947 was valued at $94 484.

The Swastika (Crescent Kirkland) mine is about 7 km southwest of Kirkland Lake, in the village of Swastika, just south of Highway 66 at **km 6.5** (*see* p. 5). Entry is at Culver Park, Swastika. *See* Map 1 on page 13.

Refs.: 116 p. 171–172; 196 p. 27; 232 p. 9–11; 307 p. 27–28; 343 p. 47–49; 361 p. 109–110; 373 p. 597; 405 p. 462–463; 416 p. 57.

Maps (T): 42 A/1 Kirkland Lake
(G): 2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)
2239 Eby–Otto area, Timiskaming District (OGS, 1:31 680)

Lucky Cross (Golden Gate) mine

NATIVE GOLD, CALAVERITE, ALTAITE, PYRITE, CHALCOPYRITE, MOLYBDENITE

In volcanic rocks and syenite porphyry

Native gold occurred as visible gold in white quartz veins. It was associated with calaverite, altaite, and pyrite. Small amounts of chalcopyrite and molybdenite were present in the veins.

Prospectors John Wood and Walter Hurd staked the deposit in 1906. Original shaft-sinking in 1907–1908 by Crawford Mining Syndicate failed to locate economic veins. Following the discovery of rich ore at the Swastika mine in 1910 and 1911, attention was again directed to the Lucky Cross deposit. Surface exploration under the direction of J.W. Vandergrift resulted in the discovery of rich gold-bearing veins at and near the surface. In 1911, Lucky Cross Mines Limited of Swastika sank a 76 m inclined shaft and installed a ten-stamp mill. In the course of shaft sinking a number of spectacular showings of free gold were encountered “shot after shot bringing out rich samples” (ref.: 405 p. 672). Operations ended in 1913. Ten years later, Kirkland Gateway Gold Mines Limited deepened the shaft to 107 m. From 1938 to 1942, Golden Gate Mining Company Limited worked the deposit from a vertical 305 m shaft and installed a mill. The total production was 849 724 g of gold and 120 928 g of silver, valued at $1 008 655.

The Lucky Cross (Golden Gate) mine is about 7 km southwest of Kirkland Lake, just east of the village of Swastika. Access is via a 0.4 km road leading south from Highway 66 at **km 7.6** (*see* p. 5). *See* Map 1 on page 13.

Refs.: 44 p. 264–265; 47 p. 20; 116 p. 171–172; 196 p. 27; 207 p. 297; 232 p. 11–12; 307 p. 27–28; 337 p. 348, 362, 379; 343 p. 47–49; 373 p. 597–598; 405 p. 672; 406 p. 20–22.

Maps (T): 42 A/1 Kirkland Lake
(G): 1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Adams mine

MAGNETITE, HEMATITE, PYRITE, PYRRHOTITE, GRAPHITE, MARCASITE, GARNET, EPIDOTE, ACTINOLITE, CHLORITE, CALCITE, GRUNERITE-CUMMINGTONITE, SPHALERITE, GALENA, CHALCOPYRITE

In iron-formation

The ore consisted of alternating layers of massive magnetite and dark grey to red chert; it contained up to 26% iron. Magnetite also occurred as disseminated grains associated with hematite, graphite, marcasite, pyrite, and pyrrhotite in cherty quartzite. Pyrite occurred as nodules and as cubic crystals. Nonmetallic minerals associated with the orebody included brownish-red garnet, epidote, actinolite, tremolite, chlorite, calcite, and grunerite-cummingtonite. Noneconomic base-metal minerals found in the deposit include sphalerite and galena in carbonate veins cutting volcanic rocks, and pyrite and pyrrhotite in cherty quartzite.

The deposit is within the 10 km long Boston Township iron range, which contains eight orebodies from 915 m to 1220 m wide. The iron range is composed of irregular lenses of iron-formation and cherty quartzite separated by lava flows (basalt and andesite). It had been known since 1902, but the grade was then regarded as too low for exploitation. From 1948 to 1954, Dominion Gulf Company explored the iron range using airborne and ground magnetometer surveys, mapping, sampling, and drilling. The exploration revealed a potential economic orebody. In 1954, Jones and Laughlin Steel Corporation continued exploration and prepared for mining. Ten years later production from an open pit began and pelletized ore was shipped by rail to the blast furnaces in Pennsylvania. In 1971, Dominion Foundries and Steel Limited (Dofasco Inc.) acquired the mine and transported the pelletized ore to its blast furnaces in Hamilton, Ontario. Operations ended in 1990. Production from 1964 to 1990 amounted to 27 433 266 t of pelletized ore containing 65% iron. The mine consisted of five open pits in the plant area and some smaller pits 3300 m north of it. The plant consisted of concentrating and pelletizing plants.

The mine is about 11 km southeast of Kirkland Lake. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	0.3	*Roadcuts* expose amphibolite for about 500 m. Finely crystalline epidote with actinolite (tiny bladed aggregates), chlorite, and tiny titanite prisms occur in fractures in the rock.

Plate 1

Banded iron formation, Adams mine. GSC 161447

7.2 Junction; turn left onto Highway 650. Pink syenite outcrops at the junction.

8.2 *Roadcut* on left exposes coarse-grained pink syenite. The rock contains radiating bladed aggregates of dark green actinolite, and reddish-brown grains and granular aggregates of titanite.

17.5 Adams mine.

Refs.: 84 p. 79–82; 87 p. 176–181; 88 p. 67–72; 123 p. 8–17; 206 p. 49–50; 307 p. 88–89; 313 p. 457–458; 444 p. 81.

Maps (T): 32 D/4 Larder Lake
(G): 1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Plate 2

Adams mine, 1972. GSC 161448

Boston molybdenite occurrence

MOLYBDENITE, PYRITE, CHALCOPYRITE

In brecciated pink syenite porphyry

Coarse flakes and crystals of molybdenite occur with pyrite and chalcopyrite in quartz-carbonate veins in porphyry.

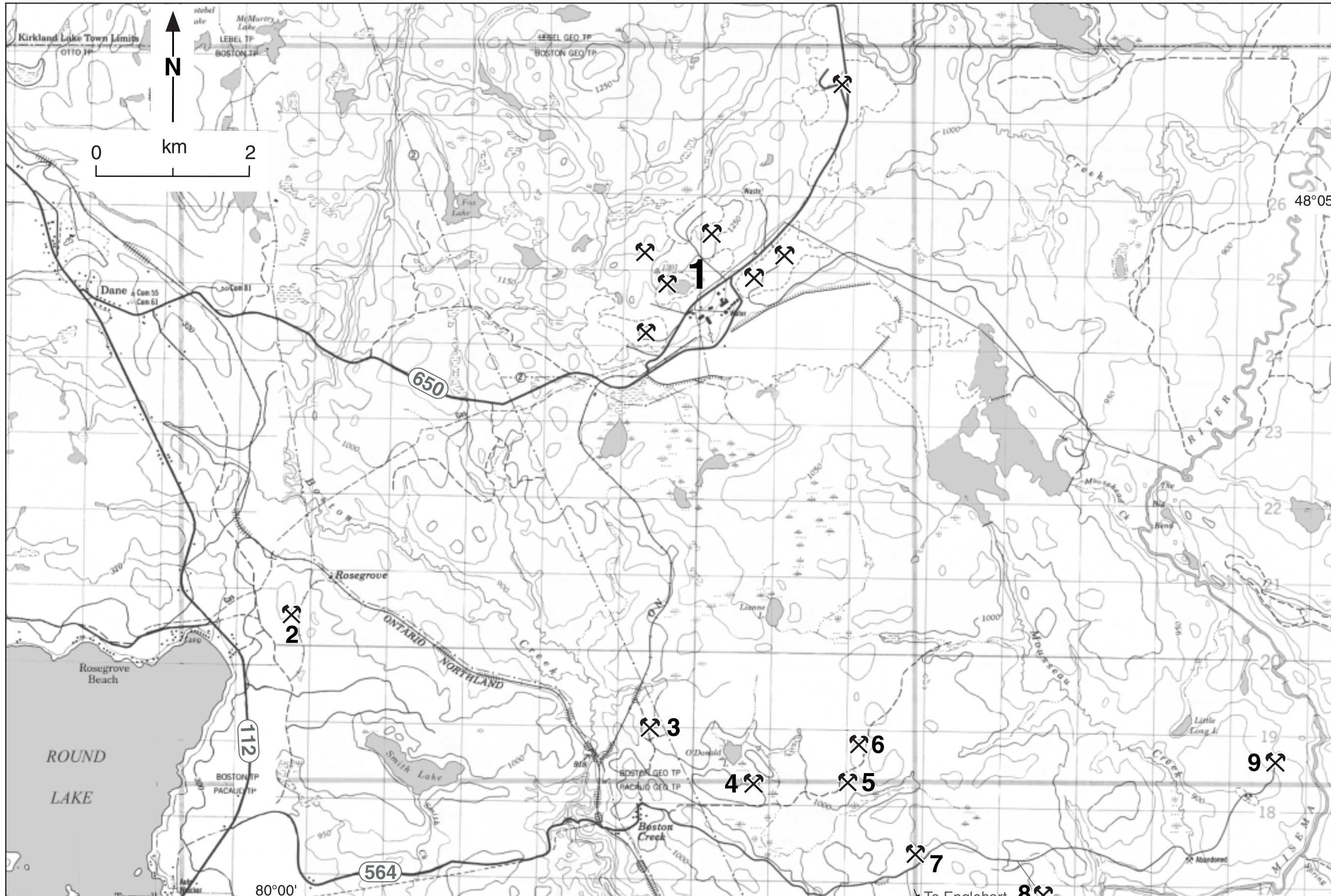
In 1942, Snails Molybdenite Mines Limited did some surface exploration of the deposit. In 1966, Boston Molybdenite Mines Limited traced the deposit by several pits for 150 m. The pits are shallow and now partly overgrown.

The occurrence is about 12 km southeast of Kirkland Lake and 5 km northwest of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	7.2	Junction, Highway 650; continue south along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.

Part of 32 D/4 and 42 A/1



1. Adams mine 2. Boston molybdenite occurrence 3. Boston Creek gold mine 4. Barry-Hollinger (Patricia) mine 5. Boston-McRae mine 6. Planet Gold mine 7. Miller Independence mine 8. Kennedy-Boston mine 9. Cathroy Larder (Yama) mine

Map 2. Boston Creek.

	15.7	Junction, rough single-lane road leading north; turn left onto it.
	17.4	Fork, at gravel pits; proceed onto the road on right.
	18.3	Boston molybdenite occurrence, on the left (west) side of the road.

Ref.: 161 p. 76–77.

Maps (T): 32 D/4 Larder Lake
(G): 1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Boston Creek gold mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, MOLYBDENITE

In volcanic rocks

Native gold was associated with pyrite and chalcopyrite in quartz veins. Some galena and molybdenite were also present. The quartz is green due to chlorite inclusions.

Early mining operations uncovered some spectacular gold showings in a vein within 8 m of the surface. The vein, known as the 'Kenzie vein', was discovered in 1914, the first gold discovery in the Boston Creek area. LaRose Mines Limited did some work on the vein immediately. In 1915, R.A.P. Syndicate sank a shaft to 61 m on the eastern part of the vein. In 1916–1917, Boston Creek Mining Company Limited undertook development of the western part of the vein from the 61 m level; a winze extended the workings to 122 m, and a raise reached the surface 80 m west of the shaft.

The mine is about 16 km southeast of Kirkland Lake and 1 km north of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	22.0	Boston Creek. Highway 564 turns right (east). Follow the road leading north.
	23.0	The road splits; one road leads left (west) and the other leads right (east). From the split, an old road leads straight ahead (north) 120 m to the Boston Creek gold mine.

Refs.: 48 p. 254–255; 116 p. 192; 166 p. 16, 18; 190 p. 32–34.

Maps (T): 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)
1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Barry-Hollinger (Patricia) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SPHALERITE, CHALCOCITE

In greenschist

Visible native gold was associated with chalcopyrite in quartz veins. Pyrite, sphalerite, and chalcocite occurred in minor amounts.

This area was originally staked for gold in 1905 and 1907 during the Larder Lake gold rush. Staking activity was renewed in 1913 following the discoveries of rich gold-bearing veins at Kirkland Lake. Ben Hollinger staked the deposit in 1916. In the same year, Lyman and Associates of Cobalt explored the claim, then known as the 'Boston-Hollinger claim'. In 1917–1918, the Patricia Syndicate worked the deposit using a 66 m shaft. A mill with a capacity of 45 t/day produced 15 551 g of gold valued at about $10 000. A forest fire in 1919 destroyed the mill and mine buildings. Barry-Hollinger Gold Mines Limited later renewed operations and produced gold from 1925 until closure in 1936. Total production (from 1918) was 2 173 820 g of gold and 264 438 g of silver from 242 841 t of ore, valued at $1 622 118. Underground development via a shaft and winze extended to 686 m.

The mine is about 17 km southeast of Kirkland Lake and 2 km east of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	22.0	Boston Creek; continue along Highway 564.
	22.4	Junction, single-lane road; turn left (northeast) onto this road.
	23.5	Junction, mine road; turn left (north).
	23.8	Barry-Hollinger (Patricia) mine.

Refs.: 50 p. 1, 14–15; 116 p. 161–162; 166 p. 16; 190 p. 45–46; 307 p. 15; 325 p. 101–102; 326 p. 92.

Maps (T): 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)
38d Part of the Boston Creek gold area, District of Timiskaming, Ontario (OGS, 1:9600)
1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Boston-McRae mine

NATIVE GOLD, CALAVERITE, TETRADYMITE, PETZITE, SPHALERITE, PYRITE, CHALCOPYRITE, MOLYBDENITE

In volcanic rocks

Native gold was associated with the telluride minerals, calaverite, tetradymite, and petzite in white quartz. Sphalerite, pyrite, chalcopyrite, and molybdenite were also present in the quartz veins.

Boston-McRae Gold Mines Limited explored the deposit by several shallow shafts in 1916.

The mine is about 18 km southeast of Kirkland Lake and 3 km east of Boston Creek. See Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	22.4	Junction, single-lane road; turn left (northeast) onto this road.
	23.5	Junction, road to Barry Hollinger mine; continue straight ahead.
	25.0	Boston-McRae mine, on the east side of the road and about 100 m from the road.

Refs.: 19 p. 100; 48 p. 256–257; 50 p. 15; 116 p. 219; 166 p. 16; 190 p. 47; 338 p. 97.

Maps (T) 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)
38d Part of the Boston Creek gold area, District of Timiskaming, Ontario (OGS, 1:9600)
1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Planet Gold mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, HEMATITE, MOLYBDENITE, BISMUTHINITE, TETRADYMITE, MAGNETITE

In volcanic rocks and granite

Visible gold occurred with pyrite in a number of quartz veins. Chalcopyrite, specular hematite, molybdenite, bismuthinite, tetradymite, and magnetite occurred in small amounts.

The deposit, staked in about 1913, was originally known as the 'Authier-Charlebois prospect'. Exploration of the veins in 1915 consisted of several pits and trenches. In 1937–1938, Planet Gold Mines Limited trenched the veins and sank a shaft to 15 m. In 1946, Lebon Gold Mines Limited did some additional trenching.

The mine is about 15 km southeast of Kirkland Lake and 3 km east-northeast of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	22.4	Junction, single-lane road; turn left (northeast) onto this road.
	23.5	Junction, road to Barry Hollinger mine; continue straight ahead.
	25.5	Planet Gold mine on left, about 75 m west of the road.

Refs.: 48 p. 258–259; 50 p. 14; 116 p. 193; 166 p. 16; 190 p. 40.

Maps (T): 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)

38d Part of the Boston Creek gold area, District of Timiskaming, Ontario (OGS, 1:9600)
1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Miller Independence mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, HEMATITE, GALENA, CALAVERITE, TELLUROBISMUTHITE

In mafic volcanic rocks

Visible gold occurred with calaverite, tellurobismuthite, pyrite, and chalcopyrite in white quartz veins. The telluride minerals occurred as minute veinlets and small masses. Some veins contained exceptionally rich shoots of gold and tellurides. Specular hematite and galena were also present.

Prospector Joseph McDonough discovered the gold-bearing vein (No. 1) on this property in 1915. His partner, F.M. Connell, explored the veins with several pits and trenches, and bagged some high grade ore. In 1916, George J. Miller bought the property and formed Miller Independence Mines Limited. In 1918, mine captain W. Adams discovered a rich gold-telluride vein referred to as the 'Independence vein'. Development of the veins during the next four years consisted of four shafts sunk to 157 m, 33 m, 30 m, and 64 m. In 1918, a test mill operated on the site and produced 1820 g of gold and 2177 g of silver from 46 t of ore, for a total value of $1283. The mill burnt down in 1919. In 1935, the company installed a new mill and produced gold and silver valued at $3690 from 28 t of ore.

The mine is about 18 km southeast of Kirkland Lake and 3 km east of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	15.7	Junction, road to Boston molybdenite occurrence; continue along the highway.
	22.4	Junction, road to Barry-Hollinger mine; continue straight ahead.
	25.4	Junction, road to Englehart; continue straight ahead.
	26.1	Junction; turn left (north) onto the mine road.
	26.3	Miller Independence mine.

Refs.: 19 p. 100; 48 p. 255–256; 50 p. 16; 116 p. 162; 166 p. 18; 190 p. 48–49; 326 p. 100; 337 p. 348, 372, 378; 341 p. 95–101; 401 p. 16.

Maps (T): 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)
38d Part of the Boston Creek gold area, District of Timiskaming, Ontario (OGS, 1:9600)

1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Kennedy-Boston mine

NATIVE GOLD, PYRITE, CHALCOPYRITE

In volcanic rocks and porphyry

Native gold occurred as fine disseminations with pyrite and chalcopyrite in quartz veins in a shear zone at the contact of volcanic and porphyritic rocks.

Kennedy-Boston Gold Mines Limited sank a shaft to 46 m in 1918. There is no record of production.

The mine is about 19 km southeast of Kirkland Lake and 3 km southeast of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 9):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	25.4	Junction, road to Englehart; continue straight ahead.
	26.1	Junction, road to Miller Independence mine; continue straight ahead.
	27.6	Junction; turn right (south).
	28.2	Kennedy-Boston mine.

Refs.: 50 p. 18–19; 116 p. 196–197; 120 p. 14.

Maps (T): 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)
1957-4 Boston Township and part of Pacaud Township, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Cathroy Larder (Yama) mine

NATIVE GOLD, PYRITE, TOURMALINE, CHALCOPYRITE, SPHALERITE

In sheared volcanic rocks

Native gold was associated with pyrite in quartz-carbonate and quartz-tourmaline veins. Chalcopyrite and sphalerite were also present.

The deposit consisted of a north zone and a south zone, 366 m apart. E.R. Ostrom of Cobalt, Ontario, staked the north zone in 1915. Between 1938 and 1942, Yama Gold Mines Limited sank a shaft to 165 m. In 1943, Cathroy Larder Mines Limited acquired the property and outlined new gold-bearing veins in the south zone. This zone was developed underground from the original shaft in the north zone. The company continued operations until 1948, and again in 1957. From 1941 to 1957, the mine produced 2041 t of ore, to recover 100 369 g of gold and 30 885 g of silver. In 1985–1987, Golden Shield Resources Limited mined 45 350 t from an open pit and 18 140 t from underground, the ore containing 4.114 to 5.828 g/t gold.

The mine is about 22 km southeast of Kirkland Lake and 7 km east of Boston Creek. *See* Map 2 on page 18.

Road log from Highway 66 at **km 9.0** (*see* p. 6):

km	0	Junction, highways 66 and 112; proceed southeast along Highway 112.
	15.0	Junction; turn left (east) onto Highway 564.
	25.4	Junction, road to Englehart; continue straight ahead.
	26.1	Junction, road to Miller Independence mine; continue straight ahead.
	29.2	Junction; proceed along the road on left.
	31.6	Cathroy Larder (Yama) mine.

Refs.: 1 p. 5, 39–40; 116 p. 148–149; 307 p. 20–21.

Maps (T): 32 D/4 Larder Lake
(G): 1950-3 Township of McElroy and portion of Township of Boston, District of Timiskaming, Ontario (OGS, 1:12 000)
2043 Catharine and Marter townships, Timiskaming District (OGS, 1:31 680)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Macassa mine

NATIVE GOLD, ALTAITE, COLORADOITE, CALAVERITE, MELONITE, MOLYBDENITE, PYRITE, SPECULARITE

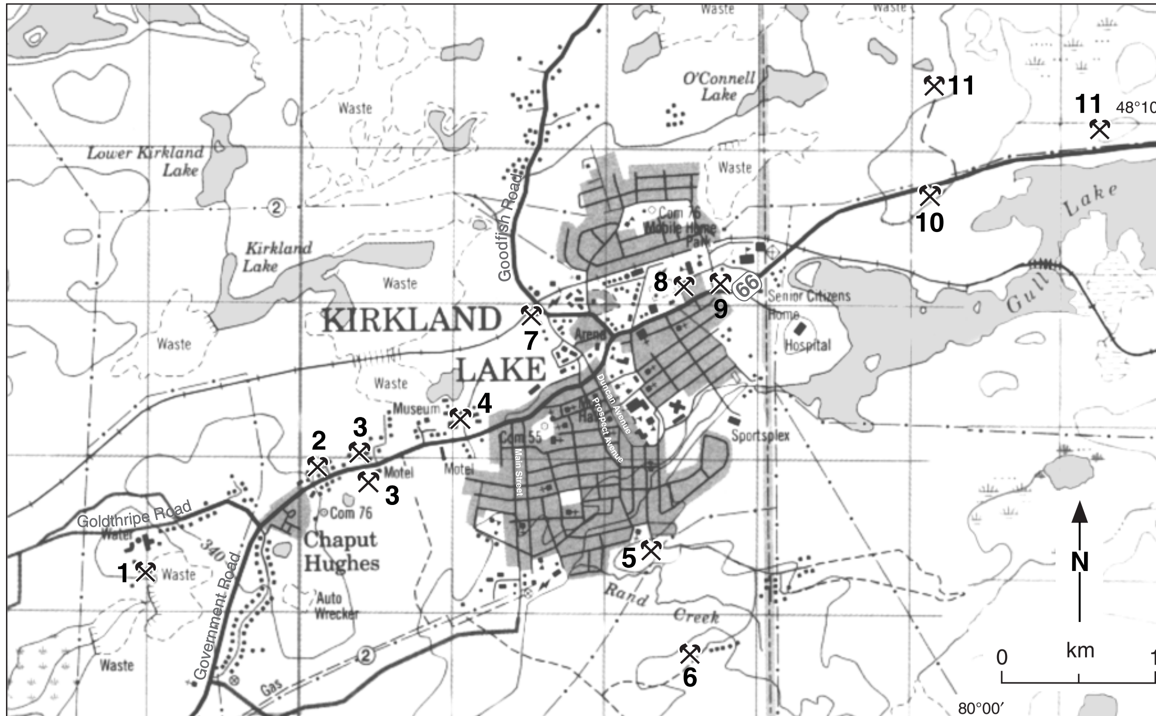
In volcanic rocks and sedimentary rocks intruded by syenitic rocks

Native gold occurs in quartz veins and lenses. It is associated with altaite, coloradoite, calaverite, melonite, and molybdenite in fractures in quartz. Specimens consisting of small particles of native gold attached to large patches of calaverite have been found. Pyrite and specular hematite are also present.

The Macassa mine is the most westerly of the seven adjoining mines that made up the 6 km gold-producing strip in Kirkland Lake. Dave Elliott staked the original claims in the summer of 1911. Claims staked late in 1912 by Harry Oakes, Ernie Martin, and Mr. Anderson (a Swastika assayer) became part of the property in 1926. Between 1916 and 1919, Elliott-Kirkland Gold Mines Limited explored the deposit by a 160 m vertical shaft. No ore of economic importance was located and exploration ended. After five years of underground exploration, Macassa Mines Limited found an economic orebody in 1931. The company sank a new shaft, installed a mill, and began production in 1933. The underground workings consist of No. 1 shaft and two winzes to 2150 m, No. 2 shaft (about 305 m to the southwest) to 1410 m, and No. 3 shaft (about 1600 m west of No. 1 shaft) to 2208 m. Willroy Mines Limited took over operations in 1970, followed by Lac Minerals Limited in 1982, American Barrick Resources Corporation in 1994, and Kinross Gold Corporation in 1995. The mine is equipped with a mill that treats ore from the Macassa mine and Lake Shore mine tailings. Total production to the end of 1997 amounted to 107 401 178 g of gold and about 13 231 744 g of silver from 7 810 611 t of ore. Since 1987, an additional 3 615 413 g of gold were recovered from the tailings.

The Macassa mine is about 3 km west of Kirkland Lake, on the Goldthorpe Road, 0.8 km from its junction with Highway 66 at **km 11.9** (*see* p. 6). *See* Map 3 on page 25.

Part of 42 A/1 and 32 D/4



1. Macassa mine 2. Kirkland Lake Gold mine 3. Teck-Hughes mine 4. Lake Shore mine 5. Kirkland Rand (Ontario Kirkland, Hudson Rand) mine 6. Tundra quarry 7. Wright-Hargreaves mine 8. Sylvanite mine 9. Toburn (Tough Oakes, Burnside) mine 10. Glenora mine 11. Continental mine

Map 3. Kirkland Lake.

Plate 3

Timiskaming conglomerate, Highway 66 roadcut at **km 9.6**. GSC 161444

Refs.: 116 p. 177–178; 134 p. 35–36; 140 p. 119; 206 p. 22–23; 211 p. 3; 212 p. 172, 217; 213 p. 7-4; 214 p. 273–279; 232 p. 16, 54; 307 p. 52–53; 337 p. 347–349, 360, 362, 379; 386 p. 125–126, 129; 387 p. 85–86; 390 p. 56–71; 444 p. 195; 445 p. 354; 461 p. 225; 462 p. 55; 465 p. 264.

Maps (T): 42 A/1 Kirkland Lake

(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Kirkland Lake gold mine

NATIVE GOLD, PYRITE, ALTAITE, CALAVERITE, COLORADOITE, HESSITE, CHALCOPYRITE, TETRAHEDRITE, MOLYBDENITE, GRAPHITE, TOURMALINE

In augite syenite, syenite porphyry, and Timiskaming sedimentary rocks

Native gold, including rare visible gold, was associated with pyrite, altaite, calaverite, coloradoite, and hessite in quartz veins. Small amounts of chalcopyrite, tetrahedrite, molybdenite, graphite, and tourmaline were also present.

In April 1911, C.A. McKane staked the original claim on a gold-bearing vein beneath 6 m of overburden. Deep trenching exposed the vein. In 1913, Kirkland Gold Mines Limited undertook initial exploration of the discovery vein by a 24 m shaft. In 1915, Beaver Consolidated Mines Limited deepened the shaft to 61 m. Kirkland Lake Gold Mining Company Limited resumed development in 1916 and began production in 1919. Development consisted of two shafts and four winzes to a maximum depth of 1831 m. Except for one year (1925), production was continuous until 1960; during this time, the mill processed 2 848 933 t of ore for a recovery of 36 484 419 g of gold and 4 061 398 g of silver, valued at $39 124 929. Production peaked in 1940 with the recovery of gold valued at $2 051 790.

The Kirkland Lake gold mine is about 2 km west of Kirkland Lake, on the north side of Highway 66 (Government Road) at **km 12.2** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 116 p. 175–176; 214 p. 276; 232 p. 44–45, 52–54; 238 p. 133, 134, 138; 307 p. 42–43; 337 p. 356, 364, 379; 351 p. 81–82, 93–98.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Teck-Hughes mine

NATIVE GOLD, ALTAITE, COLORADOITE, CALAVERITE, PYRITE, MOLYBDENITE, GRAPHITE, HEMATITE, PYRRHOTITE, MAGNETITE, CHALCOPYRITE, BARITE

In sedimentary rocks, tuff, and intrusive rocks

Visible gold was associated with altaite, coloradoite, calaverite, and pyrite in quartz veins. Minor amounts of molybdenite, graphite, specular hematite, pyrrhotite, magnetite, chalcopyrite, and red barite have been reported from the orebody.

Plate 4

Teck-Hughes mine, on the shore of Kirkland Lake, 1929. GSC 72229

The Teck-Hughes property comprises a number of claims staked in the early days of the Kirkland Lake camp. In 1911–1912, Stephen Orr, John Reamsbottom, C.A. McKane, and Sandy McIntyre staked the claims. Teck-Hughes Gold Mines Limited took over the claims in 1913 and sank three shafts in 1913–1915. Production began in 1917 and continued until 1968. The 1923 production of gold and silver from the Teck-Hughes mine valued at $1 117 963 was the highest of any mine in Kirkland Lake in that year. Production peaked in 1931 with the recovery of 9 157 376 g of gold and 767 809 g of silver, valued at $6 093 199. Total production from the mine was 115 361 245 g of gold and 15 603 038 g of silver valued at $107 824 554, the third highest value of the seven mines in the Kirkland Lake gold strip. The mine was serviced by three shafts extending to a maximum 1875 m.

The Teck-Hughes mine is about 2 km west of Kirkland Lake. The workings are on both sides of Highway 66 (Government Road) at **km 12.7** (*see* p. 6) in Kirkland Lake. *See* Map 3 on page 25.

Refs.: 49 p. 30–31; 116 p. 179–180; 122 p. 141–146; 140 p. 109, 110, 119; 214 p. 277; 232 p. 14, 15, 29–30, 43, 51; 293 p. 5; 294 p. 9; 307 p. 42–43, 66–67; 324 p. 83; 327 p. 118; 337 p. 348, 362, 364, 379; 441 p. 346.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Lake Shore mine

NATIVE GOLD, PYRITE, CALAVERITE, COLORADOITE, ALTAITE, PETZITE, CHALCOPYRITE, GALENA, MOLYBDENITE, SPHALERITE, ARSENOPYRITE, PYRRHOTITE, BARITE, CALCITE, TOURMALINE

In augite syenite, syenite porphyry, conglomerate, and greywacke

The Lake Shore mine was the largest gold producer in the Kirkland Lake camp. Native gold occurred in quartz-carbonate veins, in altered wall rock, in association with pyrite, the chief metallic mineral, and with the telluride minerals. In order of abundance, the tellurides were altaite, calaverite, coloradoite, and petzite. The best showings of coarse native gold and tellurides, particularly calaverite, were found above the 305 m level. A mass of native gold, 10 cm by 5 cm by 2.5 cm, recovered from the 244 m level, was the most spectacular showing of massive gold of any mine in the Kirkland Lake gold strip. Chalcopyrite, galena, molybdenite, sphalerite, arsenopyrite, pyrrhotite, barite, calcite, and black

Plate 5

Lake Shore mine, 1929. GSC 72231

tourmaline were minor constituents of the ore. The gold-bearing tellurides accounted for 11% to 19% of the gold in the ore, and about 90% of the tellurides were calaverite. One section of the mine produced exceptionally rich ore that averaged over $40/ton over widths of 3 m to 14 m.

Harry Oakes staked the original claims on July 30, 1912, and acquired claims staked by George Minaker in February 1911 and by Melville McDougall in June 1911. Oakes formed Lake Shore Mines Limited in 1914 and began development immediately with the sinking of No. 1 shaft on the discovery vein. Production began in 1918 after more productive veins to the north were encountered; these veins outcropped beneath the south arm of Kirkland Lake, which covered about half the property. A new shaft that became the main production shaft was put down in 1927 at a location 75 m northwest of No. 1 shaft. The mine operated continuously until 1965. Lac Minerals Limited did some additional mining in 1982–1987. The mine was serviced by four surface shafts and three internal shafts, one of them extending the underground development to 2493 m, a depth exceeded only by the Wright-Hargreaves mine.

The Lake Shore mine established itself as the camp's leader in the annual yield of gold, a position it maintained for almost 40 years. When production ended in 1965, the cumulative value of the ore treated was $271 164 534, accounting for about 40% of the recovery from the seven mines in the Kirkland Lake gold strip, and placing the mine in second place, after the Hollinger mine, in Canada's gold production to that time. In its peak years from 1931 to 1940, its annual yield was valued at over $10 million, an annual value not achieved by any other mine in the camp. Total production amounted to 26 653 670 g of gold and 60 810 470 g of silver. In 1988, Lac Minerals Limited began commercial production from the tailings. Kinross Gold Corporation took over the tailings operation in 1995 and began mining the crown pillar in 1997.

The Lake Shore mine site is at the west end of the town of Kirkland Lake, on the north side of Highway 66 (Government Road) at **km 13.4** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 57 p. 150, 154–155; 116 p. 176–177; 140 p. 110, 112, 115; 198 p. 29; 200 p. 138; 211 p. 3–4; 214 p. 277; 232 p. 15, 21; 307 p. 47–49; 337 p. 348, 351, 362, 364, 379; 344 p. 55–62; 351 p. 72–73, 82, 112, 120–122; 437 p. 183; 456 p. 262; 465 p. 264.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Kirkland Rand (Ontario Kirkland, Hudson Rand) mine

NATIVE GOLD, TELLURIDES, PYRITE, CHALCOPYRITE, MOLYBDENITE, JASPER

In Timiskaming conglomerate and greywacke, and syenite porphyry

Native gold, rarely visible gold, was associated with tellurides, pyrite, and chalcopyrite in quartz veins. Molybdenite has been reported from the deposit. The mine dumps furnish specimens of conglomerate containing pebbles and fragments of bright red jasper, grey, brown, and black chert, and pink calcite and chlorite.

In 1917, La Rose Mines Limited explored the property, then known as the 'Hurd claim', by means of a 30.5 m shaft. In 1922, Ontario Kirkland Gold Mines Limited mined the deposit via a 137 m shaft and recovered gold valued at about $10 000. Companies involved in subsequent development included Montreal-Ontario Mines Limited (1923–1924), Kirkland Rand Limited (1924–1927), Kirkland Premier Mines Limited (1927–1929), Kirkland Gold Rand Limited (1931–1937), and Hudson-Rand Gold Mines Limited (1946–1947). The shaft was ultimately deepened to 244 m and a winze extended the workings to 435 m. There was no production after 1922.

The Kirkland Rand (Ontario Kirkland, Hudson Rand) mine is at the south end of the town of Kirkland Lake. It is on Prospect Avenue, 1 km south of its junction with Highway 66 (Government Road) at **km 14.2** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 49 p. 42–44; 116 p. 173–174; 214 p. 276; 307 p. 40–41; 328 p. 42; 408 p. 135–136; 410 p. 123.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Tundra quarry

MARBLE

In volcanic rock

A decorative green carbonate rock consisting of dolomite with minor quartz and green chrome muscovite (fuschite) occurs in an altered zone in volcanic rock. The green rock (marble) is known as 'crystal green' and is suitable for interior and exterior building stone.

Tundra Granite and Marble Inc. began quarrying operations in 1992. Since then, the company has shipped 147.5 t of marble blocks to Carrara, Italy, for processing.

The Tundra quarry is about 2 km south of the town of Kirkland Lake. Access from Highway 66 (Government Road) at **km 14.3** (*see* p. 6) is via Duncan Avenue to Pollock Avenue, south to Harvey Kirkland, and south on Conroy Street, which leads directly to the quarry. *See* Map 3 on page 25.

Refs.: 212 p. 174; 213 p. 7–6; 214 p. 279, 296.

Maps (T): 42 A/1 Kirkland Lake
(G): 1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Wright-Hargreaves mine

NATIVE GOLD, CALAVERITE, COLORADOITE, ALTAITE, PETZITE, MELONITE, PYRITE, CHALCOPYRITE, HEMATITE, GALENA, SPHALERITE, MOLYBDENITE, GRAPHITE, BARITE, APATITE, ORTHOCLASE

In augite syenite, syenite porphyry, conglomerate, and greywacke

Native gold occurred in pyrite, and associated with calaverite, coloradoite, altaite, petzite, and melonite in quartz veins. Calaverite and altaite were the most common tellurides. Minute crystals of smoky quartz occurred with the tellurides in vugs in massive quartz. Pyrite was the chief metallic mineral; chalcopyrite, hematite, galena, sphalerite, molybdenite, and graphite were minor components of the ore. The gangue minerals were barite, apatite, calcite, and orthoclase.

W.H. (Bill) Wright made the first discovery of gold in the Kirkland Lake camp on this property. He staked three claims on it on July 27, 28, and 29, 1911. A claim staked about two months later by his brother-in-law, Ed Hargreaves, became part of the property. The discovery vein consisted of short shoots of rich ore in porphyry. In 1913, about 32 t of ore containing 1337 g of gold

Plate 6

Wright-Hargreaves mine, on the shore of Kirkland Lake, 1922.
National Archives Canada PA 13677

and 12 565 g of silver were shipped by R. Cartwright from a vein 168 m north of the discovery vein. Development of the deposit was resumed in 1916 by Wright-Hargreaves Mines Limited, which brought the mine into production in 1921. Four surface shafts and two internal shafts serviced the mine. Underground development extended to 2508 m, the deepest workings of any mine on the continent. In 1956, Little Long Lac Gold Mines Limited acquired the property. The mill ended operations in 1957; from then until the mine closed in 1965, ore was treated at the Lake Shore mill. From 1921 until 1965, 149 956 769 g of gold and 26 550 858 g of silver, valued at about $160 634 103, were recovered from 9 010 435 t of ore. This was the second highest yield in the Kirkland Lake gold strip. The mine's most productive period was from 1934 until 1941 when its annual output was valued at about $8 000 000.

The Wright-Hargreaves mine, now sealed, is in the town of Kirkland Lake. It is on the west side of Duncan Avenue, about 400 m north of its junction with Government Road (Highway 66) at **km 14.3** (*see* p. 6). The site of the discovery vein is on Tweedsmuir Road, 115 m north of Government Road. *See* Map 3 on page 25.

Refs.: 116 p. 183; 140 p. 111, 114; 146 p. 161, 164–170; 198 p. 29, 55; 214 p. 277; 232 p. 16–17; 268 p. 63–65; 307 p. 73–74; 337 p. 349, 360, 362, 364, 379; 344 p. 55–62; 351 p. 125–131.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Sylvanite mine

NATIVE GOLD, TETRAHEDRITE, PETZITE, ALTAITE, COLORADOITE, CALAVERITE, PYRITE, MOLYBDENITE, CHALCOPYRITE, GALENA

In syenite porphyry, greywacke, and conglomerate

Visible gold occurred with tetrahedrite and the telluride minerals (petzite, altaite, coloradoite, and calaverite) in slip planes and along fractures in quartz veins. Pyrite was the chief metallic mineral. Molybdenite, chalcopyrite, and galena were present in minor amounts.

The property comprised claims staked by J. Stirrup for W.H. Wright in October 1911, and by R.W. Robbins in September of the same year. In 1913, Sylvanite Gold Mines Limited was formed to develop the deposit. Preliminary surface exploration uncovered visible gold in quartz, but the results were not encouraging. After rich discoveries were made in the two adjoining properties, underground development began in 1916, and a mill began operations in 1927.

Development consisted of four surface shafts and one internal shaft reaching 1709 m. Continuous production from 1927 until 1961 yielded 4 579 929 t of ore containing 52 091 553 g of gold and 10 511 445 g of silver, valued at about $56 596 502. Production was at its peak from 1936 until 1943 with an annual recovery valued at over $2 000 000.

The Sylvanite mine is in the town of Kirkland Lake. The workings, now sealed, are north of Government Road (Highway 66) at **km 15.0** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 116 p. 178–179, 180; 140 p. 111; 202 p. 177–181; 214 p. 277; 232 p. 16, 28, 38; 302 p. 392; 307 p. 65–66; 344 p. 55–62; 351 p. 134–140.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Toburn (Tough-Oakes, Burnside) mine

NATIVE GOLD, ALTAITE, PETZITE, MELONITE, CALAVERITE, TETRADYMITE, HESSITE, COLORADOITE, PYRITE, CHALCOPYRITE, SPHALERITE, MOLYBDENITE, ORTHOCLASE, CALCITE, TALC, CHLORITE, HEMATITE

In fractures in greywacke, conglomerate, and feldspar porphyry

Native gold was associated with altaite, petzite, melonite, calaverite, tetradymite, hessite, and coloradoite in quartz veins. The most common telluride was altaite. Pyrite was the most abundant metallic mineral, and chalcopyrite, sphalerite, and molybdenite were minor. The gangue minerals were quartz, pink to white calcite, red orthoclase, yellowish-green talc, and dark green chlorite. Patches of specular hematite were noted on pink calcite specimens found on the rock dumps. The white calcite fluoresces pink when exposed to ultraviolet rays.

Plate 7

Tough-Oakes, Burnside, and Wright-Hargreaves mines, on the shore of Kirkland Lake, 1920. Ontario Archives R.G.13, 1-D-1, v. 29-4, p. 5b

The Toburn mine comprised the original Tough-Oakes claims and Burnside properties. It is at the eastern end of the 6 km Kirkland Lake gold strip. 'Swift' Burnside staked the three Burnside claims in July 1911, and the Tough brothers of Huntsville staked the five Tough-Oakes claims for Harry Oakes in January 1912. When preliminary surface exploration of the Tough-Oakes property revealed extremely high-grade gold-bearing veins, the discovery triggered the prospecting rush in Kirkland Lake in 1912–1913. The first production from the Kirkland Lake camp was made by C.A. Foster in 1912 from an open cut and a 35 m shaft on the Tough-Oakes property; a five-stamp mill recovered 50 915 g of gold and 71 537 g of silver from 67 t of ore. In 1913, Tough-Oakes Gold Mines Limited was incorporated to continue development of the deposit. Operations ended in 1918 when the high-grade ore was exhausted. Burnside Gold Mines Limited worked the adjoining Burnside property from 1913 to 1918. In 1923, the two properties were amalgamated as Tough-Oakes Burnside Gold Mines Limited, which continued mining and milling until October 1928. Toburn Gold Mines Limited acquired the property in 1931 and continued production until the mine closed in 1953.

The mine consisted of two shafts on the Tough-Oakes property and three shafts on the Burnside property. The main shaft (Burnside No. 3) workings extend to 755 m. Total production from the mine amounted to 17 749 207 g of gold and 4 206 307 g of silver from 1 075 988 t of ore, valued at about $17 738 506.

The Toburn (Tough-Oakes, Burnside) mine is at the east end of the town of Kirkland Lake, on the north side of Highway 66 (Government Road) at **km 15.3** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 47 p. 25–29; 49 p. 23–24, 37–41; 116 p. 181–182; 140 p. 111, 114; 214 p. 277; 228 p. 184–185, 186; 232 p. 16, 21–22, 24, 38; 307 p. 69–70; 329 p. 148; 337 p. 348, 352, 356, 360, 362, 364, 372, 379; 338 p. 95–97.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
1945-1 Township of Teck, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Glenora mine

NATIVE GOLD, PYRITE

In conglomerate and tuff

Gold-bearing quartz veins containing abundant pyrite occurred near the surface. The quartz assayed 8.88 g/t gold.

T.H. Tough staked the claim in 1912. London Gull Lake Mines Limited sank an inclined shaft to 14 m in 1924. In 1936–1937, Glenora Gold Mines Limited did some trenching, sank a shaft to 142 m, and hoisted 318 t of ore.

The Glenora mine is about 2 km northeast of Kirkland Lake. Access is by a 0.2 km road leading south from Highway 66 at **km 16.8** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 116 p. 143–144; 307 p. 25–26.

Maps (T): 42 A/1 Kirkland Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Continental mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, HEMATITE

In fracture zone in Timiskaming sedimentary rocks

Native gold was associated with pyrite, chalcopyrite, galena, and specular hematite in quartz veins.

Continental Mines Limited explored the gold prospect between 1922 and 1925. The work consisted of surface trenching and sinking No. 1 shaft to 252 m. In 1927–1929, Continental Kirkland Mines Limited explored another vein about 1100 m farther east, and sank No. 2 shaft to 152 m on this vein.

The Continental mine is about 3 km northeast of Kirkland Lake. Access to No. 1 shaft is by a 0.6 km road leading north from Highway 66 at **km 17.2** (*see* p. 6). Access to No. 2 shaft is by a 0.2 km road leading north from Highway 66 at **km 18.1** (*see* p. 6). *See* Map 3 on page 25.

Refs.: 116 p. 143; 147 p. 68-69; 307 p. 22–23; 351 p. 154–155.

Maps (G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Kirkroyale (Conroyal) mine

PYRITE, MOLYBDENITE

In lava and conglomerate

Pyrite and molybdenite occur with calcite and dolomite in quartz veins. The veins were explored for gold.

Kirk Gold Mines Limited sank a shaft to 91 m on a quartz vein in 1924–1925. Conroyal Mines Limited continued exploration from 1926 to 1928, deepening the underground workings to 340 m. Kirkroyale Gold Mines Limited investigated the deposit in 1937.

The mine is about 6 km east of Kirkland Lake. *See* Map 4 on page 35.

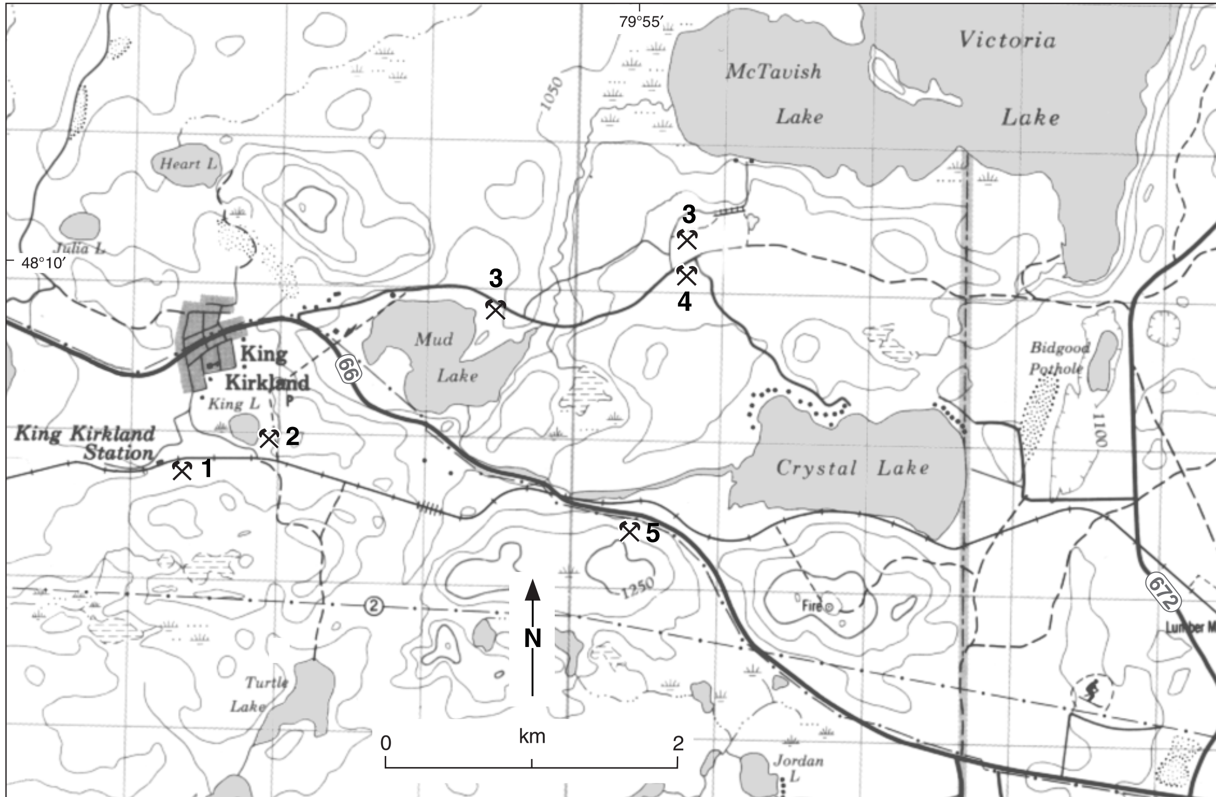
Road log from Highway 66 at **km 20.3** (*see* p. 6):

km	0	Junction in King Kirkland village; proceed along the road leading south.
	0.4	Junction; turn right.
	0.7	End of the road; walk south and cross the railway tracks.
	0.85	Kirkroyale (Conroyal) mine.

Refs.: 116 p. 145–146; 307 p. 44–45; 351 p. 157–158.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Part of 32 D/4



1. Kirkroyale (Conroyal) mine 2. King Kirkland mine 3. Bidgood Kirkland mine
4. Moffat-Hall mine 5. Morris (Wood) Kirkland mine

Map 4. King Kirkland.

King Kirkland mine

NATIVE GOLD, PYRITE, GALENA, SPHALERITE, CHALCOPYRITE, TETRAHEDRITE-TENNANTITE, BARITE, CHROME MUSCOVITE

In porphyritic rocks

Very fine visible gold occurred with pyrite and minor galena in quartz-carbonate veins occupying fracture zones in the host rock. Sphalerite, chalcopyrite, tetrahedrite-tennantite, and barite were present in minor amounts. Chrome muscovite (fuschite) occurs in altered porphyritic rock in the mine dumps.

R. Montgomery discovered gold on the property and staked it in 1918. In 1920–1922, King Kirkland Gold Mines Limited discovered several veins by trenching and sank an inclined shaft to 137 m. Tonapah Mining Company did some additional underground development in 1923. Lampe Resource Company Limited and prospectors Mike Leahy and Carl Forbes did some trenching and surveying on the property in 1980–1983.

The mine is about 6 km east of Kirkland Lake. It is south of King Kirkland village and just east of King Lake. *See* Map 4 on page 35.

Road log from Highway 66 at **km 20.3** (*see* p. 6):

km	0	Junction, in King Kirkland village; proceed along the road leading south.
	0.4	Junction; turn left.
	0.9	Junction; follow the trail on left leading northeast up a hill.
	1.0	King Kirkland mine.

Refs.: 49 p. 48; 116 p. 145; 147 p. 70–72; 212 p. 7–18; 307 p. 36–37.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Bidgood Kirkland mine

NATIVE GOLD, PYRITE, MOLYBDENITE, CHALCOPYRITE, HEMATITE, PYRRHOTITE, COLORADOITE, CALAVERITE, ALTAITE, PETZITE, BARITE, FELDSPAR, EPIDOTE

In diorite, porphyry, and hornblende syenite

Native gold occurred with pyrite and small amounts of molybdenite, chalcopyrite, specular hematite, pyrrhotite, coloradoite, calaverite, altaite, and petzite in quartz veins. Coloradoite occurred as compact masses of exceptional size associated with calaverite, altaite, native gold, and molybdenite in brecciated quartz. Barite, ankerite, and feldspar were constituents of the gangue. The mine dumps furnish host rocks containing cavities lined with microcrystals of epidote associated with tiny plates of specular hematite. Patches of epidote occur as crusts on the rocks. Red feldspar porphyry, greyish-green quartz porphyry, and pink and white calcite are common on the dumps.

Development of the deposit began in 1919 by Bidgood Gold Mines Limited. By 1923, when operations were suspended, No. 1 shaft reached a depth of 183 m. Bidgood Consolidated Mines Limited conducted underground development from 1927 to 1931. Bidgood Kirkland Gold Mines Limited acquired the property in 1933 and began production in 1934. Underground workings extended to 297 m via No. 1 shaft and to 633 m via No. 2 shaft, the main production shaft. Operations ended in 1949. The mine produced 4 982 203 g of gold and 2 253 972 g of silver from 531 835 t of ore, valued at $5 917 133.

The Bidgood Kirkland mine is about 9 km east of Kirkland Lake. *See* Map 4 on page 35.

Road log from Highway 66 at **km 21.**1 (*see* p. 6):

km	0	Junction, Highway 66 and a gravel road; proceed east along the gravel road.
	0.15	Junction; follow the road on right leading east.
	1.6	Bidgood Kirkland mine No. 1 shaft on the right (south) side of the road. The road log continues east.
	3.1	Bidgood Kirkland mine No. 2 shaft on the left (north) side of the road. The Moffat-Hall mine (see following description) is on right (south) side of the road.

Refs.: 49 p. 47–48; 116 p. 142–143; 147 p. 73–74; 236 p. 657; 307 p. 16–17; 337 p. 348, 362, 364, 379; 363 p. 268; 424 p. 22.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Moffat-Hall mine

NATIVE GOLD, PYRITE, CHALCOPYRITE

In altered feldspar porphyry

Native gold was associated with pyrite in quartz. Some chalcopyrite occurred in the mineralized zone.

F.C. Bidgood staked the deposit in 1917–1918. Trenching in 1920 located the main mineralized vein. In 1931–1932, Moffat-Hall Gold Mines Limited sank a shaft to 174 m. H. Jardine did some mining in 1934 and shipped 2882 t of ore to the Noranda mill. In 1934–1935, Bidgood Kirkland Gold Mines Limited mined the deposit via an underground connection to their adjacent Bidgood mine. This operation produced 148 672 g of gold and 35 737 g of silver from 14 864 t of ore.

The Moffat-Hall mine is about 9 km east of Kirkland Lake and adjacent to the Bidgood Kirkland mine. *See* Map 4 on page 35. For access follow the road log to the Bidgood Kirkland mine.

Refs.: 96 p. 59–60; 116 p. 147; 214 p. 277; 307 p. 55–56.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)

53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Morris (Wood) Kirkland mine

NATIVE GOLD, PYRITE, GALENA, CHALCOPYRITE, HEMATITE

In trachyte intruded by porphyry

Gold mineralization occurred in a fault zone in trachyte and porphyry. The gold values were associated with pyrite, galena, and chalcopyrite. The mine dumps provide specimens of dolomite-quartz containing small masses of platy specular hematite, and fine-textured porphyry consisting of white feldspar phenocrysts in a dark grey matrix sprinkled with fine grains of pyrite.

E.B. Wood staked the property. In 1920, Wood Kirkland Gold Mines Limited sank a shaft to 30 m. Between 1929 and 1934, Kirkland Gold Belt Mines Limited sank No. 2 shaft to 234 m. Morris Kirkland Gold Mines Limited took over development in 1935, deepening No. 2 shaft to 504 m. The company installed a mill and processed ore until 1942. The mine produced 115 418 t of ore recovering 528 720 g of gold and 925 439 g of silver, valued at about $621 544.

The Morris Kirkland mine is about 9 km east of Kirkland Lake, on the south side of Highway 66 at **km 23.8** (*see* p. 6). *See* Map 4 on page 35.

Refs.: 116 p. 147–48; 214 p. 277; 307 p. 56; 351 p. 158–159.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
53a Township of Lebel, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Northland mine

NATIVE GOLD, PYRITE, CHALCOPYRITE

In syenite porphyry

Native gold was associated with pyrite and chalcopyrite in quartz veins.

Northland Gold Mines Limited explored the deposit from 1922 to 1929 by trenching and sinking a shaft to 311 m.

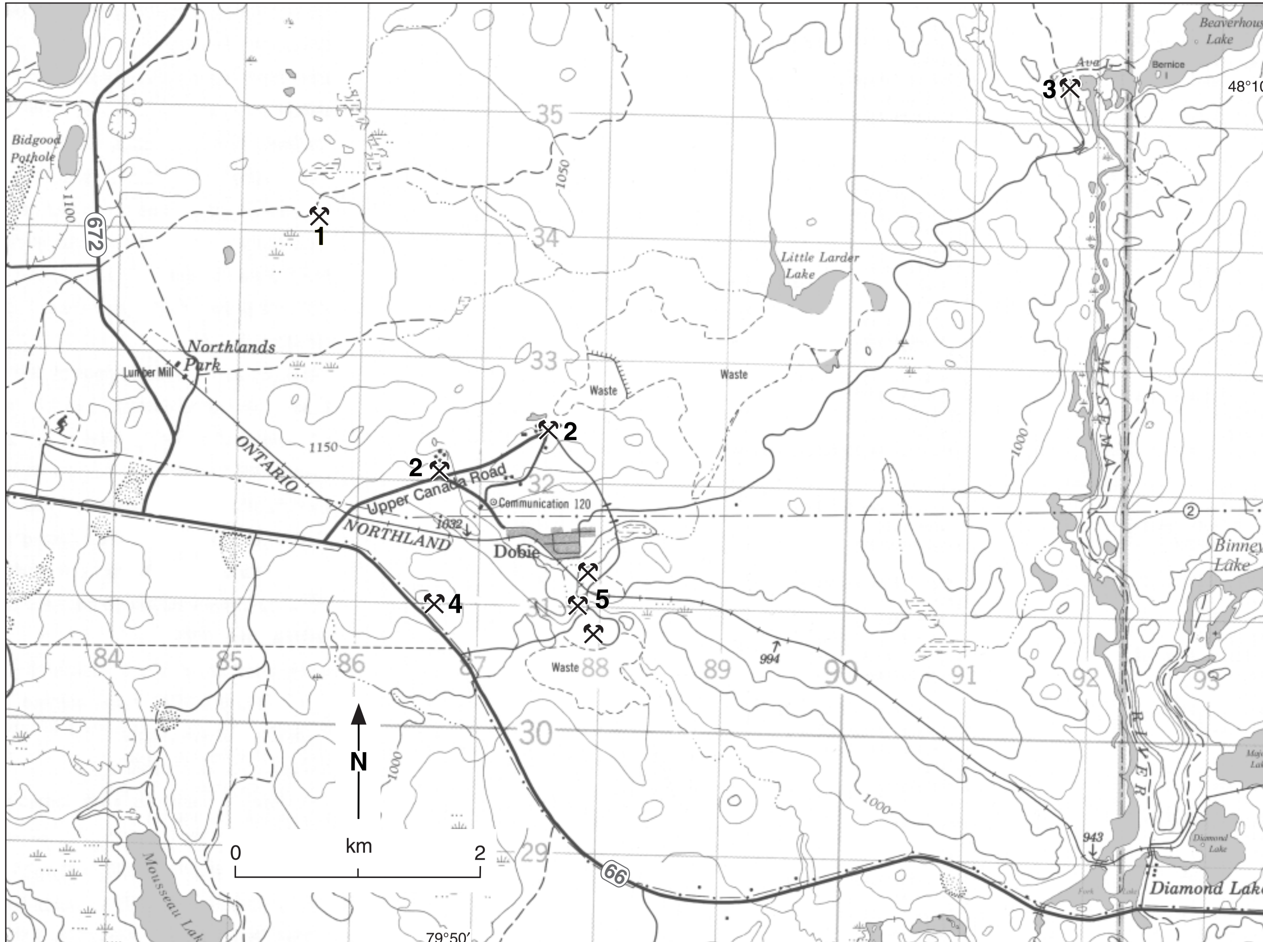
The mine is about 14 km east of Kirkland Lake. *See* Map 5 on page 39.

Road log from Highway 66 at **km 28.2** (*see* p. 7):

km	0	Junction, highways 66 and 672; proceed north along Highway 672.
	0.8	Junction; continue along Highway 672.
	2.2	Junction; turn right (east).
	4.3	Northland mine.

Refs.: 116 p. 132–133; 307 p. 57–58; 346 p. 19–20.

Part of 32 D/4



1. Northland mine 2. Upper Canada mine 3. Argonaut (Upper Beaver, Huronia) mine 4. Anoki mine 5. Queenston (McBean) mine

Map 5. Dobie.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
50c Township of Gauthier, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Upper Canada mine

NATIVE GOLD, PYRITE, ALTAITE, PETZITE, CALAVERITE, TOURMALINE, CHALCOPYRITE, SPHALERITE, GALENA, ARSENOPYRITE, MAGNETITE, TENNANTITE, MOLYBDENITE, HEMATITE, CHLORITE, SELENITE, CELESTINE, BARITE, ANHYDRITE, GRAPHITE, TALC, EPIDOTE, LEUCOXENE, TITANITE, APATITE, SCHEELITE, CALCITE

In altered tuff, trachyte, trachyte porphyry, and syenite porphyry

Native gold occurred in fractures in silicified zones, in association with pyrite, altaite, and the gangue minerals (quartz, calcite, and feldspar). Some coarse native gold was found in the upper levels of the mine. Petzite and calaverite occurred with altaite, chalcopyrite, pyrite, and native gold in sheared porphyry. Black massive tourmaline was common in the ore zone; arsenopyrite was associated with the tourmaline. Chalcopyrite, sphalerite, galena, magnetite, tennantite, and molybdenite occurred in bluish cherty quartz. Other minerals reported from the deposit include specular hematite, chlorite, selenite, celestine, barite, anhydrite, graphite, dolomite, talc, epidote, leucoxene, titanite, apatite, scheelite, and blue calcite crystals. A kimberlite dyke intrusion into porphyritic syenite was encountered underground at the 839 m level; the rock is dark greenish grey to greenish black with a porphyritic texture and contains grains of olivine, purplish-red garnet, and phlogopite.

East Main Gold Mines Limited began underground development by sinking a shaft to 41 m in 1928. Upper Canada Mines Limited resumed development in 1936. Production began in 1938, the ore being treated at the Morris Kirkland mill; in 1939, the mill at the Upper Canada mine began operations. Mining operations ended in 1972, concluding 34 years of continuous production that resulted in the recovery of 43 491 045 g of gold and 18 341 315 g of silver from 4 216 628 t of ore. The mine was serviced by No. 1 shaft to 1920 m and No. 2 shaft to 572 m.

The mine is about 15 km east of Kirkland Lake. *See* Map 5 on page 39.

Road log from Highway 66 at **km 29.6** (*see* p. 7):

km	0	Junction, Highway 66 and Upper Canada Road; proceed northeast along Upper Canada Road.
	1.1	Junction; continue straight ahead.
	1.2	Upper Canada mine No. 1 shaft on left.
	1.9	Upper Canada mine No. 2 shaft and mill.

Refs: 37 p. 89–90; 116 p. 135–136; 193 p. 1, 4; 214 p. 277; 307 p. 70–71; 337 p. 352, 379; 346 p. 23–26; 369 p. 24, 29–34; 444 p. 334.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
50c Township of Gauthier, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Argonaut (Upper Beaver, Huronia) mine

NATIVE GOLD, PYRITE, TOURMALINE, CHALCOPYRITE, MAGNETITE, MOLYBDENITE, HEMATITE, PYRRHOTITE, TETRAHEDRITE, EPIDOTE

In volcanic rocks

Visible gold occurred in quartz-calcite veins filling fractures in volcanic rocks. Pyrite, tourmaline, chalcopyrite, and feldspar also occurred in the veins. Molybdenite, specular hematite, pyrrhotite, and tetrahedrite occurred in the orebody. A massive ore consisting of chalcopyrite, pyrite, and magnetite in cherty rocks was associated with the deposit. Basalt containing epidote and an epidote-quartz-feldspar rock suitable for lapidary purposes have been reported from the deposit.

The mine produced gold, silver, and copper. Alfred Beauregard discovered the gold-bearing veins on the west shore of Beaverhouse Lake in 1912. La Mine D'Or Huronia Limited of Trois-Rivières, Quebec, originally developed the veins between 1913 and 1916. The company sank a shaft to 31 m and put a fifteen-stamp mill in operation. The first production of gold was obtained in 1913. Argonaut Gold Mines Limited resumed production between 1919 and 1935, followed by Upper Beaver Mines Limited between 1964 and 1972. The mine workings consisted of two shallow shafts, two adits, and the production shaft and winze developed to the 381 m level. From 1965 to 1972, the ore was treated at the Upper Canada mill. Total recovery from 526 570 t of ore amounted to 4 376 472 g of gold, 1 840 271 g of silver, and 5 415 756 kg copper.

The mine is about 20 km east of Kirkland Lake. *See* Map 5 on page 39.

Road log from Highway 66 at **km 29.6** (*see* p. 7):

km	0	Junction, Highway 66 and Upper Canada Road; proceed northeast along Upper Canada Road.
	1.1	Junction; turn right.
	2.4	Junction, at Dobie; turn left (north) onto a gravel road.
	9.7	Argonaut (Upper Beaver, Huronia) mine.

Refs.: 37 p. 93–95; 112 p. 6, 10; 114 p. 28–31; 116 p. 134–135; 147 p. 76–81; 168 p. 65–76; 214 p. 277; 289 p. 73–80; 307 p. 47; 323 p. 168; 326 p. 98–99; 346 p. 3, 16–18; 444 p. 334.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
50c Township of Gauthier, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Anoki mine

NATIVE GOLD, PYRITE, CHALCOPYRITE

In altered intrusive rock

Coarse native gold occurred with pyrite and chalcopyrite. The dumps provide specimens of light greyish-green siliceous rock studded with tiny pyrite crystals (about 4 mm across) and of epidote in dark volcanic rock.

Elstone-Duncan discovered gold on this property in 1916. Elstone Kirkland Mines Limited trenched the occurrence in the same year. Additional surface exploration included work by Elstone Duncan Mines Limited (1928–1929), and by Oriole Mines Limited (1930–1932). Anoki Gold Mines Limited did some underground development from 1938 to 1940 and sank a shaft to 230 m. The investigation failed to locate economic-grade ore.

The Anoki mine is about 15 km east of Kirkland Lake, on the north side of Highway 66 at **km 30.7** (*see* p. 7). *See* Map 5 on page 39.

Refs.: 116 p. 130–131; 147 p. 82–83; 307 p. 11–12; 347 p. 13–15; 409 p. 167; 410 p. 118; 411 p. 132.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
50c Township of Gauthier, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Queenston (McBean) mine

NATIVE GOLD, PYRITE

In syenite and schistose rocks

Native gold was associated with pyrite in green and brown carbonate rock, and in quartz veins in syenite and carbonatized chlorite schist. Dolomite was the main component of the carbonate rock.

Murphy Mines Limited did the original development of the deposit in 1928 by sinking two shafts, No. 1 shaft to 198 m and No. 2 shaft to 30 m. Queenston Gold Mines Limited acquired the property in 1941, deepened No. 2 shaft to 83 m, and installed a mining plant. A mill test of 956 t of ore at the Upper Canada mill yielded 5505 g of gold and 74 025 g of silver. In 1946, the company sank another shaft to 220 m just northwest of shaft No. 2. An open-pit operation from 1984 to 1986 produced 505 762 t of ore, which yielded 1 427 628 g of gold. The open pit is known as the 'McBean pit'.

The Queenston (McBean) mine is about 16 km east of Kirkland Lake, near the village of Dobie. Access is by a 1.2 km road leading east from Highway 66 at **km 31.1** (*see* p. 7) to the McBean pit. No. 2 shaft is just north of the pit and No. 1 shaft is on the north side of the railway about 400 m to the northeast. *See* Map 5 on page 39.

Refs.: 116 p. 133–134; 134 p. 34; 214 p. 277; 307 p. 61–62; 346 p. 20–21; 354 p. 48–49; 454 p. 325–326.

Maps (T): 32 D/4 Larder Lake
(G): 32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
50c Township of Gauthier, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Raven River (Harris-Maxwell) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, CHROME MUSCOVITE, TOURMALINE, MAGNESITE, DOLOMITE

In altered syenite

Native gold occurred with pyrite, chalcopyrite, and galena in quartz-filled fractures in the host rock. Emerald-green chrome muscovite (fuchsite) occurs as masses in white quartz containing tiny prisms and finely granular aggregates of black tourmaline, amber magnesite, and white massive dolomite. Dark grey talc-chlorite schist containing small cubes of pyrite is found on the mine dumps.

This deposit was one of the earliest to be developed in the Larder Lake district and one of the most promising of the early discoveries. Spectacular ore specimens consisting of abundant visible gold in quartz enclosed in silicified dolomite were displayed in 1908 at the Toronto Star building. Harris-Maxwell Gold Mining Company Limited began surface exploration in 1907; a test shipment of 679.5 kg of ore sent to the Kingston School of Mining assayed $11.97/t. Some rich samples of ore were obtained from a pocket near the surface. A ten-stamp mill operated for a short time in the summer of 1908. The workings consisted of an open cut at the top of a hill and an adit on the shore of Larder Lake. Following a brief period of operation in 1909 by the Lucky Boy Mining Company, the property remained idle until 1913 when Associated Goldfields Mining Company Limited sank a shaft to 133 m. Between 1934 and 1939, Raven River Gold Mines Limited resumed underground development, deepening the shaft to the 152 m level from which a winze extended to 213 m. A mill operated from 1937 to 1939 recovering gold valued at $287 513 from 38 329 t of ore.

The mine is about 24 km east of Kirkland Lake and 1 km east of Larder Lake village. It is on the steep shore of Northwest Bay, Larder Lake, near Raven Beach. *See* Map 6 on page 44.

Road log from Highway 66 at **km 41.3** (*see* p. 7):

km	0	Junction of highways 66 and 624 in Larder Lake; proceed south along Highway 624.
	0.05	Intersection; turn left (east) onto Second Avenue.
	0.8	Junction; turn left (northeast) onto a single-lane road.
	0.95	End of the road at the base of a hill; follow the path up the slope for about 50 m to the Raven River (Harris-Maxwell) mine dumps and shafts at the top of the hill.

Refs.: 40 p. 216; 111 p. 10; 116 p. 139–140; 307 p. 45–46; 342 p. 76, 78–80; 396 p. 53; 403 p. 34, 514; 404 p. 344; 415 p. 227.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50b Township of McVittie, District of Timiskaming, Ontario (OGS, 1:12 000)
1947-1 Township of Hearst and portion of Township of McFadden, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

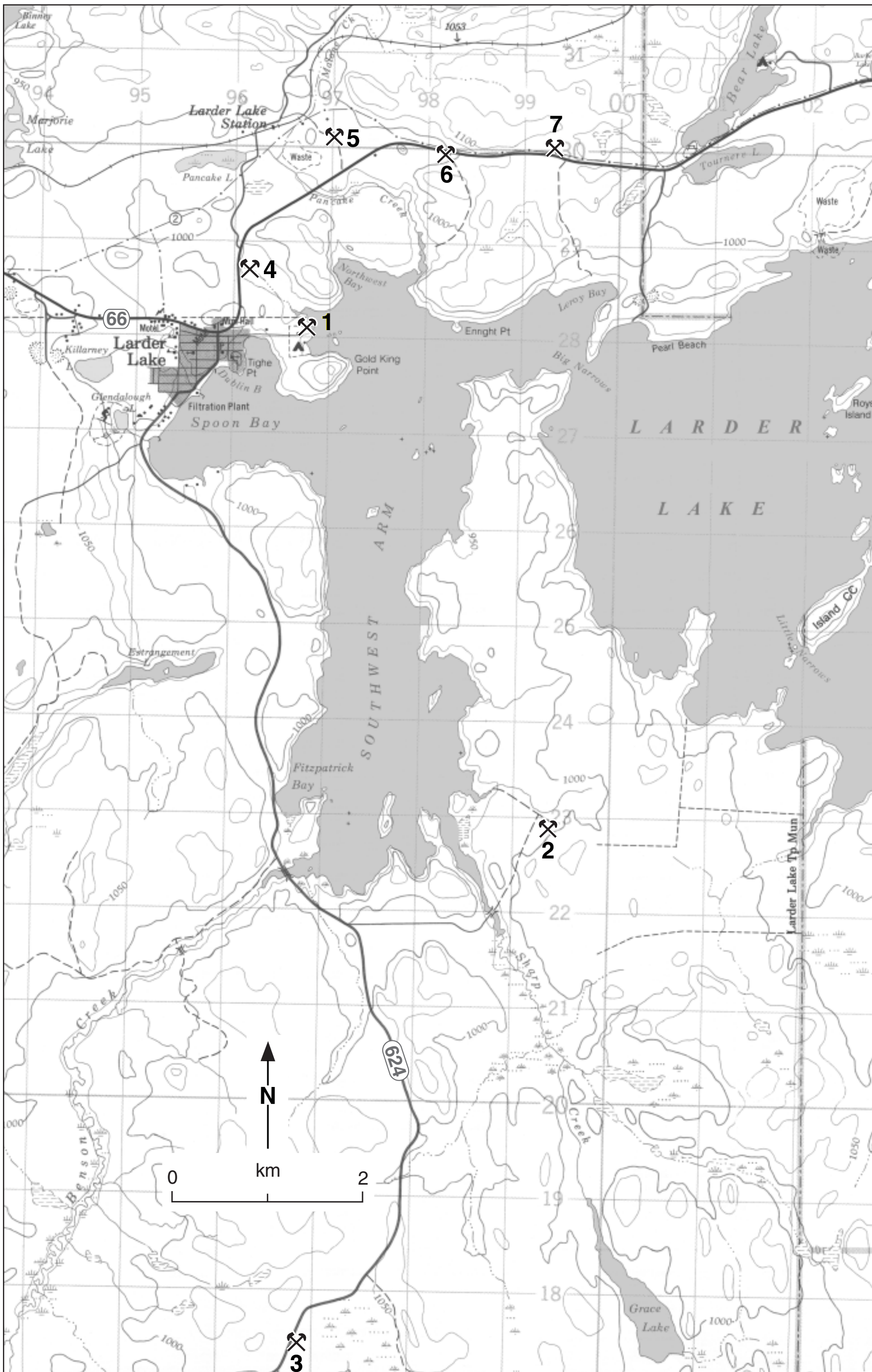
Martin-Bird mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, CHROME MUSCOVITE

In altered greywacke

Native gold occurs as grains in quartz and in association with pyrite in carbonate mudstone (altered greywacke). Chalcopyrite and galena occur in quartz. Bright green chrome muscovite (fuschite) occurs in a quartz-carbonate rock.

Part of 32 D/4



1. Raven River (Harris-Maxwell) mine 2. Martin-Bird mine
3. Manley-O'Reilly (Manor) mine 4. Laguerre mine 5. Omega mine
6. Fernland mine 7. Cheminis mine

Map 6. Larder Lake.

The Martin-Bird Syndicate began exploration of the property in 1933–1934. Between 1936 and 1939, Martin-Bird Gold Mines Limited sank two shafts to 122 m each. There was no production. In the 1980s, Long Lac Mineral Explorations Limited carried out further exploration.

The mine is about 29 km southeast of Kirkland Lake and 6 km southeast of Larder Lake village. *See* Map 6 on page 44.

Road log from Highway 66 at **km 41.3** (*see* p. 7):

km	0	Junction of highways 66 and 624 in Larder Lake; proceed south along Highway 624.
	7.5	Junction; turn left (east).
	9.1	Bridge over Sharp Creek; continue straight ahead.
	10.2	T-junction; turn right (east).
	10.5	Martin-Bird No. 1 shaft; No. 2 shaft is about 220 m to the southwest.

Refs.: 97 p. 56–58; 116 p. 140; 199 p. 97; 307 p. 54.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
1947-1 Township of Hearst and portion of Township of McFadden, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Manley-O'Reilly (Manor) mine

NATIVE GOLD, PYRITE

In porphyry and carbonate rock

Native gold occurred as small particles at the contact of porphyry and green carbonate rock, and as seams in carbonate rocks. Pyrite cubes and galena occurred in quartz.

Walter Manley discovered rock containing spectacular visible gold on the Manley-O'Reilly claim in 1919. Manley-O'Reilly Gold Mines Limited sank a shaft to 73 m in 1923–1924. In 1927, Manor Gold Mines Limited deepened the shaft to 152 m. There was no production.

The mine is about 28 km southeast of Kirkland Lake and 11 km south of Larder Lake village. *See* Map 6 on page 44.

Road log from Highway 66 at **km 41.3** (*see* p. 7):

km	0	Junction of highways 66 and 624 in Larder Lake; proceed south along Highway 624.
	7.5	Junction, road to the Martin-Bird mine; continue south along Highway 624.
	12.7	Manley-O'Reilly (Manor) mine on left, about 100 m east of the highway.

Refs.: 50 p. 24; 116 p. 166; 142 p. 34–35.

Maps (T): 32 D/4 Larder Lake
(G): 30d Boston–Skead gold area, District of Timiskaming, Ontario (OGS, 1:47 520)
1949-3 Township of Skead, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Laguerre mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, MAGNETITE

In pink syenite

Native gold occurred with pyrite, chalcopyrite, and magnetite in syenite.

The first gold discovery on this property, then known as the 'Knutson claim', was made in 1939. Laguerre Gold Mines Limited trenched the showing near the north end of Spoon Bay in 1939–1940. In 1946–1947, the company sank a shaft to 237 m on an extension of the Knutson mineralized zone 215 m farther north. No ore of economic grade was found.

The Laguerre mine is about 25 km southeast of Kirkland Lake, just north of Larder Lake village, on the east side of Highway 66 at **km 41.9** (*see* p. 7). A single-lane road, 125 m long, leads to the shaft. The Knutson claim is 215 m south of the shaft. *See* Map 6 on page 44.

Refs.: 116 p. 139–140; 307 p. 45–46; 342 p. 76–78.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50b Township of McVittie, District of Timiskaming, Ontario (OGS, 1:12 000)
1947-1 Township of Hearst and portion of Township of McFadden, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Omega mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, CHALCOPYRITE, GRAPHITE, CHROME MUSCOVITE

In sheared dacitic lava

Native gold occurred in quartz and in association with pyrite, arsenopyrite, and chalcopyrite. The host rocks were talc-chlorite schist and carbonate rock, the latter containing green chrome muscovite (fuchsite). Pyrite was the most common sulphide; arsenopyrite and chalcopyrite were relatively uncommon. Graphite was also present.

Prospector Jack Costello discovered gold on this property in 1914. The discovery vein was about 700 m east of Pancake Lake. Associated Goldfields Mining Company Limited sank a shaft to 320 m on the Costello discovery in 1922, and milled some ore in 1926–1928. Crown Reserves Mines Limited sank a new shaft to 366 m on the northern extension of the vein, 110 m to the northeast. Omega Gold Mines Limited resumed mining and milling in 1936, continuing without interruption until closure in 1947. The new shaft eventually reached a depth of 610 m. In 1983, Lenora Exploration Limited did some trenching and stripping on the property. The mine produced 1 464 878 t of ore containing 6 659 090 g of gold and 911 007 g of silver.

The Omega mine is about 25 km east of Kirkland Lake and 2 km northeast of Larder Lake village. Access is by a 0.3 km road leading north from Highway 66 at **km 43.6** (*see* p. 7). *See* Map 6 on page 44.

Refs.: 116 p. 155–156; 200 p. 139; 307 p. 58–59; 343 p. 5; 345 p. 82–87.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50a Township of McGarry, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Fernland mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, ARSENOPYRITE, SPHALERITE, CHROME MUSCOVITE

In carbonate rock

Native gold occurs with coarse-grained pyrite in green carbonate rock. Chalcopyrite, arsenopyrite, and sphalerite are also present. The host rock consists mainly of dolomite containing green chrome muscovite (fuchsite).

Initial investigation of the property consisted of drilling by Coniagas Mines Limited (1922) and by S. and J. Cohen (1923), and surface work by M.J. O'Brien Limited (1924). Fernland Gold Mines Limited continued exploration and sank a 167 m shaft in 1937–1939.

The Fernland mine is about 27 km east of Kirkland Lake and 3 km northeast of Larder Lake village. It is about 150 m south of Highway 66 at **km 44.8** (*see* p. 7). *See* Map 6 on page 44.

Refs.: 116 p. 154–155; 148 p. 20–21; 307 p. 10–11; 342 p. 53–56.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50b Township of McVittie, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Cheminis mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, CHROME MUSCOVITE, DOLOMITE, TALC

In sheared volcanic rocks

Mineralization consisted of gold-bearing pyrite and arsenopyrite. The mine dumps furnish specimens of emerald-green chrome muscovite (fuchsite) and white to pink massive dolomite; microcrystals of dolomite occur in cavities in massive dolomite. A black, lustrous, compact talc rock is found on the mine dumps.

Cheminis Gold Mines Limited discovered the deposit by drilling in 1937–1939. The exploration was stimulated by the resumption of mining operations in 1936 at the nearby Omega mine, and by the discovery of an important orebody at the Kerr-Addison mine. Underground development between 1938 and 1940 was done via a 169 m shaft. In 1991, Northfield Minerals Inc. resumed mining operations and produced two gold bars. To 1995, the mine produced 533 852 g of gold from 159 644 t of ore. In 1996, NFX Gold Inc. took over exploration and development of recently discovered ore zones.

The Cheminis mine is about 28 km east of Kirkland Lake and 4 km northeast of Larder Lake village. It is on the north side of Highway 66 at **km 45.9** (*see* p. 7). *See* Map 6 on page 44.

Refs.: 116 p. 154; 212 p. 172–173; 213 p. 7-5; 214 p. 279; 215 p. 263; 307 p. 10–11; 342 p. 5, 49–53; 461 p. 271.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
32e Kirkland–Larder area, District of Timiskaming, Ontario (OGS, 1:31 680)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50b Township of McVittie, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Barber-Larder mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, CHROME MUSCOVITE

In lava and volcanic breccia

Native gold is associated with pyrite, pyrrhotite, and some chalcopyrite. The sulphides occur as disseminated, fine-grained masses and veinlets in the host rocks. The mine dumps furnish specimens of green chrome muscovite (fuchsite) in carbonate rock.

Barber-Larder Gold Mines Limited did some development work on the deposit from 1937 to 1939. In 1942, Amalgamated Larder Mines Limited located the orebody by drilling and explored it via a 125 m shaft.

The Barber-Larder mine is about 32 km east of Kirkland Lake and 8 km northeast of Larder Lake village. It is on the south side of Highway 66 at **km 50.2** (*see* p. 7). *See* Map 7 on page 49.

Refs.: 116 p. 150–151; 342 p. 45–49.

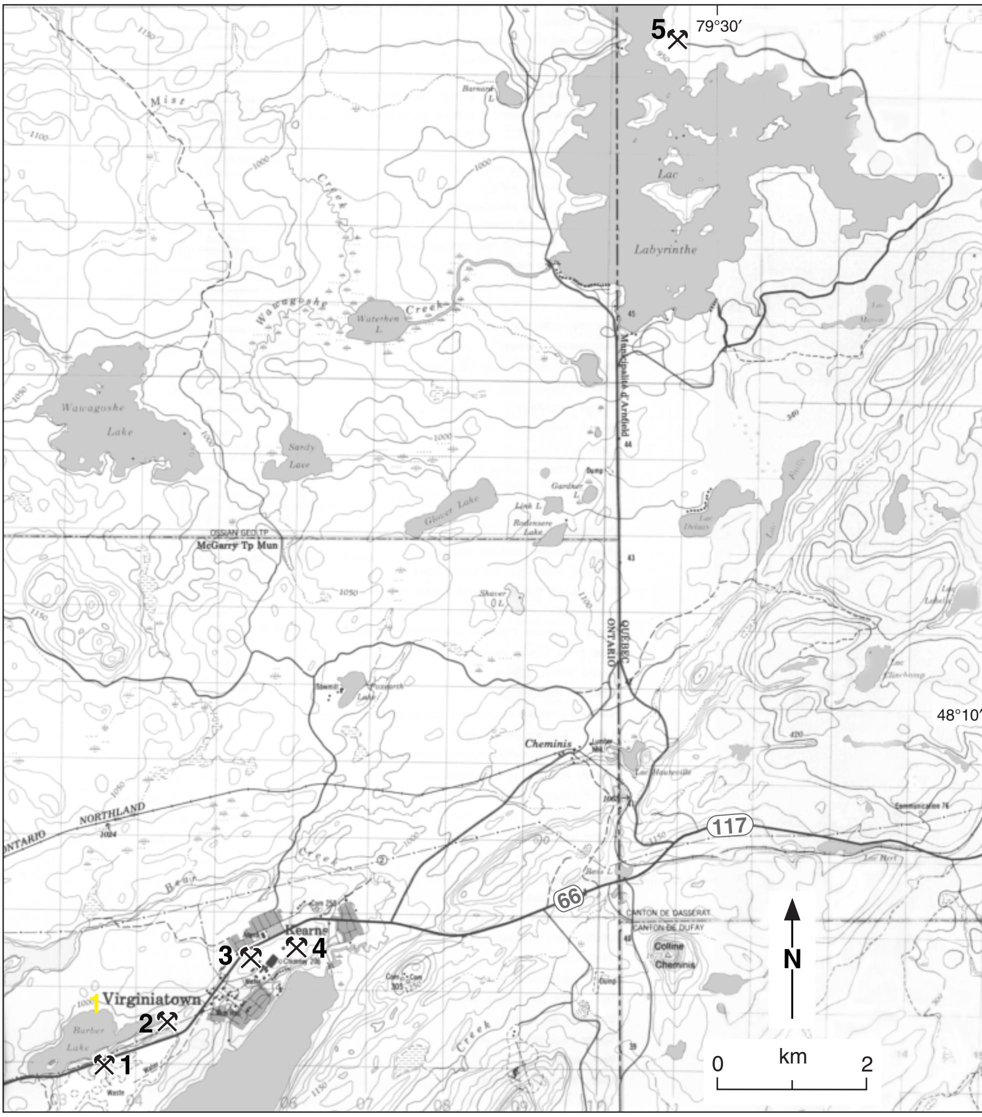
Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50a Township of McGarry, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Armistice mine

NATIVE GOLD, PYRITE, CHROME MUSCOVITE, CALCITE

In Timiskaming sedimentary rocks and Keewatin lava

Native gold is associated with pyrite in carbonate rock. Bright green chrome muscovite (fuchsite) occurs in grey quartz-carbonate rock; tiny colourless crystals of calcite occur as encrustations on the rock.



1. Barber-Larder mine 2. Armistice mine 3. Kerr (Kerr-Addison) mine
4. Chesterville mine 5. Russian Kid (Bordulac) mine

Map 7. Virginiatown.

M.T. Culbert and W. Petkethly staked the property in 1906. From 1945 to 1948, Armistice Gold Mines Limited conducted underground development via a 391 m shaft. Exploration failed to locate an economic orebody. In 1995, Armistice Resources Limited began a program of exploration and development. It deepened the shaft to 698 m and shipped a 4879 t bulk sample to the Macassa mill for processing. The sample produced 14 152 g of gold.

The Armistice mine is about 33 km east of Kirkland Lake, near the eastern end of Barber Lake, about 9 km northeast of Larder Lake village. Access is by a 0.15 km road leading north from Highway 66 at **km 51.5** (see p. 7). *See* Map 7 on page 49.

Refs.: <u>116</u> p. 150; <u>211</u> p. 4; <u>212</u> p. 174; <u>213</u> p. 7-6; <u>307</u> p. 13; <u>342</u> p. 57.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50a Township of McGarry, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Kerr (Kerr-Addison) mine

NATIVE GOLD, CHROME MUSCOVITE, CHLORITE, PYRITE, ARSENOPYRITE, CHALCOPYRITE, SPHALERITE, GALENA, SCHEELITE, MILLERITE

In green carbonate rock, sheared syenite, volcanic rocks, and talc-chlorite schist

Two types of ore occurred in this deposit. The green carbonate ore consisted of native gold in white quartz veins containing green chrome muscovite (fuchsite), chlorite, pyrite, arsenopyrite, chalcopyrite, sphalerite, and hair-like crystals of millerite. The flow-type ore consisted of lava and tuff containing native gold associated with pyrite, and traces of chalcopyrite, arsenopyrite, galena, sphalerite, and scheelite. Coarse grains and patches of native gold occurred in the white quartz containing the green muscovite, and in smoky grey quartz veins and stringers in the volcanic rocks. Massive emerald-green muscovite (fuchsite) in quartz is common in the mine dumps.

This property comprises the first claims staked in the Larder Lake area. Dr. R. Reddick of Winchester, Ontario, staked the first claim — the Annie R. claim — on July 31, 1906. The showing consisted of a large body of gold-bearing quartz exposed on the northeast arm of Larder Lake. The discovery resulted from a prospecting expedition undertaken by Dr. Reddick and his partners, Edward Flynn of Chesterville, Ontario, and John Hummel and William Knott, both of Hilliardton, Ontario. These prospectors were attracted to the district by reports of gold discoveries in the Opasatica Lake area in Quebec, and in Boston and Playfair townships in Ontario. The party staked seven claims in the area. A short time later, Dr. William Addison staked the Kerr-Addison claim. Dr. Reddick Larder Mines Limited began development on the Reddick claims in 1907. In the following year, a twenty-stamp mill operated and gold valued at $314 was recovered and used in the minting of the first gold coins in Canada. At the time, the mine consisted of a 25 m shaft and several test pits and open cuts. In 1914, Associated Goldfields acquired the Reddick and Kerr-Addison properties, but failed to locate ore. Its successor, Canadian Associated Goldfields, deepened the shaft to 99 m in 1921 with equally disappointing results. Surface and underground exploration by Kerr-Addison Gold Mines Limited in 1936–1937 outlined a large tonnage of ore. The company rushed a mill to the site and mined the deposit from 1938 to 1987. Golden Shield Resources Limited operated the mine in 1987–1990. Deak Resources Corporation (renamed ‘A J Perron Gold Corporation’ in 1994) bought it in 1990 and continued mining operations until closure in 1996. The mine was serviced by three surface shafts and one internal shaft (No. 1 shaft (218 m), No. 2 shaft (26 m), and No. 3 shaft (1218 m with an internal shaft to 1837 m)). The mine produced a total of about 36 403 816 t of ore, for a recovery of 324 884 552 g of gold and 17 930 911 g of silver. It holds the all-time record for gold production in the Kirkland Lake–Larder Lake area.

In 1992, Tundra Granite and Marble Corporation began quarrying green carbonate rock for use as a decorative stone. The quarry is adjacent to the mine shaft.

The Kerr (Kerr-Addison) mine is about 35 km east of Kirkland Lake, in Virginiatown on the south side of Highway 66. Access is by a 0.5 km road leading southeast from Highway 66 at **km 52.3** (*see* p. 7). *See* Map 7 on page 49.

Refs.: 66 p. 130; 116 p. 151–152; 148 p. 23; 197 p. 35–40; 211 p. 2; 212 p. 174; 214 p. 276; 307 p. 34–36; 317 p. 33–34, 49–55; 342 p. 5, 64–75; 362 p. 369; 396 p. 53–54; 402 p. 166; 426 p. 105; 439 p. 97–99; 444 p. 177, 178; 445 p. 184; 455 p. 199; 457 p. 147–148, 202; 462 p. 25, 126; 464 p. 27.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50a Township of McGarry, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Chesterville mine

NATIVE GOLD, CHROME MUSCOVITE, PYRITE, CHALCOPYRITE, PYRRHOTITE, MAGNETITE

In lava and carbonate rock

Native gold occurred in quartz in lava and in green dolomite-quartz rock. The green colour is due to chrome muscovite (fuschite). Pyrite was the most abundant metallic mineral present. Chalcopyrite, pyrrhotite, and magnetite were minor constituents.

J.T. Kearns of Chesterville, Ontario, found rich surface showings of native gold in 1906. In 1907–1909, Chesterville Larder Lake Gold Mining Company Limited explored the property by two 9 m shafts and some pits and trenches. The company undertook underground development in 1938 and mined the deposit until 1952. Development consisted of a shaft 854 m deep. Production amounted to 2 957 218 t of ore, which yielded 11 162 244 g of gold and 602 496 g of silver valued at $13 307 581.

The Chesterville mine is about 36 km east of Kirkland Lake and 1 km northeast of Virginiatown. Access is by a 0.3 km road leading south from Highway 66 at **km 53.7** (*see* p. 7). *See* Map 7 on page 49.

Refs.: 116 p. 151; 148 p. 23–24; 307 p. 21–22; 342 p. 59–63.

Maps (T): 32 D/4 Larder Lake
(G): 31A Larder Lake, Nipissing District, Ontario (GSC, 1:63 360)
33b Larder Lake area, District of Timiskaming, Ontario (OGS, 1:47 520)
50a Township of McGarry, District of Timiskaming, Ontario (OGS, 1:12 000)
2205 Timmins–Kirkland Lake, Cochrane, Sudbury, and Timiskaming districts (OGS, 1:253 440)

Russian Kid (Bordulac) mine

NATIVE GOLD, PYRITE, GOETHITE, SCHEELITE

In sheared diorite

Native gold occurred as visible gold, and associated with pyrite in quartz-carbonate veins. It also occurred in goethite derived from the weathering of pyrite. Scheelite occurred in quartz.

A.W. Balzimer and Mike Mitto staked the property in the fall of 1924 and immediately began exploring the vein. Trenching over 107 m revealed a very rich gold-bearing vein, which the partners referred to as the ‘Russian Kid vein’ after Balzimer, the giant-statured prospector and co-discoverer of the deposit. Erie Canadian Mines Limited did some trenching and sank two prospect shafts on the vein in 1935. In 1948–1949, Bordulac Mines Limited sank a shaft to 46 m and discovered significant tungsten mineralization. Because of the demand for tungsten, the company deepened the shaft to 98 m in 1951–1952 and conducted a program of drilling followed by geophysical surveys in 1956 and 1957. In 1972–1973, Somed Mines Limited dewatered the shaft and drove a decline 140 m toward the shaft. El Coco Explorations Limited continued underground development between 1979 and 1984, extending the decline to a total length of 909 m to the 152 m level. The company shipped 15 297 t of ore averaging 2.44 g/t gold to the Lamaque and Belmoral mills near Val-d'Or. The sample produced 14 152 g of gold.

The mine is about 42 km northeast of Kirkland Lake and 35 km west of Rouyn-Noranda. It is near the northeastern end of Labyrinth Lake. *See* Map 7 on page 49.

Road log from Highway 66 at **km 55.1** (*see* p. 7):

km	0	Junction, Highway 66 and the road to Cheminis; proceed north along the road to Cheminis.
	4.0	Junction; continue straight ahead (northeast).
	8.8	Junction; turn right (east).
	19.2	Russian Kid (Bordulac) mine.

Refs.: 61 p. 19–20; 65 p. 234–235; 143 p. 87; 271 p. 12; 425 p. 25; 431 p. 34.

Maps (T): 32 D/4 Larder Lake
(G): 50-3A Northwest Dasserat, Témiscamingue County, Quebec (GSC, 1:12 000)
271A Rouyn-Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

ROUYN-NORANDA–VAL-D'OR AREA

The mineral deposits along Highway 117 lie within the gold-producing belt of early Precambrian volcanic and sedimentary rocks extending eastward from Timmins through Kirkland Lake to and beyond Val-d'Or; they contain numerous gold-copper and copper-zinc-gold deposits. Outside this mineralized belt, the region contains deposits of molybdenum, bismuth, lithium, and beryl associated with granitic batholiths and deposits of nickel in ultrabasic rocks. Many of the early producers are now inactive.

It was the search for precious metals that initiated prospecting in the area. The early discoveries of gold mineralization were made in 1906 at Fortune Lake, in 1910 at Cadillac and Duparquet Lake, and in 1911 at Lac de Montigny. Because the attention of prospectors and developers was focused at that time on the exciting discoveries in the Porcupine district, the Rouyn-Noranda–Val-d'Or area did not undergo extensive prospecting until 1923–1924 after Ed Horne staked his discovery that became the Horne mine. During that prospecting rush, the entire Rouyn-Noranda area was staked, numerous discoveries of gold and copper-gold showings were made, and claims staked several years earlier were re-examined. Production increased successively each year from 1928 until 1942 when 32 mines in the western Quebec area accounted for the bulk of the province's output of slightly over 31 000 000 g of gold. The 1939 production of 29 600 kg from western Quebec gold mines placed the province in second position after Ontario in Canada's gold production, a position it holds today. Thirteen gold mines and seven base-metal mines operated in the Rouyn-Noranda–Val-d'Or area in 1997.

Descriptions are given for mines and occurrences accessible from Highway 117.

Refs.: 3 p. 6–8; 28; 74 p. 1–5; 85; 158 p. 126–144; 177 p. 10; 181 p. 204–206; 249 p. 15; 250 p. 28; 274 p. 4–52; 283 p. 93–105; 287 p. 10, 55; 367.

Maps (T): 32 C Senneterre
32 D Noranda-Rouyn
(G): 1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)

Lake Fortune mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SYLVANITE, PETZITE, CHROME MUSCOVITE

In shear zone in lava

Native gold occurs in quartz, and associated with pyrite, chalcopyrite, and the telluride minerals sylvanite and petzite in quartz-ankerite veins in chlorite-sericite schist. The quartz-carbonate veins contain green chrome muscovite (fuschite).

Alphonse Olier and Auguste Renaud of Ville-Marie, Quebec, discovered the deposit in 1906, the first discovery of gold mineralization in northwestern Quebec. In 1907, the discoverers formed Pontiac and Abitibi Mining Company, which excavated some pits. Underground investigation began in 1910–1911 when Union Abitibi Mining Company sank No. 1 shaft to 43 m. Towagmac Exploration Company Limited continued exploration in 1923–1933 and sank No. 2 shaft to 46 m. Lake Fortune Gold Mines Limited sank No. 3 shaft to 149 m in 1934–1935. The underground operations exposed some spectacular native gold and gold tellurides, but ore of consistent commercial grade was not located. Some gold was obtained by panning the sand. Ressources Minières Rouyn Inc. (name changed in 1988 to 'Rouyn Mining Resources Inc.' and in 1991 to 'Richmont Mines Inc.') conducted underground exploration via a ramp to the 108 m level in 1985.

The mine is about 20 km southwest of Rouyn-Noranda and 3 km west of Arntfield. *See* Map 8 on page 54.

Road log from Highway 117 at **km 74.2** (*see* p. 7):

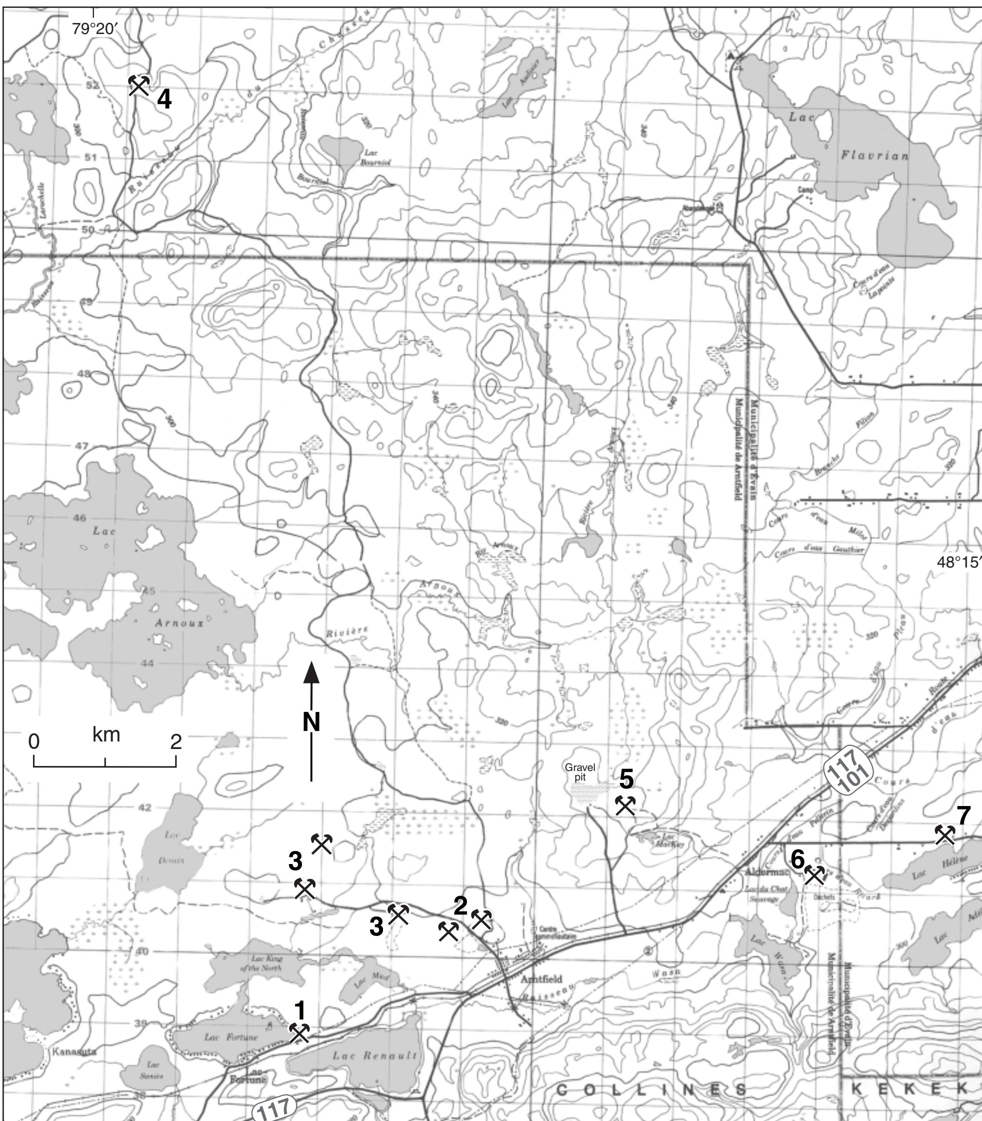
km	0	Junction, road to Lac-Fortune; proceed north along the road to Lac-Fortune.
	1.3	Junction, at Lac-Fortune; continue straight ahead along the road leading east.
	2.15	Lake Fortune shaft No. 2 on left (between the road and the shore of Fortune Lake); continue straight ahead to reach the other shafts.
	2.3	Junction. Follow the road on left leading north 300 m to shaft No. 3; continue straight ahead (east) 125 m to shaft No. 1 on the right (south) side of the road.

Refs.: 45 p. 39, 59–64; 65 p. 262–263; 83 p. 132–133; 204 p. 19–21; 272 p. 14; 452 p. 348; 458 p. 343.

Maps (T): 32 D/3 Rouyn
(G): 45-17A Western Beauchastel, Témiscamingue County, Quebec (GSC, 1:12 000)
218 Arntfield-Aldermac mines area, Township of Beauchastel (co. Témiscamingue) (MRNQ, 1:12 000)
271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)

463 Fortune Lake area, Dasserat Township, Témiscamingue County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Part of 31 D/3, 6



1. Lake Fortune mine 2. Arntfield mine 3. Francoeur (Wasamac No. 2) mine
4. Robb-Montbray mine 5. Aldermac mine 6. Wasa Lake (Wasamac No. 1) mine
7. Wingait mine

Map 8. Arntfield

Arntfield mine

NATIVE GOLD, PYRITE, HEMATITE, RUTILE, CHALCOPYRITE, EPIDOTE, TOURMALINE, CHLORITE, TALC, ORTHOCLASE

In sheared volcanic rocks, diorite, and quartz-feldspar porphyry

Native gold was associated with pyrite in quartz and in albite-carbonate veins. Hematite, rutile, and chalcopyrite occurred in massive pyrite. The dumps furnish specimens of epidote and black tourmaline in quartz, dark green chlorite associated with yellowish-green talc, grey mica, pyrite, and specular hematite in a quartz-carbonate matrix, pink granular massive calcite, and brick-red massive orthoclase.

F.S. Arntfield staked the original claim during the Rouyn prospecting rush in the autumn of 1923. Arntfield Gold Mines Limited began development of the original claim and the adjacent claims in 1929. Production began in 1935 and ended in 1942. The mine produced 480 238 t of ore, which yielded 1 731 255 g of gold and 453 637 g of silver, valued at $2 011 755. The mine workings consisted of three shafts, 76 m, 328 m, and 305 m deep. A mill at the mine site operated at a capacity of 317 t/day.

The mine is about 18 km west of Rouyn-Noranda and 1 km northwest of Arntfield. *See* Map 8 on page 54.

Road log from Highway 117 at **km 79.9** (*see* p. 8):

km	0	Junction, in Arntfield; proceed along the road leading north.
	0.3	Junction; follow the road on left leading northwest.
	0.9	Intersection; the road on right leads 380 m northeast to the Arntfield main shaft and the site of the mill. The road on left leads 150 m southwest to another shaft. The road log continues straight ahead (west).
	1.3	Old Arntfield shaft and small dump on the left (south) side of the road.

Refs.: 5 p. 22–23; 45 p. 64–73; 65 p. 270–275; 83 p. 132–134, 134–135; 131 p. 711–716; 132 p. 485–486; 271 p. 20; 402 p. 63; 405 p. 65; 421 p. 214.

Maps (T): 32 D/3 Rouyn
(G): 45-17A Western Beauchastel, Témiscamingue County, Quebec (GSC, 1:12 000)
218 Arntfield–Aldermac mines area, Township of Beauchastel (co. Témiscamingue) (MRNQ, 1:12 000)
271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Francoeur (Wasamac No. 2) mine

NATIVE GOLD, PYRITE, HEMATITE, RUTILE, CHALCOPYRITE, MELONITE, GYPSUM, ANHYDRITE

In sheared volcanic rocks, diorite, and quartz-feldspar porphyry

Native gold occurs as grains in pyrite and as fine disseminations in albite-carbonate veins. Hematite, rutile, chalcopyrite, and melonite occur in massive pyrite. Minerals in the shear zone include gypsum, anhydrite, hematite, muscovite, and carbonates. The deposit is similar to the Arntfield gold deposit and is in the western end of the Francoeur-Arntfield zone of gold-bearing sheared rocks.

The original property consisted of the Francoeur-Thomson claims staked in 1923. Exploration in 1926–1929 by Towagmac Exploration Company Limited outlined the eastern (No. 1) orebody 300 m west of the Arntfield mine. In 1936, Francoeur Gold Mines Limited discovered two more orebodies, No. 2 orebody, 550 m west of No. 1, and No. 3 orebody, 1170 m west of No. 1. The company mined the deposit from two inclined shafts 610 m apart (No. 1 shaft to 227 m and No. 2 shaft to 172 m). Production from 1938 to 1947 yielded 2 880 200 g of gold from 517 632 t of ore. Between 1967 and 1971, Wright-Hargreaves Mines Limited sank the Wasamac No. 2 shaft to 476 m on No. 3 orebody and recovered 2 173 260 g of gold from 385 652 t of ore, which were processed at the Wasamac mill at the Wasa Lake mine. In 1985, Ressources Minières Rouyn Inc. (name changed in 1988 to 'Rouyn Mining Resources Inc.') acquired the Francoeur property and discovered a new orebody 760 m northeast of No. 3 orebody. In 1991, Richmont Mines Inc. began production from the new orebody via the 823 m Jean Rivard shaft. The mine has been in production since 1988.

The mine is about 20 km west of Rouyn-Noranda and 2 km northwest of Arntfield. *See* Map 8 on page 54.

Road log from Highway 117 at **km 79.9** (*see* p. 8):

km	0	Junction, in Arntfield; proceed along the road leading north.
	0.3	Junction; follow the road on left.
	0.9	Junction, road to the Arntfield mine; continue straight ahead.
	1.7	Francoeur (Wasamac No. 2) mine. The old shafts are on the south side of the road. The road continues west to the main operations.

Refs.: 5 p. 22–23; 45 p. 64–73; 65 p. 270–275; 72 p. 35–54; 73 p. 1664–1672; 83 p. 132–134, 134–135; 131 p. 711–716; 132 p. 485–486; 204 p. 24–26; 271 p. 20; 272 p. 14; 276 p. 11; 402 p. 63; 405 p. 65; 417 p. 64–65; 421 p. 214; 422 p. 80; 441 p. 371; 456 p. 402; 457 p. 343; 459 p. 310.

Maps (T): 32 D/3 Rouyn
(G): 45-17A Western Beauchastel, Témiscamingue County, Quebec (GSC, 1:12 000)
218 Arntfield–Aldermac mines area, Township of Beauchastel (co. Témiscamingue) (MRNQ, 1:12 000)
271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Robb-Montbray mine

CHALCOPYRITE, PYRITE, PYRRHOTITE, SPHALERITE, CHALCOCITE, NATIVE GOLD, ALTAITE, TELLUROBISMUTHITE, KRENNERITE, PETZITE, COLORADOITE, MELONITE, FROHBERGITE, MONTBRAYITE

In altered rhyolite

Chalcopyrite occurred as a replacement of chlorite in silicified and chloritized rhyolite. Pyrite, pyrrhotite, sphalerite, and chalcocite were minor constituents of the ore. Native gold occurred with microscopic intergrowths of the telluride minerals, altaite, tellurobismuthite, krennerite, petzite, coloradoite, melonite, frohbergite, and montbrayite. A pocket containing 5 kg of massive gold and gold tellurides was found during underground exploration. The deposit contained two new mineral species, frohbergite and montbrayite. Frohbergite occurred as microscopic patches in intergrowths of other telluride minerals; it was named in honour of mining geologist Dr. M.H. Frohberg of Toronto, Ontario. Montbrayite, named for the mine and the township in which it occurs, was found as coarsely crystallized aggregates with other telluride minerals.

J.M. Robb discovered and staked the property for Quebec Prospectors Limited in 1924. Nipissing Mines Company Limited explored the deposit from 1925 to 1929 and sank a shaft to 172 m. In 1934–1935, Robb-Montbray Mines Limited investigated the deposit and shipped 1106 t of copper-zinc-silver-gold ore to the Noranda smelter. Between 1958 and 1962, Inmont Copper Mines Limited installed a new headframe and conducted an underground investigation.

The mine is about 25 km northwest of Rouyn-Noranda and 14 km northwest of Arntfield. *See* Map 8 on page 54.

Road log from Highway 117 at **km 79.9** (*see* p. 8):

km	0	Junction, in Arntfield; proceed along the road leading north.
	0.3	Junction; follow the road on right leading northeast.
	7.0	Junction, road on left; continue straight ahead (east).
	17.6	Robb-Montbray mine.

Refs.: 65 p. 224–227; 83 p. 112–113; 145 p. 27–28; 332 p. 86; 337 p. 346, 352, 359, 360, 364, 368, 369, 380; 339 p. 11–14; 434 p. 115.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1535 Southeast quarter of Montbray Township, Rouyn-Noranda County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Aldermac mine

PYRITE, MAGNETITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, CHLORITOID, TREMOLITE, EPIDOTE, HORNBLENDE, DEVILLINE, BROCHANTITE, GYPSUM, GOETHITE

In rhyolite, tuff, and agglomerate

The ore consisted of massive pyrite and pyrrhotite with smaller amounts of magnetite, chalcopyrite, and sphalerite. Quartz, calcite, epidote, chlorite, titanite, and amphibole were associated with the ore minerals. Chloritoid was found in magnetite. Tremolite occurred as a replacement of quartz and chlorite. The rock dumps furnish specimens of epidote and black tourmaline in quartz, and secondary minerals including greenish-blue devilline, bright green brochantite, white gypsum, and rusty brown goethite occurring as coatings and encrustations on ore specimens. A buff-coloured porphyritic rhyolite suitable for lapidary purposes occurs at the mine; it is composed of lath-shaped oligoclase feldspar in a fine-grained matrix of feldspar, quartz, and sericite. Fragments of this rock are found in gravel pits in the vicinity of the mine.

The mine is a former producer of copper, gold, silver, and sulphur. A.A. MacKay and W.P. Alderson staked the deposit in the winter of 1923. In 1926, Towagmac Exploration Company Limited located an economic orebody by drilling and underground exploration. Aldermac Mines Limited undertook development of the deposit in 1927 and operated a concentrating mill in 1932 to produce copper and pyrite concentrates. From 1937 to 1943, Aldermac Copper Corporation Limited worked the deposit from a shaft 496 m deep. The mine produced 28 041 t of copper, 332 024 g of gold, 12 102 177 g of silver, and 518 296 t of pyrite concentrates.

The mine is about 13 km west of Rouyn-Noranda and 3 km northeast of Arntfield. It is just east of a large gravel pit. *See* Map 8 on p 54.

Road log from Highway 117 at **km 81.7** (*see* p. 8):

km	0	Junction, road leading to a gravel pit; proceed north along this road. A small rock dump and the site of the filter plant are on the north side of Highway 117 at this junction.
	0.9	Junction; turn right (east).
	1.5	Junction; continue straight ahead (northeast).
	1.9	Aldermac mine.

An alternate route is via a 2 km road leading northwest from Highway 117 at **km 83.6**.

Refs.: 5 p. 21; 13 p. 44; 45 p. 74–86; 53 p. 1–5; 65 p. 175–183; 139 p. 719–725; 150 p. 131–135.

Maps (T): 32 D/3 Rouyn
(G): 45-17A Western Beauchastel, Témiscamingue County, Quebec (GSC, 1:12 000)
218 Arntfield–Aldermac mines area, Township of Beauchastel (co. Témiscamingue) (MRNQ, 1:12 000)
271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Wasa Lake (Wasamac No. 1) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, CHROME MUSCOVITE, HEMATITE, EPIDOTE

In sheared volcanic rocks

Gold-bearing pyrite occurred in quartz, carbonate, and chlorite. Chrome muscovite (fuchsite), epidote, and hematite were less common, and visible gold was very rare.

La Mine d'Or Champlain Limited discovered gold on this property in 1936 and explored the deposit via a 67 m shaft. Between 1944 and 1950, Wasa Lake Gold Mines Limited located a gold-bearing shear zone and sank a shaft to 385 m. Wasamac Mines Limited extended the underground workings to 412 m and began production in 1965. A mill, brought in from the Bicroft mine in the Bancroft, Ontario area, operated until the mine closed in 1971. The mine produced 7 906 538 g of gold and 136 291 g of silver.

The mine is about 13 km southwest of Rouyn-Noranda and 4 km northeast of Arntfield. *See* Map 8 on page 54.

Road log from Highway 117 at **km 84.2** (*see* p. 8):

km	0	Junction; proceed east along the road toward Hélène Lake.
	0.3	Turn right (south) onto the mine road.
	1.0	Wasa Lake (Wasamac No. 1) mine.

Refs.: 5 p. 23–21; 113 p. 730–733; 399 p. 47; 425 p. 110; 440 p. 343–344; 443 p. 396–397.

Maps (T): 32 D/3 Rouyn
(G): 45-17A Western Beauchastel, Témiscamingue County, Quebec (GSC, 1:12 000)
218 Arntfield–Aldermac mines area, Township of Beauchastel (co. Témiscamingue) (MRNQ, 1:12 000)
271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
464 Wasa Lake area, Beauchastel Township, Témiscamingue County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Wingait mine

NATIVE GOLD, PYRITE, CHLORITE

In rhyolite

Native gold and pyrite occur in a carbonate-quartz zone in sheared rhyolite. Chlorite is also present.

Wingait Gold Mines Limited located a gold-bearing zone during exploration from 1944 to 1947. Development consisted of a 10 m shaft.

The mine is about 11 km west of Rouyn-Noranda and 6 km northeast of Arntfield. It is just north of Hélène Lake. *See* Map 8 on page 54.

Road log from Highway 117 at **km 84.2** (*see* p. 8):

km	0	Junction; proceed east along the road toward Hélène Lake.
	0.3	Turnoff to the Wasa Lake (Wasamac No. 1) mine; continue straight ahead.
	2.4	Wingait mine on left, about 120 m north of the road.

Refs.: 155 p. 19–20; 399 p. 48.

Maps (T): 32 D/3 Rouyn
(G): 45-17A Western Beauchastel, Témiscamingue County, Quebec (GSC, 1:12 000)

218 Arntfield–Aldermac mines area, Township of Beauchastel (co. Témiscamingue) (MRNQ, 1:12 000)
271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
464 Wasa Lake area, Beauchastel Township, Témiscamingue County (MRNQ, 1:9600)
1106A Southeast Beauchastel Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Elder (Peel-Elder) mine

NATIVE GOLD, PYRITE, HEMATITE, CHALCOPYRITE, GALENA, MOLYBDENITE, QUARTZ CRYSTALS

In granite

The ore consisted of pyrite with minor amounts of specular hematite, chalcopyrite, galena, and molybdenite in quartz veins. Native gold occurred in fractures in bluish cherty quartz. The mine dumps furnish specimens of massive quartz containing cavities lined with crystals of quartz and pyrite.

O'Leary Malartic Mines Limited discovered a gold-bearing zone during surface exploration in 1933. In 1944, Elder Gold Mines Limited began an extensive program of drilling followed by underground development. Mining from 1946 to 1966 produced a shipment of about 2 154 565 t of siliceous gold ore to the Noranda smelter; gold recovery amounted to 10 834 356 g. In 1989, Aunore Resources Inc. produced a small amount of gold. The workings consisted of two shafts, 381 m and 762 m deep; the shafts are about 750 m apart.

The mine is about 8 km northwest of Rouyn-Noranda and 5 km north of Évain. *See* Map 9 on page 61.

Road log from Highway 117 at **km 91.1** (*see* p. 8):

km	0	Junction, in Évain; proceed along the road leading north.
	3.6	Junction; continue straight ahead (north).
	5.2	Elder (Peel-Elder) mine.

Refs.: 61 p. 2, 5; 152 p. 7–10; 275 p. 14; 427 p. 69; 438 p. 263; 457 p. 61.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

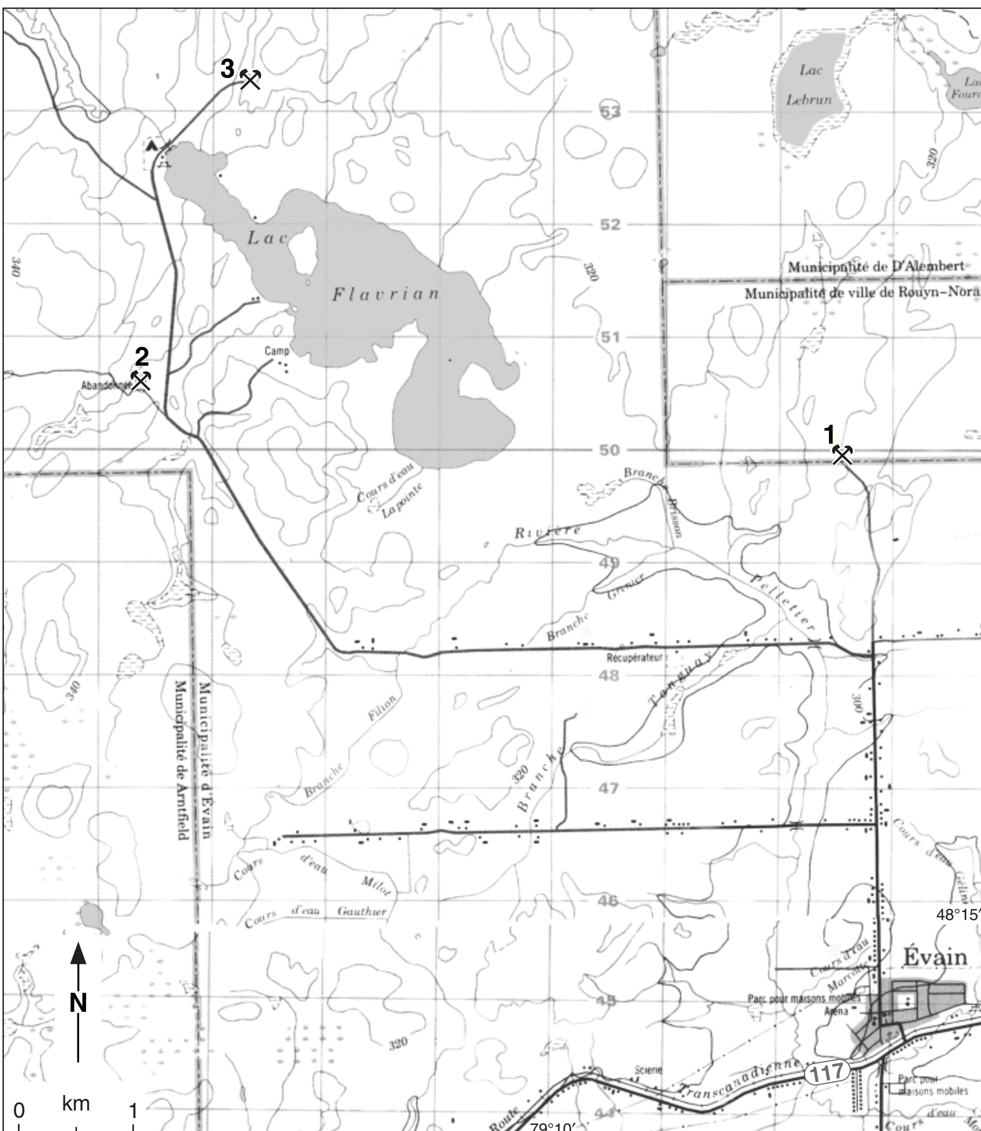
Quesabe mine

NATIVE GOLD, PYRITE, CALCITE, CHLORITE, EPIDOTE

In volcanic rocks

Native gold was associated with pyrite in quartz lenses and in the host rock; visible gold was rare. The dumps furnish specimens of coarsely cleavable white calcite (fluoresces bright pink when exposed to long ultraviolet rays), pink massive calcite, chlorite, epidote, and pyrite.

Part of 32 D/3, 6



1. Elder (Peel-Elder) mine 2. Quesabe mine 3. Eldrich (Pierre Beauchemin) mine

Map 9. Évain north

Birrell Gold Mines Limited did the original surface exploration in 1934. Other operators, including Flavrian Gold Mines Limited and Payco Gold Mines Limited, were involved in intermittent exploration and development until 1946 when Quesabe Mines Limited undertook mining operations. From 1950 to 1952, the mine produced about 885 000 g of gold from 103 000 t of ore. Development consisted of two shafts, 194 m and 320 m deep. A mill operated at the mine site.

The mine is about 16 km northwest of Rouyn-Noranda and 9 km northwest of Évain. It is just west of Flavrian Lake. *See* Map 9 on page 61.

Road log from Highway 117 at **km 91.1** (*see* p. 8):

km	0	Junction, in Évain; proceed along the road leading north.
	3.6	Junction; turn left (west).
	11.0	Junction, at a bend in the road. Follow the mine road on left leading northwest. (The main road bends northward.)
	11.6	Quesabe mine.

Refs.: 61 p. 33–34; 69; 83 p. 115; 130 p. 413–415; 291 p. 13–14; 332 p. 86–87.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
510 Flavrian Lake area, Abitibi and Témiscamingue counties (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Eldrich (Pierre Beauchemin) mine

NATIVE GOLD, PYRITE, CALCITE, CHLORITE, EPIDOTE, STILPNOMELANE, AMPHIBOLE

In granitic and dioritic rocks

Native gold was associated with pyrite in quartz veins. The rock dumps provide specimens of pyrite, chlorite, white calcite (fluoresces pink under long ultraviolet rays), and epidote. Stilpnomelane occurs with chlorite and radiating aggregates of amphibole. An ornamental rock consisting of epidote in pink to red granite is common in the dumps; the rock takes a good polish.

Capital Rouyn Gold Mines Limited did the original exploration in 1927–1929. The work consisted of trenches and a 15 m shaft sunk on chalcopyrite-gold-quartz veins. In 1938, A. Mondoux discovered pyrite-gold-quartz veins. Boulder Hill Mines Limited explored these veins in 1945–1947. Eldrich Mines Limited undertook development of the deposit in 1951. Production from 1955 to 1962 amounted to 3 112 663 g of gold from 650 912 t of ore. The mine was serviced by a 324 m shaft and the ore was processed at the Noranda smelter. Cambior Inc. acquired the property in 1987, deepened the shaft to 580 m, and began production in 1988. Operations ended in 1993. During this period, the mine produced about 4 794 000 g of gold and 639 000 g of silver.

The mine is about 17 km northwest of Rouyn-Noranda and 10 km northwest of Évain. It is just north of Flavrian Lake. *See* Map 9 on page 61.

Road log from Highway 117 at **km 91.1** (*see* p. 8):

km	0	Junction, in Évain; proceed along the road leading north.

	3.6	Junction; turn left (west).
	11.0	Junction, road to Quesabe mine; continue north along the main road.
	12.8	Junction; follow the road on right.
	14.3	Eldrich (Pierre Beauchemin) mine.

Refs.: 17 p. 7–8; 83 p. 116; 257 p. 92; 266 p. 211–219; 276 p. 10–11; 278 p. 13; 376 p. 13–14; 427 p. 70; 435 p. 58–59.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
510 Flavrian Lake area, Abitibi and Témiscamingue counties (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-08 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Durbar (Huronian Belt) mine

PYRITE, ARSENOPYRITE, NATIVE GOLD, CHROME MUSCOVITE, TOURMALINE, CHLORITE

In rhyolite

Pyrite occurs as grains and small cubes in quartz-calcite-feldspar veins. Arsenopyrite is associated with pyrite. Native gold occurs in the veins and in a chrome muscovite (fuschite)-quartz-carbonate zone in talc schist exposed in the open pit. Black tourmaline and chlorite occur in quartz.

Huronian Belt Mining Company Limited staked the deposit in 1922. The company explored the property between 1923 and 1925 by several pits and trenches and a 14 m shaft. Normont Gold Mines Limited sank a shaft to 30 m in 1933–1934. Durbar Gold Mines Limited did some surface exploration in 1936. Between 1979 and 1991, Augmitto Explorations Limited deepened the shaft to 270 m, drove a ramp 1676 m to the 182 m level, and mined some ore from an open pit, 250 m long and 94 m wide. The company brought the mill from the Langmuir mine in Timmins to the site.

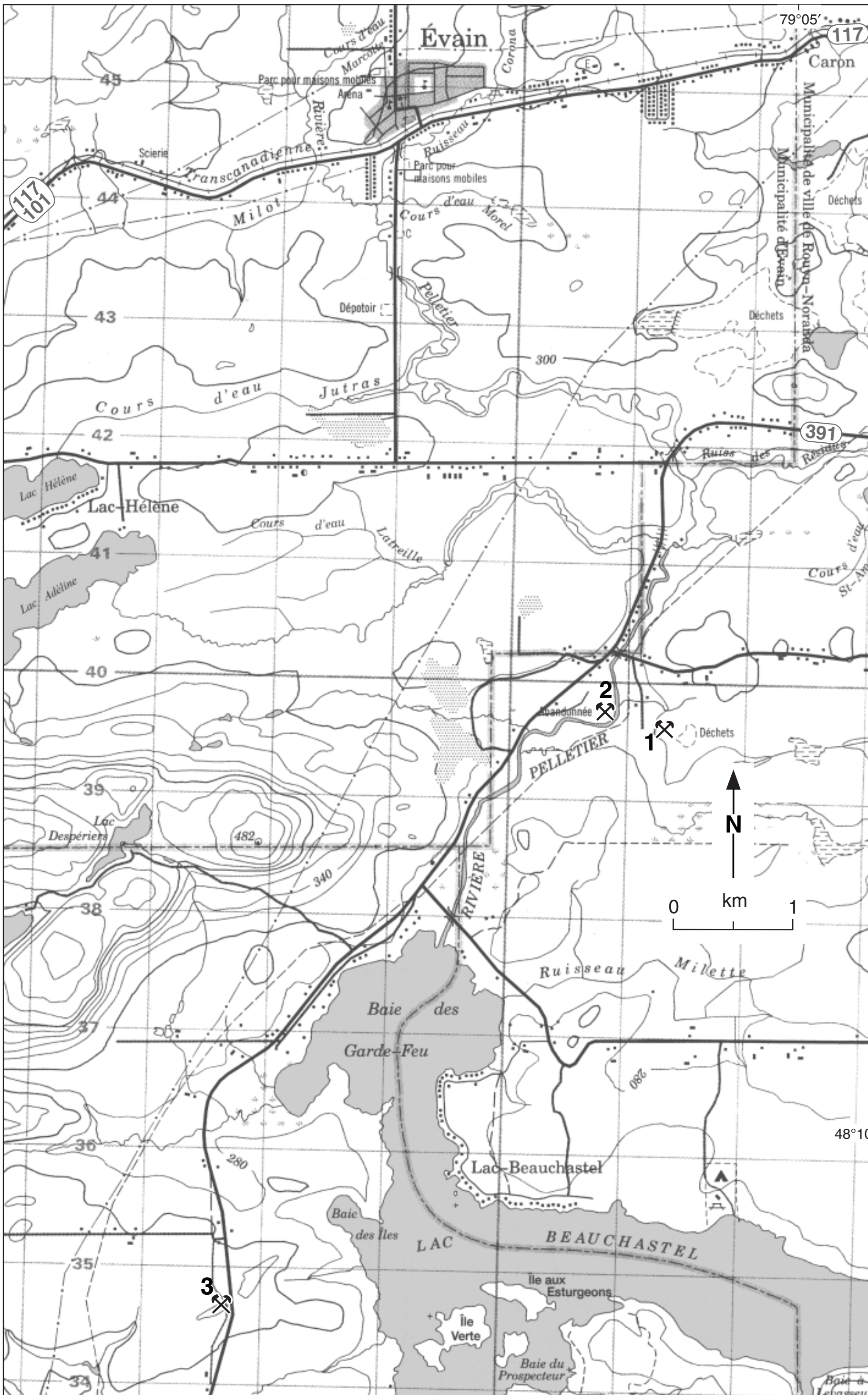
The mine is about 7 km southwest of Rouyn-Noranda and 5 km southeast of Évain. *See* Map 10 on page 64.

Road log from Highway 117 at **km 91.1** (*see* p. 8):

km	0	Junction, in Évain; proceed along the road leading south.
	2.8	T-junction; turn left (east).
	5.1	Junction, Highway 391; turn right (south).
	6.7	Junction; turn left onto a road leading east.
	6.95	Junction; turn right (south) onto the mine road.
	7.6	Durbar (Huronian Belt) mine. The original shaft is about 800 m to the northeast.

Refs.: 65 p. 275–276; 83 p. 146; 137 p. 52–55; 151 p. 68; 270 p. 14–15; 276 p. 15; 399 p. 56–59; 453 p. 50; 456 p. 53.

Part of 32 D/3



1. Durbar (Huronian Belt) mine 2. Riverside (Bazooka) mine
3. Canada Black Granite quarry

Map 10. Évain south

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1106A Southeast Beauchastel Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Riverside (Bazooka) mine

PYRITE, TOURMALINE, NATIVE GOLD, CHLORITE

In sheared andesite

Some visible gold occurs in quartz. Pyrite, tourmaline, and chlorite occur in quartz-carbonate veins.

The property was originally known as the 'McDonough claim'. Riverside Gold Mines Limited explored the vein in 1935. In 1951, D'Eldona Gold Mines Limited sank a shaft to 125 m.

The mine is about 8 km southwest of Rouyn-Noranda and 5 km south of Évain. *See* Map 10 on page 64.

Road log from Highway 117 at **km 91.1** (*see* p. 8):

km	0	Junction, in Évain; proceed along the road leading south.
	2.8	T-junction; turn left (east).
	5.1	Junction, Highway 391; turn right (south).
	6.7	Junction, road on left leading east; continue along Highway 391.
	7.5	Junction; turn left (east) onto the mine road.
	7.9	Riverside (Bazooka) mine.

Refs.: 137 p. 55; 151 p. 4–8; 399 p. 54–56.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1106A Southeast Beauchastel Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Canada Black Granite quarry

GABBRO

In dyke cutting Precambrian sedimentary rocks

The gabbro is fine to medium grained and composed of labradorite, augite, and magnetite with some olivine. It takes a high polish exhibiting a uniform distribution of black, bluish-grey, and light grey tones. It was known commercially as 'black granite' and was used as a monument stone. The gabbro occurs in a dyke, about 150 m wide, extending southwesterly from Beauchastel (KeKeKo) Lake almost to Baie à l'Orignal on the east side of Opasatica Lake.

Canada Black Granite Company Limited opened the quarry in 1950 and worked it for a few years.

The quarry is about 13 km southwest of Rouyn-Noranda and 10 km south of Évain. *See* Map 10 on page 64.

Road log from Highway 117 at **km 91.1** (*see* p. 8):

km	0	Junction, in Évain; proceed along the road leading south.
	2.8	T-junction; turn left (east).
	5.1	Junction; turn right (south) onto Highway 391.
	12.6	Junction; follow the road on right.
	13.8	Junction, quarry road; turn right (west).
	13.95	Canada Black Granite quarry.

Ref.: 52 p. 73–75.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1106A Southeast Beauchastel Township, Témiscamingue County, Quebec (GSC, 1:18 000)

Horne mine

PYRITE, CHALCOPYRITE, PYRRHOTITE, SPHALERITE, MAGNETITE, ALTAITE, NATIVE GOLD, ELECTRUM, HESSITE, PETZITE, SYLVANITE, KRENNERITE, CALAVERITE, TELLUROBISMUTHITE, RICKARDITE, KLOCKMANNITE, UMANGITE, GALENA, TETRAHEDRITE, EPIDOTE, CLINOZOISITE, CHLORITE, OTTRELITE

In siliceous, chloritized, and sericitized rhyolite

The massive-sulphide ore consisted of pyrite, chalcopyrite, pyrrhotite, sphalerite, and magnetite. Also present were native gold and electrum, the tellurides hessite, petzite, sylvanite, krennerite, calaverite, altaite, tellurobismuthite, and rickardite, and the selenides klockmannite and umangite. Galena and tetrahedrite have been reported. Epidote, clinozoisite, chlorite, and ottrelite occur in the host rocks.

Edmund Henry Horne discovered the deposit as an outcrop of rusty weathered sulphide-bearing rock in 1917 after prospecting the area in 1911 and 1914. On September 11, 1920, he and his partner, Ed Miller, staked the claims that became the Noranda mine; the claims were staked on behalf of the Tremoy Lake Prospecting Syndicate that was formed in New Liskeard to finance prospecting in adjacent parts of Quebec. In 1922, Noranda (Northern Canada) Mines Limited was incorporated to develop the property. The mine produced continuously from 1927 to 1976. The workings consisted of five surface shafts and two internal shafts to 1836 m and 2440 m. A

Plate 8

Horne mine, 1924. National Archives Canada PA 13660

concentrator, smelter, and cyanide mill operated at the mine site. The mine produced 1 179 100 t of copper, 311 030 kg of gold, 693 597 kg of silver, 4 535 000 t of pyrite, and some selenium and tellurium, from 5 378 807 t of ore. Mining operations in 1985–1989 from an open pit and from underground produced auriferous flux from mineralized rhyolite for use in the Noranda (Horne) smelter.

The Horne mine site is in Parc Industriel (Secteur Noranda) in Rouyn-Noranda. *See* Map 11 on page 68.

Refs.: 13 p. 30–35; 115 p. 29–30; 141 p. 41–44; 165 p. 153–161; 245 p. 13–14; 287 p. 25; 337 p. 349, 352, 354, 356, 359, 362, 369, 380; 361 p. 35–38; 398 p. 82–98; 444 p. 244, 246; 445 p. 251–252; 448 p. 231.

Maps (T): 32 D/6 Rivière Kanasuta

(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)

453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)

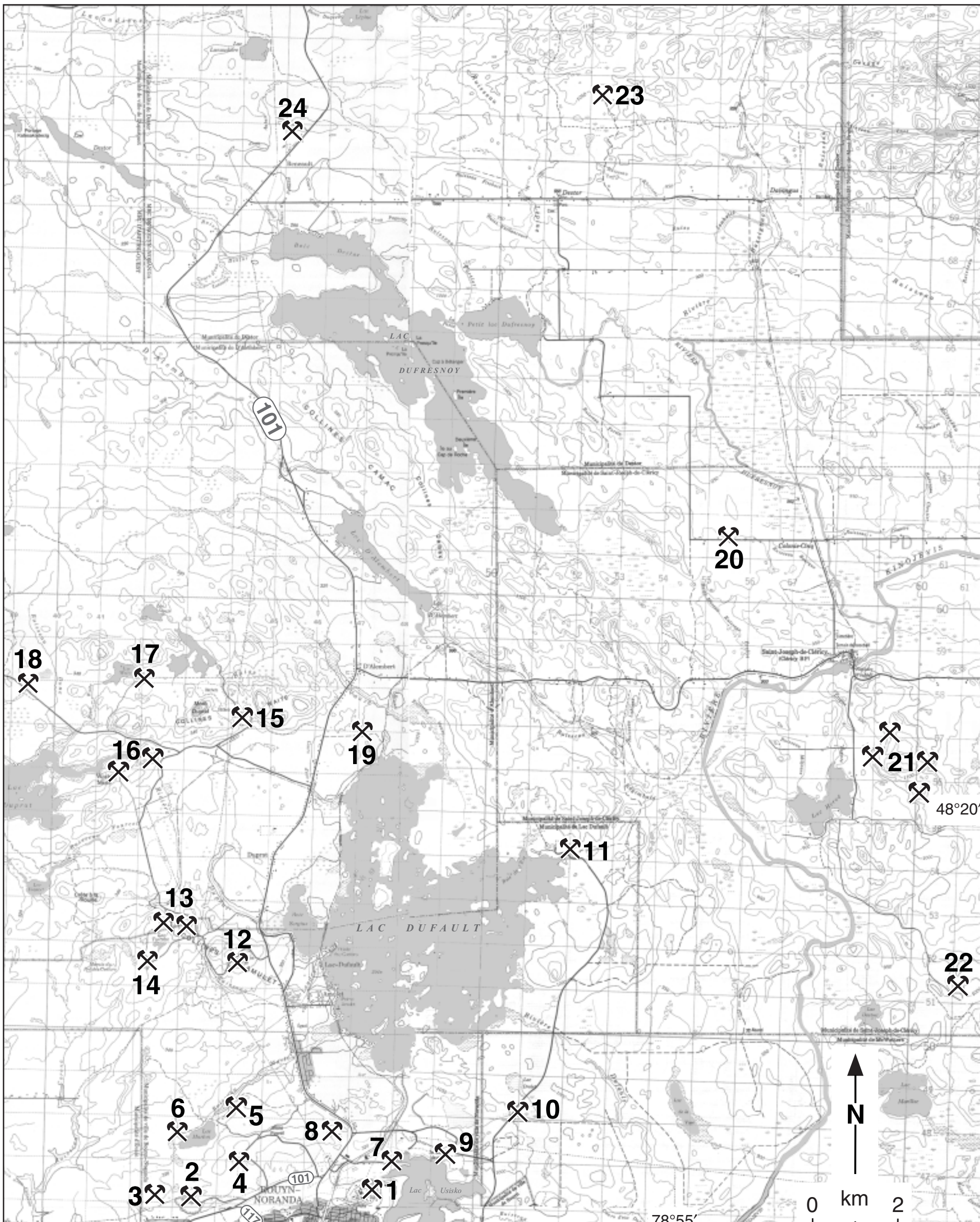
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)

M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Mines along highways 101 north and 111

Collecting localities along Highway 101 to Macamic and Highway 111 from Macamic to Normétal are described in the follows pages. The starting point is the junction of highways 117 and 111 at **km 96.9** (*see* p. 8) at the west end of Rouyn-Noranda.

Part of 32 D/2, 3, 6, 7



1. Horne mine 2. Don Rouyn mine 3. Silidor mine 4. Powell Rouyn mine 5. Pontiac Rouyn (Anglo Rouyn) mine 6. Marlon Rouyn (New Marlon) mine 7. Quemont mine 8. Joliet mine 9. Donalda (Kerralda) mine 10. D'Eldona (Delbridge) mine 11. MacDonald (Gallen) mine 12. Millenbach mine 13. Amulet mine 14. Corbet mine 15. Norbec (Lake Dufault) mine 16. Waite-Ackerman-Montgomery (Old Waite) mine 17. Vauze mine 18. Ansil mine 19. Newbec mine 20. Mobrun (Bouchard-Hébert) mine 21. Harvie (Archean) mine 22. LeRoy (Roybell, Claremont) mine 23. Vezina (Thurbois) mine 24. Duquesne mine

Map 11. Rouyn-Noranda north.

Don Rouyn mine

NATIVE GOLD, CHALCOPYRITE, PYRITE, MOLYBDENITE, BORNITE

In granitic rocks

Native gold was associated with chalcopyrite, bornite, pyrite, molybdenite, and hematite in quartz-ankerite veins. Granite containing epidote and chlorite is found in the mine dumps.

Don Rouyn Mines Limited explored the deposit between 1925 and 1929 by several surface openings and a 30 m shaft. The exploration failed to reveal economic ore. From 1958 to 1980, Noranda Mines Limited mined silica from an open pit near the old shaft. The silica was used as flux in the Noranda smelter.

The mine is about 2 km west of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	0.3	Junction; turn left (west) onto Don Rouyn Road.
	1.5	Don Rouyn mine.

Refs.: <u>65</u> p. 228–229; <u>83</u> p. 155–156; <u>160</u> p. 72–75; <u>239</u> p. 178; <u>398</u> p. 144–145.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Silidor mine

NATIVE GOLD, PYRITE, CHROME MUSCOVITE, CHALCOPYRITE, GALENA, SPHALERITE, PYRRHOTITE, MOLYBDENITE, HESSITE, GOETHITE, HEMATITE, COVELLITE, CHALCOCITE, MALACHITE

In altered tonalite

Native gold occurred as fine grains in quartz, pyrite, and in carbonates associated with carbonate-chrome muscovite (fuchsite) breccia and hematized tonalite. Chalcopyrite, galena, sphalerite, pyrrhotite, molybdenite, and hessite occurred as traces in quartz. Hematite (specularite) occurred as fine veinlets in the host rock. Oxidized zones contained goethite, hematite, covellite, chalcocite, and malachite.

The deposit was discovered in 1985 as a result of drilling. Cogesco Mining Resources Inc. outlined the orebody in 1986–1987. Mines Silidor Inc. undertook development in 1988. Production began in 1989–1990 from a 560 m shaft. The mine produced about 12 313 kg of gold and 2194 kg of silver from 1989 to 1995.

The mine is about 2 km west of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	0.3	Junction; turn left (west) onto Don Rouyn Road continung past the Don Rouyn mine.
	2.4	Silidor mine.

Refs.: 108 p. 12, 13; 239 p. 175–183; 277 p. 13, 14; 375 p. 12, 13; 458 p. 82, 272; 462 p. 77, 190; 463 p. 85, 210.

Maps (T): 32 D/6 Rivière Kanasuta
(G) 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Powell Rouyn mine

PYRITE, NATIVE GOLD, TETRADYMITE, CHALCOPYRITE, HEMATITE, MARCASITE, CHROME MUSCOVITE, SPHALERITE, GUNNINGITE, EPIDOTE, CHLORITE, CALCITE, SIDERITE, JAROSITE

In granite and diabase

Mineralization consisted mainly of gold-bearing pyrite in quartz veins. Free gold in the native state was rare. Tetradymite occurred as stringers associated with chlorite, pink calcite crystals, pyrite, and native gold. Chalcopyrite, specular hematite, and marcasite were associated with pyrite. Green chrome muscovite (fuchsite) has been reported from this deposit. Specimens available from the dumps include brown sphalerite coated with white gunningite, epidote as microcrystals in cavities in massive quartz-epidote rock, chlorite associated with epidote, white massive calcite that fluoresces deep pink under long ultraviolet rays, dark brown siderite, platy specular hematite, pyrite as cubes in quartz and in siderite, and yellow powdery jarosite on ore specimens.

Tom W. Powell discovered the gold mineralization in 1922. The discovery of gold-bearing quartz veins on this property and on the nearby Horne claim sparked the prospecting rush in the Rouyn district in the following year. Early exploration of the Powell deposit was conducted by the Chadbourne-Thompson Syndicate (1923), Nipissing Mining Company (1923–1924), and Powell Mining Properties Limited (1927–1931), who shipped some gold-bearing ore from a weathered outcrop to the Noranda smelter. In 1933, Powell Rouyn Gold Mines Limited undertook underground development and produced siliceous gold ore from 1937 to 1955. The ore was used as a direct-fluxing ore for the Noranda Mines Limited copper smelter. Production amounted to 11 841 814 g of gold and 544 956 g of silver from 2 797 775 t of ore. The workings consisted of a production shaft to 979 m and two other shafts to 170 m and 110 m.

The mine is about 2 km northwest of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	2.1	Junction; turn left (north) onto Powell Road.
	3.9	Junction, at a bend in the road; follow the road on left leading southwest.
	4.3	Powell Rouyn mine.

Refs.: 65 p. 236–240; 209 p. 739–747; 337 p. 372, 380; 398 p. 125–132; 427 p. 158–159.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Pontiac Rouyn (Anglo Rouyn) mine

NATIVE GOLD, CHALCOPYRITE, PYRITE, SPHALERITE, TOURMALINE

In sheared andesite

Native gold occurred with chalcopyrite and pyrite in quartz veins. Some sphalerite and tourmaline were also present.

The property consisted of claims originally staked by Hilda Cockeram, R. Cockeram, W. Crawford, M.G. Grover, G.F. Summers, and D. Willans. Pontiac Rouyn Mines Limited did some development work between 1928 and 1938, and shipped 901 t of ore to the Noranda smelter. Anglo-Rouyn Mines Limited resumed mining in 1943. Underground development via a shaft and winze extended to the 296 m level. Total production from 1948 to 1951 amounted to 1 033 335 g of gold and 626 725 g of silver, from 132 157 t of ore.

The mine is about 3 km northwest of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	2.1	Junction; turn left (north) onto Powell Road.
	3.9	Junction, at a bend in the road; follow the road on right leading northwest to Marlon Lake.
	5.1	Junction, at Marlon Lake; turn right onto the road leading northeast.
	5.7	Pontiac Rouyn (Anglo Rouyn) mine.

Refs.: 83 p. 154–155; 398 p. 132–135.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Marlon Rouyn (New Marlon) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE

In chloritized rhyolite

Native gold occurred in quartz veins and in quartz-carbonate stringers. Pyrite and minor chalcopyrite were also present.

Marlon Rouyn Gold Mines Limited (renamed 'New Marlon Gold Mines Limited' in 1946) discovered gold mineralization on the property by drilling in 1944–1946. The company mined the deposit via a 252 m shaft in 1947–1949, producing 79 737 t of ore valued at $673 994.

The mine is about 4 km northwest of Rouyn-Noranda, near the southwestern end of Marlon Lake. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	2.1	Junction; turn left (north) onto Powell Road to Marlon Lake.
	5.5	Junction; continue straight ahead (southwest).
	6.1	Marlon Rouyn (New Marlon) mine.

Refs.: <u>155</u> p. 126–127; <u>423</u> p. 139.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Quemont mine

PYRITE, PYRRHOTITE, SPHALERITE, CHALCOPYRITE, MAGNETITE

In rhyolite breccia

Pyrite was the most common mineral in the ore; it occurred as disseminated grains, and in massive form with pyrrhotite, sphalerite, chalcopyrite, and magnetite.

The property, staked as the Murray claims in 1922, adjoins the Horne mine to the northeast. United Verde Extension Mining Corporation sank a shaft to 72 m in 1927 and located a small body of siliceous gold ore. In the following year, Quemont Mining Corporation deepened the shaft to 281 m, but failed to locate an economic orebody. A subsequent drilling program conducted in 1944–1945 disclosed a large tonnage of gold-silver-copper-zinc ore beneath Osisko (Tremoy) Lake. Mining via a new 1266 m shaft began in 1949 and ended in 1971. Production amounted to 167 613 t of copper, 59 664 884 g of gold, 247 010 695 g of silver, 254 232 t of zinc, and 3 348 644 t of pyrite concentrates, from 13 921 543 t of ore milled.

The mine is about 1.5 km northeast of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	2.8	Junction; turn right (east).
	4.0	Centre Quémont, Parc industriel (Secteur Noranda). The Quemont mine shafts are near the north shore of Osisko Lake, just southeast of Centre Quémont.

Refs.: 334 p. 405–413; 398 p. 145; 444 p. 177–178.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Joliet mine

NATIVE GOLD, PYRITE, CHALCOPYRITE

In rhyolite breccia

Native gold and pyrite occurred in quartz stringers. Pyrite and chalcopyrite occurred in the host rock.

J.A. Brownlee, C.J. Brett, J.J. Richardson, A.C. Richardson, and Mrs. A.D. Richardson staked the original claims in 1922 during the Rouyn prospecting rush. Joliet-Quebec Mines Limited sank a shaft to 305 m in 1945 and discovered a copper orebody. Ore was mined via an underground connection to the Horne mine. The mine produced siliceous ore for use as flux for the Noranda smelter from 1954 to 1974. Production amounted to 1 465 403 t of ore averaging 0.905% copper.

The Joliet mine is about 2 km north of Rouyn-Noranda, on the west side of Highway 101 at a point 3.4 km from the junction of highways 117 and 101 in Rouyn-Noranda. *See* Map 11 on page 68.

Refs.: 83 p. 155; 154 p. 26–27; 239 p. 225; 398 p. 144; 428 p. 105.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Donalda (Kerralda) mine

PYRITE, NATIVE GOLD, CHALCOPYRITE, SPHALERITE, GALENA, EPIDOTE, ACTINOLITE, HEMATITE, CHLORITE, CALCITE

In porphyritic rhyolite

The ore consisted of pyrite and native gold, with minor amounts of chalcopyrite, sphalerite, and galena in quartz veins. The dumps furnish specimens of pyrite (as tiny cubes), epidote containing microprisms of actinolite and specular hematite, and specimens of coarse cleavable masses of pink and white calcite. The white calcite fluoresces bright orange-pink when exposed to ultraviolet rays.

John A. Brownlee staked the original claims in the 1920s. A 1943 drilling program conducted by Donalda Mines Limited revealed a gold orebody on the property. The company sank a shaft to 219 m and began production in 1948. The ore was shipped to the mill at the Powell Rouyn mine. A new mill at the mine site began treating the ore in 1951. Mining ended in 1956. Production amounted to 3 548 075 g of gold and 3 160 687 g of silver, from 630 557 t of ore. Kerralda Mines Limited produced a small amount of gold and silver in 1970–1971. Ressources Minorca Inc. resumed operations in 1994–1995 and produced about 340 kg of gold.

The mine is about 3 km northeast of Rouyn-Noranda, at the northeastern end of Osisko Lake. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	3.4	Junction; turn right (east) onto Chemin de la Mine McDonald.
	6.4	Donalda (Kerralda) mine, on the right (west) side of the road.

Refs.: 2 p. 59–60; 61 p. 55–56; 107 p. 13; 108 p. 14, 15; 239 p. 226–227; 279 p. 199–209; 382 p. 295; 430 p. 85; 463 p. 282.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

D'Eldona (Delbridge) mine

PYRITE, SPHALERITE, CHALCOPYRITE, GALENA, TETRAHEDRITE, NATIVE GOLD, ELECTRUM, ARSENOPYRITE, NATIVE SILVER, TOURMALINE

In rhyolite breccia and tuff

The ore consisted of massive and disseminated pyrite and silver-bearing sphalerite, with minor amounts of chalcopyrite, galena, and tetrahedrite, and some native gold, electrum, and arsenopyrite. Native silver occurred in quartz-carbonate veinlets in the massive-sulphide ore. Tourmaline (schorl-dravite) crystals occur in a rhyolite alteration zone associatd with the orebody.

D'Eldona Gold Mines Limited discovered a small orebody on the property in 1947 and mined it via a 457 m shaft from 1950 to 1952. The operation yielded 81 630 t of ore containing 7.7% zinc, 68.57 g/t gold, and 5.828 g/t silver. From October 1969 to September 1971, Delbridge Mines Limited mined a new deposit (400 m south of the D'Eldona deposit) and produced over 1 966 473 kg of copper, 30 894 147 kg of zinc, 808 678 g of gold, and 24 260 340 g of silver, from 360 079 t of ore.

The mine is about 4 km northeast of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	3.4	Junction; turn right (east) onto Chemin de la Mine McDonald.
	6.4	Donalda mine, on the right (west) side of the road; continue along Chemin de la Mine McDonald.
	7.3	Junction; the mine road leads straight ahead (northeast).
	8.1	D'Eldona (Delbridge) mine.

Refs: 13 p. 35–36; 35 p. 59: 55 p. 11, 15; 115 p. 30–33; 239 p. 228; 382 p. 295; 425 p. 66; 444 p. 106; 445 p. 106.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

MacDonald (Gallen) mine

PYRITE, SPHALERITE, CHALCOPYRITE, GALENA

In volcanic rocks

The ore consisted of pyrite and sphalerite with minor chalcopyrite and galena.

MacDonald Mines Limited discovered copper-gold mineralization on the property in 1937–1938. Further exploration in 1946–1947 resulted in the discovery of an ore zone containing zinc mineralization. West MacDonald Mines Limited mined this deposit from 1955 to 1959 via a 290 m shaft. MacDonald Mines Limited operated the mine from an open pit between 1981 and 1985. Total production amounted to 1 683 374 t of ore containing 34 000 t of zinc, 3184 kg of silver, and 810 kg of gold.

The mine is about 10 km northeast of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	3.4	Junction; turn right (east) onto Chemin de la Mine McDonald.
	7.3	Junction; turn left (northeast).
	15.6	MacDonald (Gallen) mine.

Refs.: 4 p. 49–50; 69; 83 p. 119–120; 133 p. 150; 374 p. 33–36; 388 p. 29–33; 389 p. 167–174; 433 p. 257–258; 451 p. 254; 453 p. 250, 280–282.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Millenbach mine

PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, MAGNETITE, GALENA, ARSENOPYRITE, MACKINAWITE, NATIVE SILVER

In andesite and rhyolite

The ore consisted of massive-sulphide lenses containing pyrite, pyrrhotite, chalcopyrite, and sphalerite. Minor amounts of magnetite and traces of galena, arsenopyrite, mackinawite, and native silver were also present.

Lake Dufault Mines Limited discovered the deposit in 1966 by drilling. Falconbridge Copper Limited (Lake Dufault Division) operated the mine from 1971 to 1981 from a 1215 m shaft. The ore was trucked to the Norbec mill for treatment. Production amounted to 3 423 000 t of ore containing 112 000 t of copper, 113 000 t of zinc, 122 000 kg of silver, and 2597 kg of gold.

The mine is about 6 km north of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	8.4	Junction; turn left (west).
	9.4	Millenbach mine.

Refs.: 69; 170 p. 255–295; 316 p. 67–78; 444 p. 125.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
454A Amulet area, Duprat, Dufresnoy, Rouyn, and Beauchastel townships, Abitibi and Témiscamingue counties, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Amulet mine

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

In andesite and rhyolite

The ore consisted of chalcopyrite, sphalerite, pyrrhotite, pyrite, and some galena. Native gold occurred as veinlets in pyrite. Dalmatianite, a dark brownish-black volcanic rock containing white spots or blotches up to 2 cm across, was associated with the orebody. The striking rock was referred to as 'dalmatianite' by the miners because of its resemblance to a Dalmatian dog. It is believed to be an altered amygdaloidal rhyolite.

The McDonough brothers staked the deposit in the winter of 1922–1923. Amulet Gold Mines Limited explored the deposit in 1924–1929 and discovered three orebodies. The company mined 654 684 t of ore in 1930. Waite Amulet Mines Limited resumed production in 1937, continuing until 1962. Development consisted of three shafts, 78 m, 108 m, and 421 m deep. Aerial tramways connected the shafts to the mill. The mine produced copper, zinc, gold, and silver.

The Amulet mine is about 8 km northwest of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	8.4	Junction; turn left (west).
	11.2	Amulet mine. Two shafts and the mill site are here; a third shaft is 1370 m to the northwest.

Refs.: 64 p. 39–43; 83 p. 361–383; 322 p. 757–762; 385 p. 9, 10; 398 p. 99–111.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
454A Amulet area, Duprat, Dufresnoy, Rouyn, and Beauchastel townships, Abitibi and Témiscamingue counties, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Corbet mine

PYRRHOTITE, PYRITE, CHALCOPYRITE, SPHALERITE, MAGNETITE, GALENA, NATIVE GOLD, MACKINAWITE, TETRADYMITE, KRENNERITE

In andesite

The orebody consisted predominantly of pyrrhotite, pyrite, chalcopyrite, and sphalerite, with minor magnetite and galena. Native gold was associated with pyrite. Mackinawite, tetradymite, and krennerite occurred in trace amounts. The gangue consisted of quartz, chlorite, and sericite.

Thayer Lindsay staked the deposit in 1926. McDougall Mines Limited explored it via a 366 m shaft in 1926–1927. Falconbridge Copper Limited sank a shaft to 1218 m in 1975 and mined the deposit from 1980 to 1986. Production amounted to about 2 753 000 t of ore containing 39 000 t of copper, 10 000 t of zinc, 17 000 kg of silver, and 2413 kg of gold.

The mine is about 8 km northwest of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	8.4	Junction; turn left (west).
	11.2	Junction, at the Amulet mine; continue along the road leading west.
	11.6	Corbet mine.

Refs.: 13 p. 19–21; 14 p. 31–33; 69; 169 p. 297–317; 398 p. 141–142.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
454A Amulet area, Duprat, Dufresnoy, Rouyn, and Beauchastel townships, Abitibi and Témiscamingue counties, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Norbec (Lake Dufault) mine

PYRITE, SPHALERITE, CHALCOPYRITE, PYRRHOTITE, MAGNETITE, GALENA

In andesite and rhyolite

The massive-sulphide orebody consisted of pyrite, sphalerite, and chalcopyrite, with minor pyrrhotite, magnetite, and galena.

Norbec Copper Mines Limited did the original surface exploration in 1944. Lake Dufault Mines Limited discovered a massive-sulphide orebody in 1961 by drilling, and mined it from 1964 to 1974. Production was from a 609 m shaft. A mill operated at the mine site. The mine produced about 3 720 000 t of ore containing 98 000 t of copper, 144 000 t of zinc, 141 000 kg of silver, 2311 kg of gold, and some lead and cadmium.

The Norbec (Lake Dufault) mine is about 12 km northwest of Rouyn-Noranda. Access is by a 1 km road leading northeast from km 15.1 on the road to the Waite-Ackerman-Montgomery mine (this page). *See* Map 11 on page 68.

Refs.: 13 p. 28–30; 69; 248 p. 53–54; 253 p. 39–40; 257 p. 85; 382 p. 123; 444 p. 125.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
455A Waite area, Duprat and Dufresnoy townships, Abitibi County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Waite-Ackerman-Montgomery (Old Waite) mine

PYRITE, SPHALERITE, PYRRHOTITE, CHALCOPYRITE, MAGNETITE, GALENA, NATIVE SILVER, NATIVE GOLD, COSALITE, ELECTRUM, CALAVERITE, DALMATIANITE

In andesite and rhyolite

The massive-sulphide ore consisted of pyrite, sphalerite, pyrrhotite, and chalcopyrite, with minor magnetite, galena, native silver, native gold, and cosalite. Traces of electrum and calaverite were reported. The striking rock referred to as 'dalmatianite' occurred here as at the Amulet mine.

Thomas Montgomery discovered the deposit in 1925, when he observed a patch of ore in the root of a tree uprooted from muskeg by the wind. He staked it on behalf of himself, J.H.C. Waite, and C.H. Ackerman. Waite-Ackerman-Montgomery Mines Limited mined the deposit from 1928 to 1932 from an open cut and from a 311 m shaft. Waite Amulet Mines Limited resumed operations in 1937, sank No. 2 shaft to 436 m, and built an aerial tramway connection to the mill at the Amulet mine. In 1949, the company discovered a new copper-zinc orebody (East Waite) 457 m farther east, and mined it from 1952 to 1961 from a 634 m shaft. The mine produced about 109 000 t of copper, 78 000 t of zinc, 4091 kg of gold, and 73 790 kg of silver from 2 490 000 t of ore.

The mine is about 12 km northwest of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	12.7	Junction; turn left (west).
	15.1	Junction, road on right leading northeast to the Norbec mine; proceed along the road on left leading west.
	16.0	Junction; proceed onto the road on left leading southwest.
	16.35	East Waite shaft. Proceed along the road leading west.
	17.2	Waite-Ackerman-Montgomery (Old Waite) mine. (A 3.5 km road leads south to the Amulet mine.)

Refs.: 63 p. 44; 69; 83 p. 361–383; 246 p. 748–752; 398 p. 111–123.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
455A Waite area, Duprat and Dufresnoy townships, Abitibi County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Vauze mine

CHALCOPYRITE, PYRRHOTITE, SPHALERITE, PYRITE, MAGNETITE

In rhyolite and andesite

The orebody consisted of chalcopyrite, pyrrhotite, sphalerite, pyrite, and magnetite. The gangue minerals included quartz, chlorite, and carbonates.

J.H.C. Waite staked the original claims around Waite Lake in 1923. Several companies did surface exploration between 1928 and 1945. Consolidated Vauze Mines Limited located an orebody in 1957–1958, and began mining operations from a 236 m shaft in 1960. Production from 1961 to 1965 amounted to 348 975 t of ore yielding 10 127 t of copper, 3329 t of zinc, 228 140 g of gold, and 9 237 746 g of silver.

The mine is about 13 km northwest of Rouyn-Noranda, at the southeastern end of Waite Lake. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	12.7	Junction; turn left (west).
	15.1	Junction, road on right leading northeast to the Norbec mine; continue along the road leading west.
	16.0	Y-junction; follow the road on right leading west. (The road on left leads to the East Waite shaft.)
	17.7	Junction; turn right (north) onto the mine road.
	19.3	Vauze mine.

Refs.: 318 p. 102–110; 398 p. 135.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
455A Waite area, Duprat and Dufresnoy townships, Abitibi County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Ansil mine

CHALCOPYRITE, PYRRHOTITE, SPHALERITE, MAGNETITE, NATIVE GOLD, ELECTRUM, NATIVE BISMUTH, COBALTITE, TELLUROBISMUTHITE, EPIDOTE

In rhyolite and andesite

The massive-sulphide orebody consisted mainly of chalcopyrite and pyrrhotite, with lesser amounts of sphalerite, and minor pyrite. Magnetite was associated with the sulphides. Native gold, electrum, native bismuth, cobaltite, and tellurobismuthite occurred in trace amounts. Epidote occurred with chlorite and sericite in altered rhyolite.

Ansil Mines Limited investigated the deposit between 1957 and 1959. Minnova Inc. discovered a massive-sulphide deposit in 1981 and mined it via a 1500 m shaft from 1989 to 1993. The mine produced 938 745 t of ore recovering 100 149 693 kg of copper, 235 560 kg of zinc, 28 840 443 g of silver, and 5 877 534 g of gold.

The mine is about 14 km northwest of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	12.7	Junction; turn left (west)
	15.1	Junction, road on right leading northeast to the Norbec mine; continue along the road leading west.
	16.0	Y-junction; follow the road on right leading west. (The road on left leads to the East Waite shaft.)
	17.7	Junction; continue straight ahead (west).
	19.7	Ansil mine, on the north side of the road.

Refs.: 13 p. 21–28; 54 p. 30, 41–42; 280 p. 143–150; 388 p. 24–26; 459 p. 239; 460 p. 229–230.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
833 Duprat Township, north-east part, Rouyn-Noranda (MRNQ, 1:24 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Fabie Bay (New Insco) mine

CHALCOPYRITE, PYRRHOTITE, PYRITE

In rhyolite and dacite

Chalcopyrite, pyrrhotite, and pyrite occurred in massive form in the host rocks.

New Insco Mines Limited located a copper orebody near the shore of Fabie Bay, Duparquet Lake, during a drilling program in 1972–1973. In 1975, Noranda Mines Limited undertook development consisting of a decline and an open pit. In 1976–1977, the company shipped 93 421 t of ore to its mill at the Horne mine in Noranda for testing.

The mine is about 35 km northwest of Rouyn-Noranda.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	12.7	Junction; turn left (west) and proceed toward the Ansil mine.
	19.7	Ansil mine. Continue northwest along this road.
	42.4	Junction; turn right (east).
	44.3	Fabie Bay (New Insco) mine.

Refs.: 221 p. 36; 448 p. 209.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
281A Duparquet sheet, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Newbec mine

CHALCOPYRITE, PYRITE, PYRRHOTITE

In andesite

Chalcopyrite, pyrite, and pyrrhotite occurred with quartz and calcite in chloritized andesite.

Norbec Mines Limited did the original exploration on this deposit in 1925. Newbec Mines Limited explored the deposit from 1927 to 1930 and sank a shaft to 76 m. About 252 t of ore containing 6.74% copper were shipped to the smelter at Noranda.

The Newbec mine is about 11 km north of Rouyn-Noranda. Access is by a 0.5 km road leading east from Highway 101 at a point 13.9 km from its junction with Highway 117 at **km 96.9** (*see* p. 8). *See* Map 11 on page 68.

Refs.: 65 p. 231–233; 83 p. 118; 257 p. 86; 398 p. 123–125.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
456A Newbec area, Dufresnoy Township, Abitibi County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)

M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Mobrun (Bouchard-Hébert) mine

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

In rhyolite breccia and sericite schist

The ore consists mainly of pyrite, chalcopyrite, and sphalerite, with lesser amounts of galena, pyrrhotite, native gold, digenite, and magnetite. The gangue consists of quartz, carbonate, sericite, and chlorite.

Rio Canadian Exploration Limited discovered the deposit in 1956 following a survey along regional roads using a wheel-mounted electromagnetic unit. The name of the deposit is an acronym derived from 'mobile road unit'. Mobrun Copper Limited outlined a copper deposit in 1955–1956. Audrey Resources Inc. undertook development in 1986 and mined the deposit from an open pit and a 396 m shaft. Production from 1987 to 1992 amounted to 7 833 850 kg of copper, 22 765 383 kg of zinc, 7 845 390 g of silver, and 1 449 305 g of gold. Cambior Inc. resumed production in 1995. Production in 1995–1997 amounted to 79 700 t of zinc, 19 700 t of copper, 2643 kg of gold, and 13 769 kg of silver.

The mine is about 21 km northeast of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	15.7	Junction; turn right (east) onto Chabot Road.
	27.7	Junction, in Saint-Joseph-de-Cléricy; turn left (north).
	30.5	Junction; turn left (west).
	32.6	Mobrun (Bouchard-Hébert) mine.

Refs.: 13 p. 37–44; 56 p. 133–142; 107 p. 6, 9, 10; 269 p. 73–83; 365 p. 99; 388 p. 26–29; 455 p. 54; 456 p. 52–53; 458 p. 53; 460 p. 47; 463 p. 85; 474 p. 91–92; 475 p. 94–95.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Harvie (Archean) mine

CHALCOPYRITE, PYRITE, PYRRHOTITE, SPHALERITE

In volcanic rocks

Chalcopyrite, pyrite, pyrrhotite, and sphalerite occur as disseminated grains in andesite and dacite, and in quartz veins cutting the volcanic rocks.

R. Harvie discovered the copper mineralization and formed Archean Mines Development Company Limited in 1924 to explore it. In 1926–1927, Harvie Mining Exploration Company Limited examined the property. Development consisted of three shafts sunk to 40 m, 32 m, and 33.5 m respectively, and an adit driven east about 244 m into a hill. United Obalski Mining Company Limited re-examined the property in 1961–1965 and shipped a 22 t test sample to the Noranda smelter.

The mine is about 17 km northeast of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	15.7	Junction; turn right (east) onto Chabot Road.
	27.7	Junction, in Saint-Joseph-de-Cléricy; continue straight ahead (east).
	28.7	Junction; turn right (south).
	30.4	Junction; turn left (east).
	30.7	End of the road. The Harvie (Archean) mine adit is about 150 m south of this point. A trail continues 600 m northeast from the end of the road to No. 4 shaft. The other shafts are 1350 m east and 1700 m southeast of the end of the road.

Refs.: 4 p. 38; 65 p. 229–230; 144 p. 9–11; 365 p. 96–97.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
1463 South west quarter of Cléricy Township, County of Rouyn-Noranda (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

LeRoy (Roybell, Claremont) mine

NATIVE GOLD, CHALCOPYRITE, PYRRHOTITE, PYRITE, TOURMALINE, EPIDOTE, TITANITE, ACTINOLITE

In diorite

Native gold occurs as free grains in quartz fractures and associated with chalcopyrite, pyrrhotite, and pyrite in quartz veins. The veins occur in shear zones and contain calcite, tourmaline, epidote, titanite, albite, and minor actinolite, chlorite, and sulphide minerals.

O'Brien Gold Mines Limited explored the gold-bearing quartz veins in 1935. LeRoy Mines Limited (renamed 'Roybell Mines Limited' in 1939) sank an 81 m shaft in 1937 and did some underground exploration. Claremont Mines Limited did some drilling in 1947. Les Mines d'Étain du Québec Limitée undertook further exploration by an open pit in 1976–1977. Shipments included vein material to the Noranda smelter for siliceous flux testing in 1977 and small ore shipments to the Pamour mill in Timmins between 1981 and 1983.

The mine is about 15 km northeast of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	15.7	Junction; turn right (east) onto Chabot Road.
	27.7	Junction, in Saint-Joseph-de-Cléricy; continue straight ahead (east).
	28.7	Junction; turn right (south).
	32.0	Junction; turn right (west).
	32.3	Junction; turn left (south).
	38.0	LeRoy (Roybell, Claremont) mine.

Refs.: 4 p. 56–59; 70 p. 18–28; 83 p. 123; 144 p. 8–9; 365 p. 98–99.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
1463 South west quarter of Cléricy Township, County of Rouyn-Noranda (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Vezina (Thurbois) mine

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

In breccia

Native gold occurred as fine grains in the host breccia and as inclusions in pyrite. Chalcopyrite, galena, sphalerite, and hematite (specularite) occurred with pyrite in quartz veins.

A. Paquin of Noranda discovered gold-bearing quartz veins on the property in 1938. Thurbois Mines Limited explored the veins from a 85 m shaft in 1947. Exploration Aiguebelle Inc. outlined an orebody in 1980–1982 and mined it until 1987. Underground operations were from a 458 m shaft and a ramp. A mill operated on the site. Cambior Inc. continued operations from 1987 to 1989; production amounted to about 3 448 825 g of gold and 1 086 459 g of silver.

The mine is about 26 km north of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	28.7	Junction; turn right (east) onto Chemin du Parc.

35.9 Junction, in Destor; continue straight ahead (east) along Chemin du Parc.

44.4 Junction; turn left (north).

47.1 Vezina (Thurbois) mine.

Refs.: 4 p. 53–54; 152 p. 47–49; 155 p. 44–46; 456 p. 86.

Maps (T): 32 D/7 Cléricy
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
635A Cléricy, Abitibi and Témiscamingue counties, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Duquesne mine

PYRITE, MAGNETITE

In quartz-feldspar porphyry

Gold was associated with finely disseminated pyrite. Magnetite was present in minor amounts.

Duquesne Mining Company Limited began development of the deposit in 1941–1942. Mining from a 381 m shaft began in 1945. Production between 1947 and 1952 amounted to 776 580 g of gold and 71 350 g of silver, from 80 872 t of ore.

The Duquesne mine is about 25 km north of Rouyn-Noranda. *See* Map 11 on page 68.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km 0 Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.

28.7 Junction, Chemin du Parc; continue north along Highway 101.

30.8 Junction; turn left (west) onto the mine road.

31.15 Duquesne mine.

Refs.: 101 p. 78; 118 p. 50–51; 257 p. 73.

Maps (T): 32 D/6 Rivière Kanasuta
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
825 Parts of Hebecourt, Duparquet, and Destor townships, West-Destor sheet, Abitibi-West County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000.

Central Duparquet mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, CHALCOPYRITE, SPHALERITE, TETRAHEDRITE

In syenite

Native gold is associated with pyrite and arsenopyrite. Visible gold associated with chalcopyrite, sphalerite, and tetrahedrite was found in quartz veins during initial exploration.

George Kellar staked the deposit in 1924. In 1928–1929, Duparquet Mining Company Limited sank a prospect shaft to 15 m and another shaft to 59 m about 49 m farther east. The company worked the deposit until 1936. Between 1937 and 1939, Dumico Gold Corporation sank No. 3 shaft to 229 m on a new zone 800 m west of the original shaft. In 1941, Consolidated Beattie Mines Limited deepened No. 3 shaft to 305 m. The deposit is estimated to contain 200 000 t of ore averaging 6.2 g/t gold.

The mine is about 32 km northwest of Rouyn-Noranda and just east of Duparquet. *See* Map 12 on page 88.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	34.3	Junction, Highway 393; proceed west along Highway 393.
	46.5	Trail on right, to the Central Duparquet mine. Follow this trail leading north for 300 m to No. 3 shaft. The original shafts are 200 m north of Highway 393, at a point 750 m east of km 46.5.

Refs.: 83 p. 96–97; 118 p. 47–48; 230 p. 101–104; 284 p. 49–51.

Maps (T): 32 D/11 Palmarolle
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
823 Parts of Hebecourt, Duparquet, and Destor townships, West-Duparquet sheet, Abitibi-West County (MRNQ, 1: 12 000)
824 Parts of Hebecourt, Duparquet, and Destor townships, East-Duparquet sheet, Abitibi-West County (MRNQ, 1: 12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

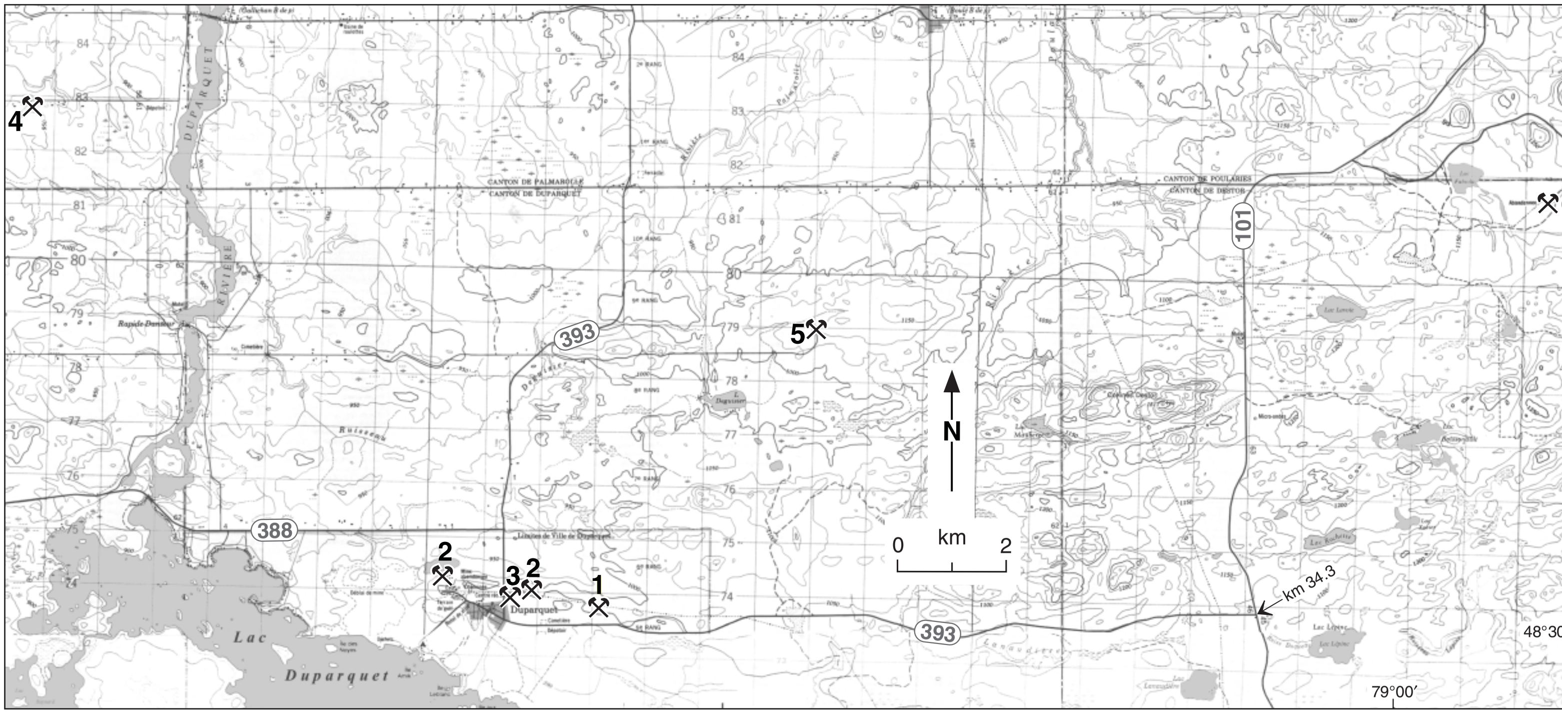
Beattie-Donchester mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, MAGNETITE, LEUCOXENE, ILMENITE, MOLYBDENITE, CHLORITE, TITANITE, MICA, FLUORITE, TOURMALINE

In brecciated and silicified porphyry

Native gold occurred as very fine particles associated with finely disseminated pyrite and arsenopyrite. Magnetite, leucoxene, ilmenite, molybdenite, chlorite, titanite, green mica, fluorite, and tourmaline have been reported from the deposit.

Part of 32 D/6, 7, 10, 11



1. Central Duparquet mine 2. Beattie-Donchester mine 3. Jasper conglomerate occurrence 4. Roquemaure jasper occurrence 5. Hunter mine 6. Lyndhurst mine

Map 12. Duparquet

John Beattie staked claims for gold on Beattie Island, in Duparquet Lake, in 1910. Subsequent exploration by the Victoria Syndicate and by Consolidated Mining and Smelting Company of Canada Limited failed to locate an orebody. In 1930, Beattie made a new discovery on the east side of Duparquet Lake, and this became the Beattie mine. An extensive diamond-drilling program conducted by Ventures Limited in 1931–1932 indicated a sufficiently large tonnage of economic ore to warrant development. The newly formed Beattie Gold Mines Limited began open-pit and underground mining in 1933. The underground workings consisted of two shafts to 159 m and 633 m. In 1941, Beattie Gold Mines Limited acquired the Donchester property 1465 m east of the Beattie main workings. Mining of this deposit began in 1943 via a 456 m shaft. Mining continued at both properties until they were mined out in 1956. The two mines produced 34 737 976 g of gold, 8 086 780 g of silver, 745 kg of copper, and some arsenic oxides.

The mine is about 32 km northwest of Rouyn-Noranda, in the town of Duparquet. *See* Map 12 on page 88.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	34.3	Junction, Highway 393; proceed west along Highway 393.
	48.2	Duparquet, at a right turn (north) of Highway 393; continue straight ahead along the main street.
	49.3	Entrance to the Beattie mine. The road to the Donchester mine leads east from Highway 393 at a point 0.6 km north of the right turn of Highway 393.

Refs.: 83 p. 84–96; 118 p. 48–50, 52; 179 p. 32–33; 229 p. 3–14, 20–26; 257 p. 89; 411 p. 23; 444 p. 115.

Maps (T): 32 D/11 Palmarolle
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
823 Parts of Hebecourt, Duparquet, and Destor townships, West-Duparquet sheet, Abitibi-West County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Roquemaure jasper occurrence

JASPER, CHERT, MAGNETITE

In iron-formation

Jasper occurs with chert and magnetite in an iron-formation enclosed in basalt. The iron-formation is exposed in an outcrop near Roquemaure.

The occurrence is about 45 km northeast of Rouyn-Noranda and 12 km northeast of Duparquet. *See* Map 12 on page 88.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.

34.3 Junction, Highway 393; proceed west along Highway 393.

48.2 Duparquet. Highway 393 turns right (north). Continue along Highwy 393.

53.3 Junction; turn left (west) onto the road to Rapide-Danseur.

59.5 Junction; turn right (north).

60.2 Bridge over the Duparquet River in Rapide-Danseur; continue straight ahead.

60.4 Junction; follow the road on right leading west.

65.2 Junction; turn left (west).

68.1 Roquemaure jasper occurrence on the south side of the road, behind the farm house.

Ref.: 217 p. 29–30.

Maps (T): 32 D/11 Palmarolle
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
823 Parts of Hebecourt, Duparquet, and Destor townships, West-Duparquet sheet, Abitibi-West County (MRNQ, 1:12 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or and Chibougamau areas (MRNQ, 1:253 440)
1736 Roquemaure Township, Abitibi-West County (MRNQ, 1:24 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Hunter mine

CHALCOPYRITE, PYRITE, MAGNETITE, SERPENTINE

In sheared rhyolite

Chalcopyrite and pyrite occur in massive form and as disseminations in a gangue consisting of quartz, calcite, and sericite. Magnetite and serpentine occur in the mine dumps.

Beattie-Duquesne Mines Limited operated the mine in 1956–1957. The underground development consisted of a 305 m shaft. The ore was treated at the Beattie mill. Production amounted to 1102 t of copper, 713 440 g of silver, and 808 g of gold, from 116 944 t of ore.

The mine is about 40 km north of Rouyn-Noranda and 8 km northeast of Duparquet. *See* Map 12 on page 88.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km 0 Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.

34.3 Junction, Highway 393; proceed west along Highway 393.

48.2 Duparquet. Highway 393 turns right (north). Continue along Highwy 393.

48.6 *Jasper conglomerate occurrence*. An outcrop on the right (east) side of the highway exposes conglomerate containing jasper, black chert, and syenite.

53.3 Junction; turn right (east) onto the mine road.

58.8 Hunter mine.

Refs.: 257 p. 90; 284 p. 47; 382 p. 133.

Maps (T): 32 D/11 Palmarolle
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
823 Parts of Hebecourt, Duparquet, and Destor townships, West-Duparquet sheet, Abitibi-West County (MRNQ, 1:12 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Lyndhurst mine

PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, GALENA, BROCHANTITE, SIDEROTIL, JAROSITE

In sheared rhyolite

Chalcopyrite and pyrite occur in massive form and as disseminations in a quartz-dolomite-talc gangue. Pyrrhotite, sphalerite, and galena are present in minor amounts. Pyrite occurs as cubic crystals. Secondary minerals including green brochantite, white siderotil, and rusty brown jarosite occur as coatings on ore specimens.

Destor Mining Syndicate Limited discovered this copper deposit in 1926. Destor Mines Limited explored the deposit between 1926 and 1929 and shipped a 45 t sample of ore to the Noranda smelter for testing. The ore contained 4.92% copper. In 1930, Abacourt Mining Corporation Limited sank a shaft to 36 m and encountered encouraging copper mineralization. Lyndhurst Mining Company Limited mined the deposit from 1955 to 1958 using a 216 m shaft. The ore was treated at the Beattie mill in Duparquet. The mine produced 2519 t of copper, 4852 g of gold, and 1 612 753 g of silver, from 141 802 t of ore.

The mine is about 40 km north of Rouyn-Noranda. *See* Map 12 on page 88.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km 0 Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.

34.3 Junction, Highway 393; continue along Highway 101.

44.4 Junction; turn right (east) toward Laferté.

49.0 Junction; turn right (south) onto the mine road.

50.1 Lyndhurst mine.

Refs.: 192 p. 9–10; 251 p. 28–30; 257 p. 72; 377 p. 21; 382 p. 114.

Maps (T): 32 D/1O Taschereau
(G): 856 Part of townships of Palmarolle and Poularies, County of Abitibi-West (MRNQ, 1:24 000)

1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Duvan mine

BORNITE, CHALCOPYRITE, PYRITE, MAGNETITE, PYRRHOTITE, SPHALERITE

In greywacke

The ore consisted of massive chalcopyrite and bornite. Pyrite, magnetite, pyrrhotite, and sphalerite were associated with the copper minerals.

Rex Copper Mines Limited held the deposit in the 1920s. Desmeloizes Mining Corporation Limited did some surface exploration prior its acquisition in 1954 by Duvan Copper Company Limited. This company completed a shaft to 305 m by 1957 and shipped about 1360 t of ore to the Noranda smelter in 1960. The ore contained values in copper and silver.

The mine is about 78 km northwest of Rouyn-Noranda. *See* Map 13 on page 93.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	34.3	Junction, Highway 393; continue along Highway 101.
	65.2	Macamic, junction of Highway 111. Proceed straight ahead (north) along Highway 111.
	101.7	Junction; turn left (west) onto the road to La Reine.
	112.6	La Reine, junction road leading north. Turn right (north).
	114.2	Junction; turn right (east).
	120.1	Duvan mine.

Refs.: 253 p. 33; 257 p. 70; 382 p. 109; 427 p. 65–66; 431 p. 90.

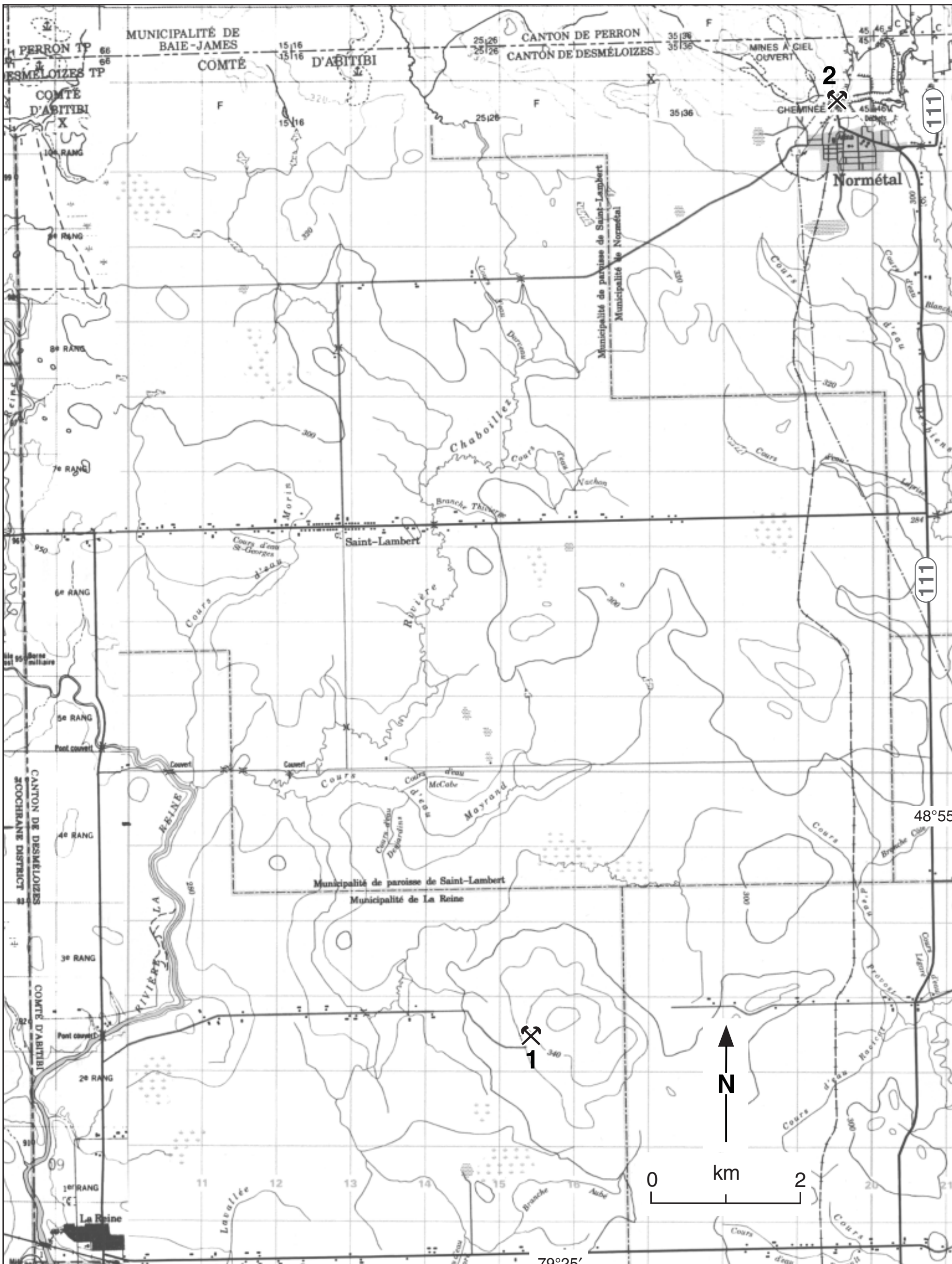
Maps (T): 32 D/14 La Sarre
(G): 1401 Desmeloizes Township, Abitibi-West County (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Normetal (Abana) mine

PYRITE, SPHALERITE, CHALCOPYRITE, PYRRHOTITE, GALENA, ARSENOPYRITE, CHALCOCITE, BORNITE, OTTRELITE, GARNET, CHLORITE, MAGNETITE, KYANITE

In sheared rhyolite

Part of 32 D/13, 14 and 32 E/4



1. Duvan mine 2. Normetal (Abana) mine

Map 13. La Reine–Normétal.

The ore consisted of massive sulphides of which pyrite, sphalerite, and chalcopyrite were the most abundant; pyrrhotite, galena, arsenopyrite, chalcocite, and bornite were also present. Ottrelite occurred as platy crystal aggregates in rhyolite and tuff. Red garnet, chlorite, and magnetite occurred in a skarn zone. Grey prismatic crystals of kyanite about 25 mm long were found in schist at the 205 m level.

M. Lefevre discovered the deposit in 1925. Abana Mines Limited began underground development immediately by sinking a shaft to 152 m. Operations were suspended in 1930. Normetal Mining Corporation Limited resumed development in 1933 and began production in 1937. Kerr Addison Mines Limited took over operations in 1968, continuing until the mine closed in 1975. Development consisted of No. 1 shaft to 91 m, No. 2 shaft to 988 m, and No. 3 shaft and winze to 2438 m. A concentrator operated on the site. Total production amounted to 10 107 426 t of ore containing 217 807 t of copper, 517 434 t of zinc, 5 422 808 g of gold, 14 690 000 g of silver, and 601 341 t of pyrite concentrates.

This mine is about 90 km northwest Rouyn-Noranda, in Normétal. *See* Map 13 on page 93.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	34.3	Junction, Highway 393; continue along Highway 101.
	65.2	Macamic, junction of Highway 111. Proceed straight ahead (north) along Highway 111.
	101.7	Junction, road to La Reine; continue north along Highway 111.
	116.5	Normétal. Highway 111 turns right (east); proceed straight ahead.
	117.5	Normétal (Abana) mine.

Refs.: 43 p. 683–687; 353 p. 19–28; 382 p. 110–111; 398 p. 72; 444 p. 177–178; 445 p. 184; 447 p. 175–177.

Maps (T): 32 D/14 La Sarre
32 E/3 Perron–Rousseau
(G): 483A Perron–Rousseau sheet (west half), Abitibi Territory and Abitibi County, Quebec (GSC, 1:63 360)
683 Normetal mine area, Abitibi West County (MRNQ, 1:9600)
1401 Desmeloizes Township, Abitibi-West County (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Casa-Berardi (Golden Pond) mines

NATIVE GOLD, PYRITE, ARSENOPYRITE, CHROME MUSCOVITE, TOURMALINE, CHLORITOID

In silicified and sericitized volcanic and sedimentary rocks

Visible gold is associated with pyrite and arsenopyrite in quartz-dolomite-ankerite veins containing chrome muscovite (fuschite). Tourmaline and chloritoid occur in the host rocks.

The deposit consists of four zones extending 5 km west to east. Inco Limited discovered gold mineralization in 1981 during a drilling program in search of base metals. Inco Limited and Golden Knight Resources Inc. jointly began exploration at the East mine in 1983 and drove a ramp decline 100 m. A mill operated at the site and produced the first gold brick in 1988. Production from the West mine via a ramp to the 200 m level began in 1990. From 1991 to 1997, Golden Knight Resources Inc. and TVX Gold Inc. continued operations as a joint venture. Additional development consisted of extending the East mine ramp to the 300 m level, and sinking a 340 m shaft in 1995 at the East mine. A 5 km tunnel at the 300 m level connects the East and West mines to the Main zone located between the two mines. Operations ended in 1997. The mines produced about 20 820 kg of gold.

The mines are about 150 km north of Rouyn-Noranda.

Road log from Highway 117 at **km 96.9** (*see* p. 8):

km	0	Rouyn-Noranda, at the junction of highways 117 and 101; proceed northeast along Highway 101.
	34.3	Junction, Highway 393; continue along Highway 101.
	65.2	Macamic, junction of Highway 111. Proceed straight ahead (north) along Highway 111 to Normétal.
	116.5	Normétal. Highway 111 turns right (east); proceed east along Highway 111.
	126.5	Junction; turn left (north) onto Highway 383.
	142.5	Junction, road to Val-Paradis; continue straight ahead (north).
	192.0	Casa-Berardi (Golden Pond) West mine. A 5 km road leads east to the East mine.

Refs.: 107 p. 14–15; 178 p. 321–323; 237 p. 170–183; 242 p. 16–18; 243 p. 337–348; 457 p. 198, 234; 458 p. 178, 383; 459 p. 165, 356; 460 p. 162, 345–346; 462 p. 173, 375; 463 p. 199, 422–423; 464 p. 205, 458–459.

Maps (T): 32 E/11 Lac Raymond
(G): 1357 Harricana–Turgeon area, Grenier Lake sheet, Abitibi-West County (MRNQ, 1:63 360)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)

Chadbourne mine

NATIVE GOLD, PYRITE, HEMATITE, CHALCOPYRITE, TOURMALINE

In volcanic breccia

Native gold occurred as microscopic grains in pyrite cubes, in quartz veinlets, and in the host breccia. Specular hematite, chalcopyrite, and tourmaline were also present.

The S.C. Thomson-C.W. Chadbourne syndicate staked the deposit in 1922. Noranda Mines Limited explored the deposit by several trenches and a 42 m shaft between 1923 and 1925. The company did additional underground exploration between 1932 and 1951 via the underground extensions from the nearby Horne mine. Development in 1974 consisted of a ramp driven 1100 m. Production from 1979 to 1986 amounted to about 5 217 404 g of gold and 2 317 733 g of silver, from 1 639 856 t of ore.

The mine site is in Mouska Park in Rouyn-Noranda. *See* Map 14 on page 97.

Road log from Highway 117 at **km 98.1** (*see* p. 8) in Rouyn-Noranda:

km	0	Junction, Highway 117 (Rideau Boulevard) and Richelieu Street in Rouyn-Noranda; proceed east along Richelieu Street.
	0.8	Turn left (north) onto 15^{e} Street.
	1.9	Mouska Park, on left. The Chadbourne mine site is about 300 km southwest of this point.

Refs.: 65 p. 240–242; 71 p. 70–71; 383 p. 58–64; 398 p. 95, 98.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
453A Rouyn area, Rouyn Township, Témiscamingue County, Quebec (GSC, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Senator Rouyn mine

NATIVE GOLD, PYRITE, CHROME MUSCOVITE, TOURMALINE, GRAPHITE, CHALCOPYRITE, SPHALERITE

In carbonate rock

Native gold occurred with quartz and pyrite in carbonate rock composed of ankerite, chrome muscovite (fuschite), sericite, chlorite, and plagioclase. Tourmaline, graphite, chalcopyrite, and sphalerite also occurred in the deposit.

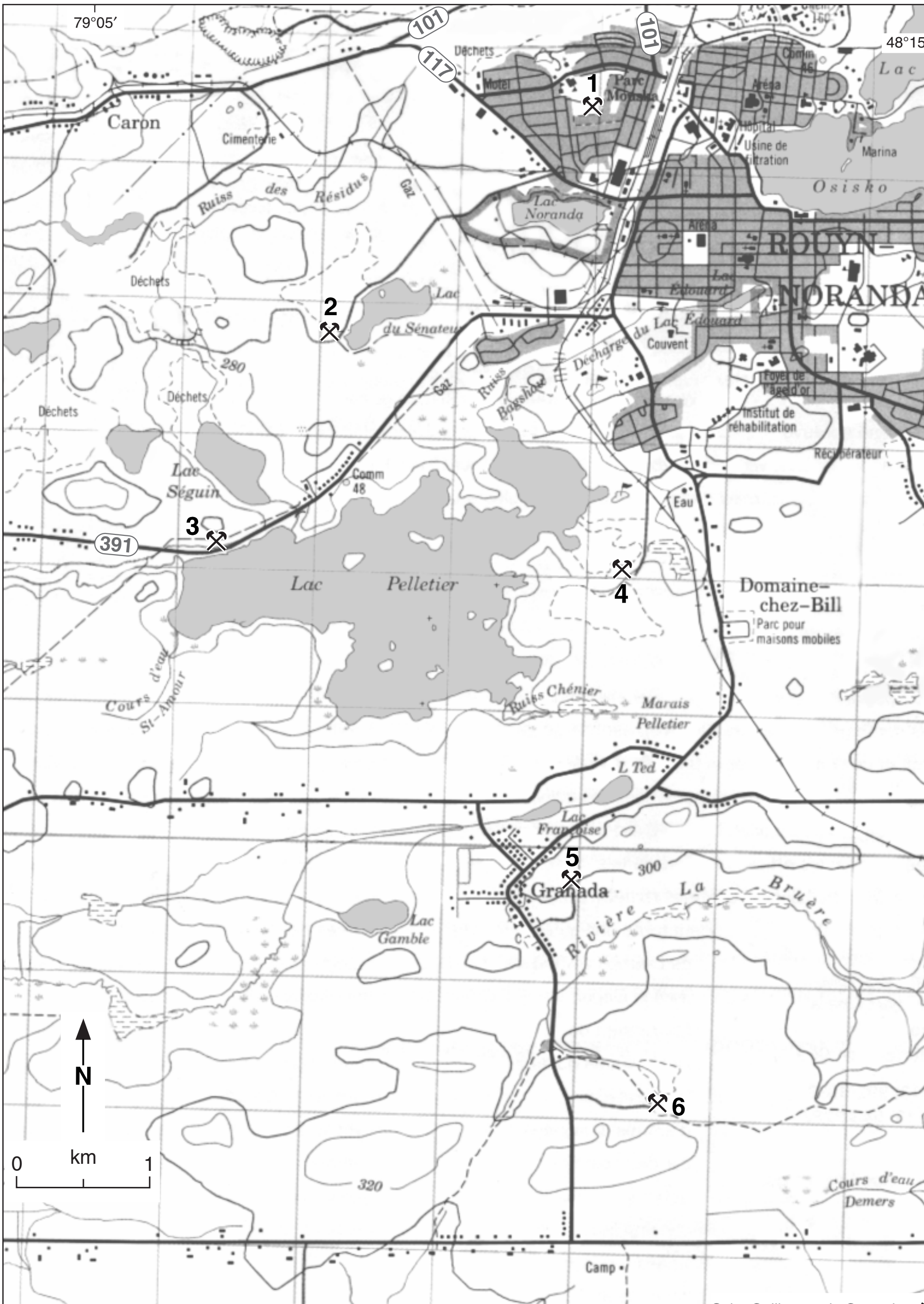
Senator Rouyn Mines Limited discovered gold on the property in 1937 as a result of surface exploration. Drilling revealed sections of high-grade ore. Production began in 1940 and continued until ore depletion in 1955. Underground workings extended to 846 m. Recovery amounted to 7 339 344 g of gold from 1 666 885 t of ore.

The Senator Rouyn mine is about 2 km west of Rouyn-Noranda. Access is by Senator Road leading west from Highway 117 (Rideau Boulevard) at **km 98.4** (*see* p. 8). The distance from this junction to the mine is 1.9 km. *See* Map 14 on page 97.

Refs.: 83 p. 159–161; 333 p. 59; 399 p. 65–68.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)

Part of 32 D/3, 6



1. Chadbourne mine 2. Senator Rouyn mine 3. Abbeville mine 4. Stadacona mine 5. Astoria mine 6. Granada mine

Map 14. Rouyn-Noranda south.

1107A Southwest Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Abbeville mine

PYRITE, NATIVE GOLD, ARSENOPYRITE, CHROME MUSCOVITE, TOURMALINE

In sheared volcanic rocks

Native gold was associated with pyrite in quartz and carbonates. Arsenopyrite, green chrome muscovite (fuschite), and tourmaline were also present.

B. Bainbridge and J.B. Ryan staked the property during the 1921–1922 Rouyn gold rush. Between 1937 and 1939, Abbeville Gold Mines Limited did surface work on the deposit and sank a shaft to 114 m.

The mine is about 4 km southwest of Rouyn-Noranda, just north of the northwestern end of Pelletier Lake. *See* Map 14 on page 97.

Road log from Highway 117 at **km 99.1** in Rouyn-Noranda (*see* p. 8):

km	0	Junction, Highway 117 (Rideau Boulevard) and Québec Boulevard in Rouyn-Noranda; proceed south along Québec Boulevard.
	0.7	Junction; turn right (west) onto Témiscamingue Boulevard (Highway 391).
	4.3	Junction; turn right (north) onto a single-lane road.
	4.4	Abbeville mine.

Refs.: 83 p. 167; 399 p. 61–63.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1107A Southwest Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Stadacona mine

PYRITE, NATIVE GOLD, PETZITE, ARSENOPYRITE, CHALCOPYRITE, GALENA, TALC, CHROME MUSCOVITE, TOURMALINE, AMPHIBOLE, EPIDOTE, CALCITE

In volcanic rocks

The ore consisted of pyrite, native gold, petzite, arsenopyrite, chalcopyrite, galena, and tourmaline in quartz-ankerite-calcite veins. Talc and chrome muscovite (fuschite) were also present. The mine dumps provide specimens of black massive tourmaline, brown prismatic microcrystals of amphibole in calcite, grey fibrous aggregates of amphibole, buff-coloured massive and foliated talc, epidote in quartz, pink massive calcite, and coarsely crystalline white calcite; the white calcite fluoresces pink when exposed to ultraviolet rays.

J. Smith discovered native gold in a quartz-carbonate vein in 1923. Stadacona Mines Limited (name changed later to 'Stadacona Rouyn Mines Limited') undertook underground development in 1928 by sinking a shaft to 91 m. Several years of underground exploration resulted in locating an economic orebody. Production from 1936 to 1957 amounted to 14 492 629 g of gold and some silver valued at $16 532 527, from about 2 721 000 t of ore milled. The mine was serviced by a 1235 m shaft and a cyanide mill with a capacity of 408 t /day.

The mine is about 2 km south of Rouyn-Noranda, near the southeastern shore of Pelletier Lake. *See* Map 14 on page 97.

Road log from Highway 117 at **km 99.1** in Rouyn-Noranda (*see* p. 8):

km	0	Junction, Highway 117 (Rideau Boulevard) and Québec Boulevard in Rouyn-Noranda; proceed south along Québec Boulevard.
	0.7	Junction; continue south along Québec Boulevard.
	2.0	Junction; turn right (southwest) onto the mine road.
	3.0	Stadacona mine.

Refs.: 65 p. 98–99; 83 p. 161–162; 399 p. 69–74; 431 p. 248–249.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1107A Southwest Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Astoria mine

NATIVE GOLD, ARSENOPYRITE, PYRITE, CHROME MUSCOVITE, TOURMALINE

In talc-chlorite-carbonate schist

Native gold occurred as finely disseminated grains in quartz and in quartz-ankerite veins. Arsenopyrite (as prismatic crystals), pyrite, green chrome muscovite (fuschite), and tourmaline were present in the veins and in the host rock.

The property consists of the Imrie-Racicot-Paré claims staked in 1922–1923. It extends 1 km from west to east. Astoria Rouyn Mines Limited explored the property between 1928 and 1937. Exploration consisted of an adit driven 54 m into the north side of a hill, several surface openings, No. 1 shaft to 131 m, and No. 2 shaft to 82 m. The shafts are about 900 m apart. Astoria Quebec Mines Limited continued the investigation in 1943–1946. Yorbeau Resources Inc.

resumed exploration in 1984 and discovered a new mineralized zone in 1987. The company mined this zone via a 532 m shaft from 1993 to 1996. Production amounted to 677 kg gold and 47 kg silver, from 150 229 t of ore.

The mine is about 6 km south of Rouyn-Noranda. *See* Map 14 on page 97.

Road log from Highway 117 at **km 99.1** in Rouyn-Noranda (*see* p. 8):

km	0	Junction, Highway 117 (Rideau Boulevard) and Québec Boulevard in Rouyn-Noranda; proceed south along Québec Boulevard.
	0.7	Junction; continue south along Québec Boulevard.
	2.0	Junction, road to Stadacona mine; continue straight ahead along the road to Granada.
	4.0	Granada.
	5.2	Junction; turn left (east) onto the mine road.
	5.6	Astoria mine.

Refs.: 83 p. 171; 107 p. 14, 15; 108 p. 14; 137 p. 45–46; 277 p. 18; 399 p. 75–77; 462 p. 399; 463 p. 254; 464 p. 489–490.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1107A Southwest Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Granada mine

NATIVE GOLD, ARSENOPYRITE, PYRITE, GALENA, SPHALERITE, PYRRHOTITE,

CHALCOPYRITE, MOLYBDENITE, TOURMALINE, JASPER

In conglomerate, greywacke, and syenite porphyry

Coarse native gold occurred with chlorite and sericite in fractures in quartz veins. The most abundant metallic minerals were pyrite and arsenopyrite. Minor amounts of galena, sphalerite, pyrrhotite, chalcopyrite, and molybdenite were present in the ore. The veins consisted chiefly of quartz with minor carbonates, chlorite, sericite, and black tourmaline. The conglomerate in the mine area contains jasper fragments.

Thomas Bathurst staked the property for Robert C. Gamble and W.A. Gamble in 1922 during the Rouyn prospecting rush. In 1923, the Gambles discovered gold-bearing veins. The deposit was regarded as the most important discovery of the early days of the Rouyn-Noranda camp. Granada-Rouyn Mining Company Limited (name later changed to 'Granada Gold Mines Limited') began underground exploration in 1927. Three years later the mine became the first gold producer in the Rouyn-Noranda camp. Production ended in 1935 when a fire destroyed the mill and mine buildings. Development consisted of No. 1 shaft to 191 m and No. 2 Shaft to

517 m. Production amounted to 1 601 058 g of gold and 248 824 g of silver, from 164 783 t of ore. KWG Resources Inc. carried out open-pit mining from 1992 to 1994 and produced 355 kg of gold. One pit is near No. 1 shaft, another is 100 m east of No. 2 shaft.

The mine is about 7 km south of Rouyn-Noranda. *See* Map 14 on page 97.

Road log from Highway 117 at **km 99.1** in Rouyn-Noranda (*see* p. 8):

km	0	Junction, Highway 117 (Rideau Boulevard) and Québec Boulevard in Rouyn-Noranda; proceed south along Québec Boulevard.
	0.7	Junction; continue south along Québec Boulevard.
	2.0	Junction, road to Stadacona mine; continue straight ahead along the road to Granada.
	4.0	Granada
	5.4	Junction; turn left (east).
	6.2	Granada mine.

Refs.: 75 p. 65–69; 83 p. 170; 108 p. 14; 137 p. 7, 26–39; 399 p. 77–80; 413 p. 106; 463 p. 254.

Maps (T): 32 D/3 Rouyn
(G): 271A Rouyn–Harricanaw area, Abitibi and Témiscamingue counties, Quebec (GSC, 1:253 440)
1107A Southwest Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

McWatters mine

NATIVE GOLD, HESSITE, TETRADYMITE, ARSENOPYRITE, PYRITE, TOURMALINE, PYRRHOTITE, CHALCOPYRITE, MOLYBDENITE, GALENA, SPHALERITE, SCHEELITE, CHROME MUSCOVITE

In conglomerate

Native gold and hessite were associated with quartz and arsenopyrite in quartz-ankerite veins. Tetradymite occurred with chalcopyrite, pyrite, and native gold. Other ore minerals were pyrrhotite, molybdenite, galena, sphalerite, and scheelite. The gangue consisted chiefly of grey to blue quartz with chrome muscovite (fuschite), albite, and ankerite. Crystals of pyrite and arsenopyrite occurred with black tourmaline in quartz.

Original staking was done in 1922 during the first Rouyn staking rush. In 1932, Dave McWatters restaked the property and discovered a conglomerate outcrop containing a quartz vein rich in native gold. McWatters Gold Mines Limited mined it from 1934 to 1944. The underground workings extended to 457 m and the mine was equipped with a cyanide mill. Production amounted to 33 378 779 t of ore containing 3 371 565 g of gold and 373 236 g of silver, valued at $3 946 752. In 1995, McWatters Mining Inc. took a 26 344 t test sample from an open pit near the shaft.

The mine is about 9 km east of Rouyn-Noranda. *See* Map 15 on page 103.

Road log from Highway 117 at **km 109.5** (*see* p. 8):

km	0	Junction, Highway 117 and the road to McWatters; proceed southwest toward McWatters.
	0.4	Junction; turn right (east).
	0.6	Junction; turn left (east).
	1.0	McWatters mine.

Refs.: 11 p. 9–31; 83 p. 162–165; 138 p. 7, 33–43; 257 p. 228; 340 p. 48–49; 399 p. 97–106; 464 p. 290–291.

Maps (T): 32 D/2 Lac Kinojévis
(G): 1108A Southeast Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Adanac mine

PYRRHOTITE, PYRITE, CHALCOPYRITE, ARSENOPYRITE, TOURMALINE, NATIVE GOLD

In biotite and graphite schist

Pyrrhotite, pyrite, chalcopyrite, arsenopyrite, and tourmaline occur in quartz veins. Native gold was reported to occur in graphite schist and in rusty vugs in quartz.

Adanac Gold Syndicate discovered gold in a number of quartz veins in 1931 as a result of extensive surface exploration over nearly 5 km. In 1933, Adanac Gold Mines Limited sank a shaft to 152 m and did underground exploration until 1936, but did not locate an economic orebody.

The mine is about 9 km southeast of Rouyn-Noranda. *See* Map 15 on page 103.

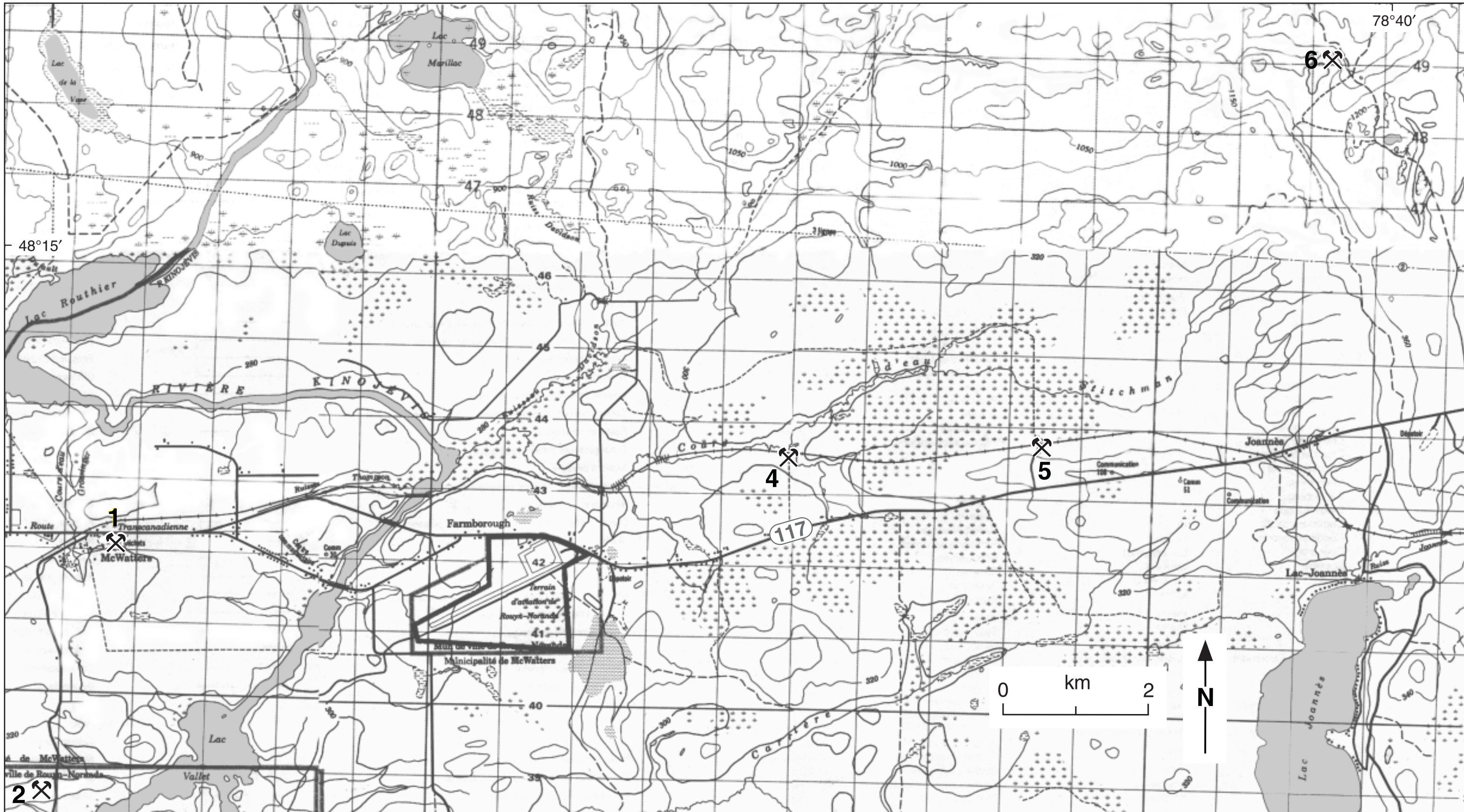
Road log from Highway 117 at **km 109.5** (*see* p. 8):

km	0	Junction, Highway 117 and the road to McWatters; proceed southwest toward McWatters.
	0.4	Junction; continue straight ahead (southwest).
	4.0	Junction, trail on right. Follow this trail west.
	4.2	Adanac mine.

Refs.: 83 p. 172; 399 p. 94–97.

Maps (T): 32 D/2 Lac Kinojévis
(G): 1108A Southeast Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Part of 32 D/2, 7



1. McWatters mine 2. Adanac mine 3. Rouyn-Merger mine 4. Heva mine 5. Hosco mine 6. Arrowhead mine

Map 15. Rouyn-Noranda east.

Rouyn-Merger mine

NATIVE GOLD, PYRITE, TOURMALINE, CHALCOPYRITE, PYRRHOTITE, ARSENOPYRITE, SCHEELITE, TALC

In conglomerate and tuff

Native gold occurred with pyrite, chalcopyrite, and minor amounts of pyrrhotite and arsenopyrite in quartz-carbonate veins and in the wall rock. Black tourmaline and scheelite were also present. The dumps furnish specimens of massive black tourmaline, pyrite, chlorite, and green talc.

Edith McCrea staked the property during the 1922–1923 Rouyn staking rush. East Rouyn (Quebec) Limited outlined a gold deposit by drilling in 1938. Underground development began in 1945 with the sinking of an inclined shaft to 342 m by Rouyn-Merger Gold Mines Limited. The company mined the deposit during a seven-month period beginning in June 1948. Production amounted to 121 146 g of gold from 29 204 t of ore.

The mine is about 11 km east of Rouyn-Noranda. *See* Map 15 on page 103.

Road log from Highway 117 at **km 111.6** (*see* p. 8):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	0.1	Junction; turn right (east).
	0.9	Rouyn-Merger mine.

Refs.: 61 p. 60–61; 83 p. 175–177; 399 p. 107–112.

Maps (T): 32 D/2 Lac Kinojévis
(G): 1108A Southeast Rouyn Township, Témiscamingue County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Heva mine

NATIVE GOLD, PYRITE, TOURMALINE, CHLORITE, ACTINOLITE

In chlorite schist and greywacke

Fine native gold occurred with pyrite in quartz veins. Specimens of quartz containing pyrite, small black tourmaline prisms, dark green radiating prismatic aggregates of actinolite, and chlorite are available from the mine dumps.

Heva Cadillac Gold Mines Limited discovered gold-bearing veins by drilling in 1944–1945. Between 1946 and 1948, Heva Gold Mines Limited developed the deposit from an inclined shaft to 213 m. The company shipped 35 717 t of ore to the mill at the Powell Rouyn mine for treatment in 1951–1952. The ore yielded 247 362 g of gold and 2 005 366 g of silver. In 1986, Eastern Mines Limited and Silver Sceptre Resources Limited conducted a joint drilling program on the property.

The Heva mine is about 17 km east of Rouyn-Noranda. Access is by a 1.1 km road leading north from Highway 117 at **km 119.7** (*see* p. 9). *See* Map 15 on page 103.

Refs.: 61 p. 36–37; 273 p. 13; 425 p. 86–87.

Maps (T): 32 D/2 Lac Kinojévis
(G): 615A Bousquet–Joannès, Joannès and Rouyn townships, Témiscamingue County, Quebec, sheet 4 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Hosco mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, PYRRHOTITE, TOURMALINE, JAROSITE

In shear zone in greywacke and argillite

Coarse native gold occurred in quartz veins containing pyrite, arsenopyrite, and pyrrhotite. Tiny arsenopyrite crystals are common in quartz and in the host rock. The mine dumps contain specimens coated with rusty yellow jarosite and massive quartz containing microscopic prisms of dark brown to black tourmaline.

Hosco Gold Mines Limited discovered three gold-bearing zones as a result of a drilling program in 1944–1945. From June 1948 to October 1949, the company mined the deposit from a 162 m shaft and trucked the ore to the McWatters mill. Production amounted to 229 322 g of gold and 3670 g of silver, from 45 864 t of ore. In 1986, Eastern Mines Limited and Silver Sceptre Resources Limited jointly explored the deposit via a 500 m ramp.

The Hosco mine is about 21 km east of Rouyn-Noranda. Access is by a 0.8 km road leading north from Highway 117 at **km 123.2** (*see* p. 9). *See* Map 15 on page 103.

Refs.: 61 p. 37–38; 257 p. 133–134; 273 p. 13.

Maps (T): 32 D/2 Lac Kinojévis
(G): 614A Bousquet–Joannès, Joannès and Rouyn townships, Témiscamingue and Abitibi counties, Quebec, sheet 3 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Arrowhead mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, TOURMALINE

In altered volcanic rocks

The deposit consists of quartz-calcite-ankerite veins in chlorite-carbonate schist. Native gold occurs in fractures in quartz. The veins also carry pyrite, pyrrhotite, chalcopyrite, and black tourmaline.

R. Hoffman and Fred Thompson originally staked the deposit in 1923. Arrowhead Consolidated Mines Limited drilled the property in 1929–1930 and sank a prospect shaft to about 10 m. In 1936–1937, Arrowhead Gold Mines Limited resumed development and sank a 158 m shaft about 110 m northeast of the prospect shaft.

The mine is about 26 km northeast of Rouyn-Noranda. *See* Map 15 on page 103.

Road log from Highway 117 at **km 129.3** (*see* p. 9):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	4.2	Junction; proceed north along the road on right.
	5.3	Junction; follow the road on left leading north.
	5.5	Arrowhead mine.

Refs.: 24 p. 23–25; 83 p. 181–182; 127 p. 54–57; 371 p. 32.

Maps (T): 32 D/2 Lac Kinojévis
(G): 614A Bousquet–Joannès, Joannès and Rouyn townships, Témiscamingue and Abitibi counties, Quebec, sheet 3 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Calder-Bousquet mine

NATIVE GOLD, ARSENOPYRITE, PYRRHOTITE, PYRITE, CHALCOPYRITE, TOURMALINE, HORNBLENDE, ACTINOLITE

In greywacke

Native gold, arsenopyrite, pyrrhotite, pyrite, chalcopyrite, and tourmaline occur in quartz-ankerite veins. Black hornblende and actinolite occur in the host rock.

Gold was discovered on the original Clement-Manning claims in 1932. Calder-Bousquet Gold Mines Limited sank a 38 m shaft to investigate two mineralized zones.

The Calder-Bousquet mine is about 31 km east of Rouyn-Noranda. Access is by a trail leading south from Highway 117 at **km 133.2** (*see* p. 9). Proceed south along this trail for 330 m, then east for about 180 m to the shaft area. *See* Map 16 on page 107.

Refs.: 24 p. 27; 83 p. 188–189; 127 p. 69–71; 371 p. 33.

Maps (T): 32 D/2 Lac Kinojévis
(G): 613A Bousquet–Joannès, Bousquet and Joannès townships, Abitibi and Témiscamingue counties, Quebec, sheet 2 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Doyon (Silverstack) mine

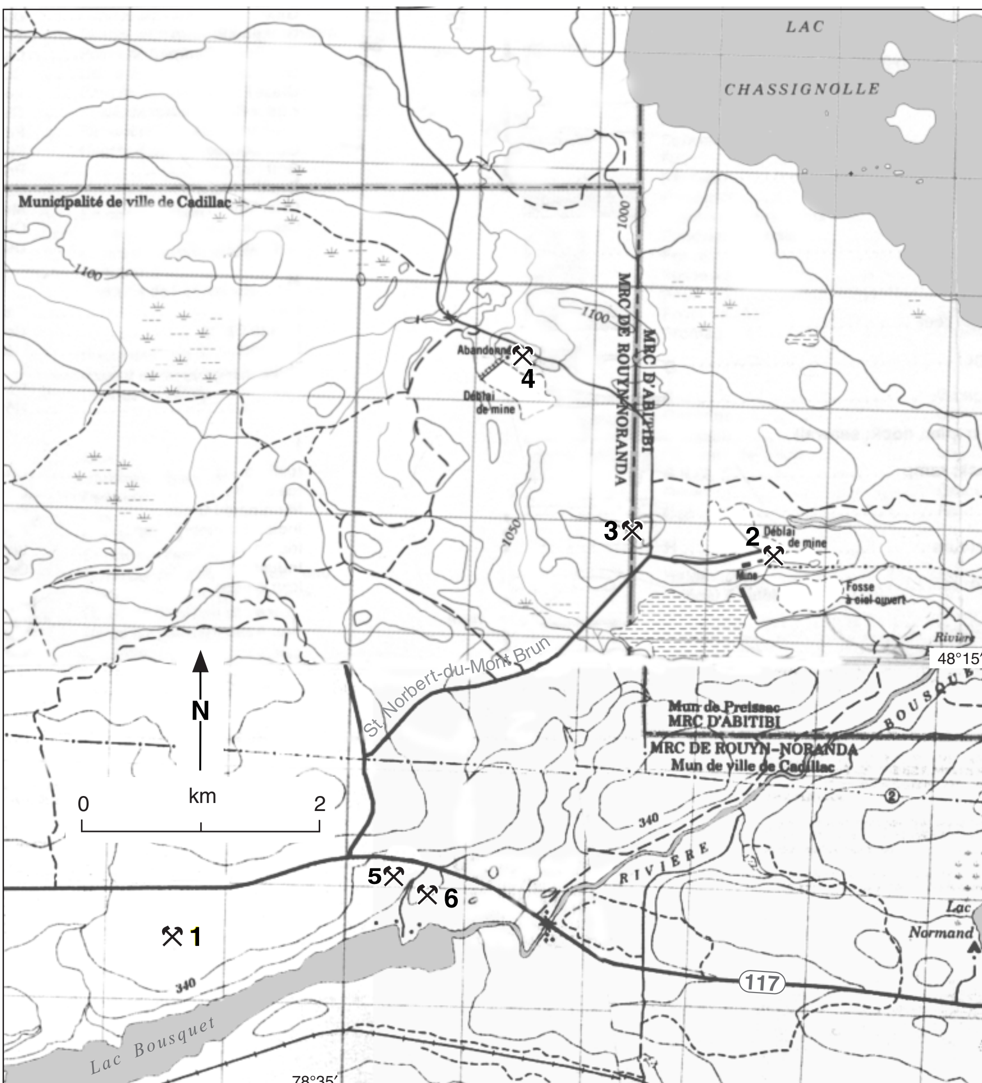
NATIVE GOLD, CALAVERITE, PETZITE, PYRITE, CHALCOPYRITE, SPHALERITE, ALTAITE, PYRRHOTITE, GALENA, ARSENOPYRITE, TETRADYMITE, TELLUROBISMUTHITE, CHALCOCITE, TOURMALINE, TITANITE, RUTILE, EPIDOTE, MAGNETITE, HEMATITE

In sericite schist and felsic volcanic rocks

The mineralization consists of native gold, calaverite, and petzite associated with pyrite, chalcopyrite, and sphalerite in quartz-carbonate veins and in the host rocks. Altaite, pyrrhotite, galena, arsenopyrite, tetradymite, tellurobismuthite, and chalcocite also occur in the ore. The gangue minerals include quartz, dolomite, calcite, chlorite, muscovite, tourmaline, titanite, rutile, epidote, magnetite, and hematite.

The deposit consists of three ore zones. Joint exploration by Société québecoise d'exploration minière (SOQUEM) and Silverstack Mines Limited resulted in the discovery of two ore zones in 1972. In 1977, Long Lac Mineral Exploration Limited acquired Silverstack Mines Limited

Part of 32 D/2, 7



1. Calder-Bousquet mine 2. Doyon (Silverstack) mine 3. Mooshla mine
4. Mouska (Mic Mac) mine 5. Norgold mine 6. Doreva mine

Map 16. Bousquet.

and continued development jointly with SOQUEM. Mining began in 1980 from an open pit. Further exploration in 1983–1984 located ore beneath the pit. Mining of this zone via a vertical shaft began in 1986; the underground development extended to 1000 m below the surface. A drilling program outlined the west zone in 1983 and mining by open pit began there in 1985. In 1986, Cambior Inc. replaced SOQUEM to continue the joint operation with Lac Minerals Limited, which was replaced by American Barrick Resources Corporation (now Barrick Gold Corporation). Cambior Inc. acquired the mine in 1998. To the end of 1997, the mine produced about 113 570 kg of gold from 19 657 628 t of ore.

The mine is about 36 km east of Rouyn-Noranda. *See* Map 16 on page 107.

Road log from Highway 117 at **km 135.2** (*see* p. 9):

km	0	Junction, Highway 117 and the road to Saint-Norbert-de-Mont-Brun; proceed north along the road to Saint-Norbert-de-Mont-Brun.
	4.1	Junction; turn right (east).
	5.0	Doyon (Silverstack) mine.

Refs.: 103 p. 108–110; 104 p. 159–172; 107 p. 9–11; 125 p. 50–57; 308 p. 97–106; 309 p. 401–411; 314 p. 401–411; 368 p. 29–36; 458 p. 115; 460 p. 73–74, 210; 462 p. 55, 76–77; 464 p. 63–64, 91; 465 p. 66–67.

Maps (T): 32 D/7 Cléricy
(G): 612A Bousquet–Joannès, Bousquet Township, Abitibi County, Quebec, sheet 1 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet–Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Mooshla mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, GALENA, MAGNETITE, RUTILE, EPIDOTE, GARNET, TOURMALINE, TITANITE, CALCITE

In alaskite

The main gold-bearing vein contained pyrite and pyrrhotite with minor chalcopyrite, sphalerite, galena, and magnetite (rare). The deposit contained some spectacular concentrations of native gold in white quartz. Rutile, tourmaline, and epidote occurred in the wall rock. The gangue consisted of quartz, albite, and calcite; a pale yellow garnet occurred in the vein and in the adjacent wall rock. A large dump near the shaft furnishes specimens of pyrite, chalcopyrite, pyrrhotite, chlorite, and epidote in white quartz, and colourless to white cleavable masses of calcite that fluoresce pink under long ultraviolet rays. The epidote occurs as greenish-yellow and yellowish- to greyish-green prismatic crystals measuring about 3 mm wide and up to 3 cm long. Small brown crystals of titanite were noted in the calcite.

Dubuisson Mines Limited discovered the gold mineralization in 1933. Mooshla Gold Mines Company Limited explored the deposit between 1935 and 1940 and sank a shaft to 113 m. In 1939–1940, the company shipped 4445 t of sorted ore to the Noranda smelter; it yielded 120 182 g of gold.

The mine is about 35 km east of Rouyn-Noranda. *See* Map 16 on page 107.

Plate 9.

Mooshla mine, 1937. GSC 82395

Road log from Highway 117 at **km 135.2** (*see* p. 9):

km	0	Junction, Highway 117 and the road to Saint-Norbert-de-Mont-Brun; proceed north along the road to Saint-Norbert-de-Mont-Brun.
	4.1	Junction, road to the Doyon mine; continue straight ahead (north).
	4.35	Mooshla mine, on the left (west) side of the road.

Refs.: 83 p. 184–185; 127 p. 82–88; 371 p. 32.

Maps (T): 32 D/7 Cléricy
(G): 613A Bousquet–Joannès, Bousquet and Joannès townships, Abitibi and Témiscamingue counties, Quebec, sheet 2 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet–Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Mouska (Mic Mac) mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, MAGNETITE, ILMENITE, EPIDOTE, HORNBLENDE

In sheared volcanic rocks

The mineralized shear zone consisted of quartz veins containing native gold, pyrite, pyrrhotite, chalcopyrite, and magnetite. Ilmenite occurred with native gold and sulphide minerals in quartz. Gangue minerals included quartz, carbonate, epidote, and hornblende.

Tom Duval discovered gold mineralization on this property in 1936. Mic Mac Mines Limited undertook development in 1939 and sank an exploration shaft to 410 m. Production began in 1942 and continued until ore was mined out in 1947. The mine yielded 1150 t of copper, 3342 kg of gold, and 50 kg of silver, from 723 400 t of ore. In 1987, Cambior Inc. acquired the property and discovered new gold mineralization west of the original mine. Mining of this deposit from a 410 m shaft began in 1991. To the end of 1997, production amounted to about 55 513 kg of gold.

The mine is about 34 km east of Rouyn-Noranda. *See* Map 16 on page 107.

Road log from Highway 117 at **km 135.2** (*see* p. 9):

km	0	Junction, Highway 117 and the road to Saint-Norbert-de-Mont-Brun; proceed north along the road to Saint-Norbert-de-Mont-Brun.
	4.1	Junction, road to the Doyon mine; continue straight ahead (north).
	4.35	Mooshla mine, on the left (west) side of the road. Continue straight ahead (north).
	10.6	Mouska (Mic Mac) mine, on the left (south) side of the road.

Refs.: 107 p. 12–13; 216 p. 803–808; 277 p. 17; 368 p. 48–50; 371 p. 31; 382 p. 58; 421 p. 204–205; 460 p. 74; 462 p. 77; 464 p. 91; 465 p. 95.

Maps (T): 32 D/7 Cléricy
(G): 613A Bousquet–Joannès, Bousquet and Joannès townships, Abitibi and Témiscamingue counties, Quebec, sheet 2 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet–Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Norgold, Doreva mines

NATIVE GOLD, ARSENOPYRITE, PYRITE, PYRRHOTITE, CHALCOPYRITE

In shear zone in greywacke and conglomerate

Native gold is reported to occur in quartz veins in carbonate schist. The veins also contain arsenopyrite, pyrite, pyrrhotite, and chalcopyrite.

The mineralized zones were prospected by two companies. Norgold Mines Limited sank a prospect shaft in 1936 on the original Clement claim. Doreva Gold Mines Limited drove an adit 82.3 m into a ridge on a claim staked by B.J. Cavanagh. The Doreva adit is 300 m east of the Norgold prospect shaft.

The Norgold and Doreva mines are about 33 km east of Rouyn-Noranda. Access is by a 0.4 km road leading south from Highway 117 at **km 135.9** (*see* p. 9). The Norgold shaft is on the west side of the road about 100 m west of this point, and the Doreva adit is about 150 m east of the road at this point. *See* Map 16 on page 107.

Refs.: 24 p. 29; 83 p. 189–190; 127 p. 76–77, 87–88; 371 p. 33.

Maps (T): 32 D/2 Lac Kinojévis
(G): 613A Bousquet–Joannès, Bousquet and Joannès townships, Abitibi and Témiscamingue counties, Quebec, sheet 2 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Bouscadillac mine

NATIVE GOLD, ARSENOPYRITE, PYRITE, PYRRHOTITE, CHALCOPYRITE, TOURMALINE

In sheared porphyritic andesite

Mineralization consisted of native gold with small amounts of arsenopyrite, pyrite, pyrrhotite, chalcopyrite, and tourmaline in quartz veins, and in sheared andesite altered to talc-chlorite schist.

P.T. Graham and D. Abrams discovered gold-bearing quartz veins on the property in 1924. For the next five years, Graham-Bousquet Mining Corporation carried out exploration consisting of drilling, trenching, and sinking of a shaft to 160 m. Bouscadillac Gold Mines Limited continued underground exploration in 1936–1937.

The Bouscadillac mine is about 43 km east of Rouyn-Noranda, on the north side of Highway 117 at **km 146.0** (*see* p. 9). *See* Map 17 on page 112.

Refs.: 65 p. 264–265; 83 p. 192–193; 127 p. 59–65; 257 p. 31.

Maps (T): 32 D/1 Malartic
(G): 612A Bousquet–Joannès, Bousquet Township, Abitibi County, Quebec, sheet 1 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet–Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Mines along Highway 395

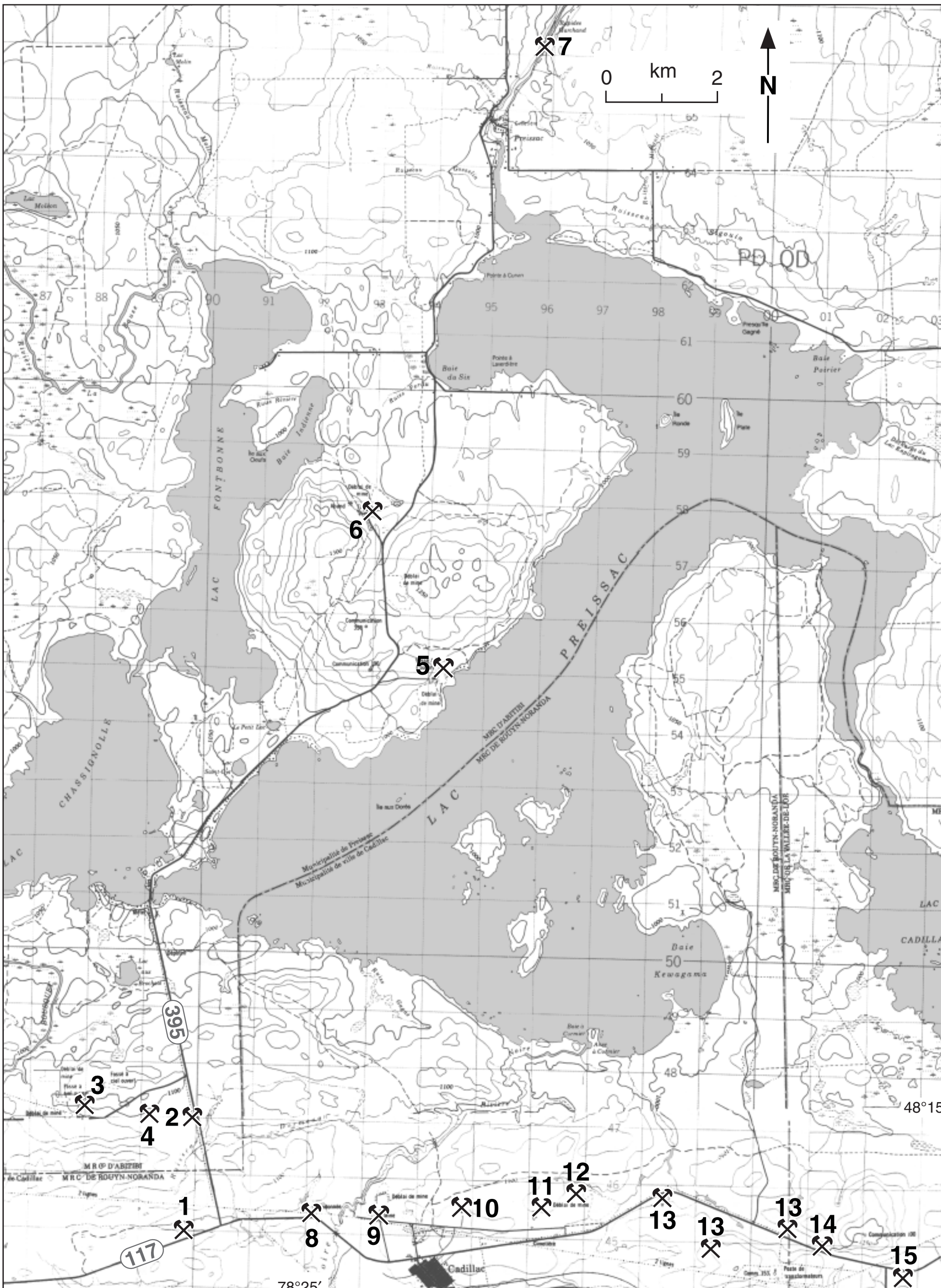
Collecting localities along Highway 395 are described in the text that follows. The starting point is at the junction of highways 395 and 117 at **km 146.1** (*see* p. 9).

LaRonde (Dumagami) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, BORNITE, DIGENITE, CHALCOCITE, STROMEYERITE, MCKINSTRYITE, GALENA, NATIVE SILVER, ALABANDITE, ALTAITE, ARSENOPYRITE, CALAVERITE, COVELLITE, PETZITE, PYRRHOTITE, SPHALERITE, STANNITE, TENNANTITE

In sericite, andalusite, and kyanite schist

Part of 32 D/1, 8



1. Bouscadillac mine 2. LaRonde (Dumagami) mine 3. Bousquet No. 1 mine
4. Bousquet No. 2 mine 5. Cadillac Moly (Anglo American) mine 6. Preissac (Indian) mine
7. Height of Land mine 8. Thompson-Cadillac mine 9. O'Brien mine 10. Kewagama mine
11. Central Cadillac mine 12. Wood Cadillac mine 13. Pandora (Amm) mine
14. Tonawanda mine 15. Lapa Cadillac mine

Map 17. Cadillac

Native gold is associated with pyrite. Chalcopyrite, bornite, digenite, chalcocite, stromeyerite, mckinstryite, galena, and native silver are the main sources of copper and silver. Other ore minerals are alabandite, altaite, arsenopyrite, calaverite, covellite, petzite, pyrrhotite, sphalerite, stannite, tennantite, and some sulphosalt minerals. These minerals occur as intergrowths in disseminated and massive sulphides.

Dumagami Mines Limited began exploration of the property in 1963 and completed No. 1 shaft to 971 m in 1987. Production began in 1988 from an open pit and in 1989 from underground. Open-pit operations ended in 1990. Agnico Eagle Mines Limited conducted surface and underground exploration from 1990 to 1995, resulting in the discovery of ore zones containing silver-zinc and copper-gold mineralization. Additional development consisted of deepening No. 1 shaft to 1208 m, and sinking No. 2 shaft (1220 m east of No. 1 shaft) to 525 m and No. 3 shaft to 2242 m. A mill operates at the mine site. Production to the end of 1997 amounted to about 38 224 kg of gold, 68 443 kg of silver, and 25 811 228 kg of copper, from 51 274 727 t of ore.

The mine is about 43 km east of Rouyn-Noranda. *See* Map 17 on page 112.

Road log from Highway 117 at **km 146.1** (*see* p. 9):

km	0	Junction, highways 117 and 395; proceed north along Highway 395.
	2.1	LaRonde (Dumagami) mine, on the west side of Highway 395.

Refs.: 107 p. 12; 205 p. 2, 45–53; 368 p. 42–48; 371 p. 30; 453 p. 133; 455 p. 150–151; 456 p. 153; 457 p. 38; 459 p. 29; 460 p. 28; 462 p. 24; 464 p. 26; 465 p. 27.

Maps (T): 32 D/8 La Motte
(G): 612A Bousquet–Joannès, Bousquet Township, Abitibi County, Quebec, sheet 1 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet–Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Bousquet No. 1, Bousquet No. 2 mines

NATIVE GOLD, PYRITE, ALTAITE, PETZITE, CALAVERITE, GALENA, BORNITE, CHALCOPYRITE, PYRRHOTITE, SPHALERITE, ARSENOPYRITE, TETRAHEDRITE, MAGNETITE, TENNANTITE, RUTILE, ILMENITE, STANNITE, GUDMUNDITE, ANDALUSITE, KYANITE, PYROPHYLLITE, DIASPORE, CHLORITOID, KAOLINITE, PARAGONITE, GARNET

In tuff and agglomerate

Native gold occurs as microscopic grains associated with pyrite, quartz, altaite, petzite, calaverite, galena, and bornite. Chalcopyrite, pyrrhotite, sphalerite, arsenopyrite, galena, tetrahedrite, magnetite, bornite, tennantite, rutile, ilmenite, stannite, and gudmundite are minor components. Bornite, chalcopyrite, and tennantite are important ores of copper in the No. 2 deposit; bornite and visible gold occur as fracture coatings. Gangue minerals include quartz, mica, and chlorite. Alteration zones associated with the metallic mineralization consist of a fine-grained andalusite schist composed of quartz, muscovite, andalusite, kyanite, pyrophyllite, diaspore, chloritoid, kaolinite, paragonite, and the sulphide minerals pyrite and pyrrhotite. Andalusite grains are generally less than 1 cm across. Kyanite occurs as crystals up to 2 cm long. Manganese-bearing garnet occurs in muscovite-garnet schist in the alteration zones.

The Bousquet mines consist of Bousquet No. 1 and Bousquet No. 2 mines. Bousquet No. 1 orebody is the western extension of the LaRonde orebody. Thompson-Bousquet Gold Mines Limited discovered gold mineralization in 1937 on the property that is now Bousquet No. 1 mine. Long Lac Minerals Exploration Limited discovered eight additional gold-bearing zones between 1975 and 1978. Production at the Bousquet No. 1 mine began in 1979 from underground and in 1985 from an open pit. Underground development consists of a 567 m shaft. Lac Minerals Limited discovered a copper-gold deposit (Bousquet No. 2 deposit) 1.2 km east of the No. 1 mine in 1986 and began mining it in 1989. In 1994, American Barrick Corporation (renamed 'Barrick Gold Corporation' in 1995) took over operations. Development consists of a 1244 m shaft. Production from the Bousquet mines to the end of 1997 amounted to about 58 277 kg of gold and 11 541 t of copper, from 8 762 527 t of ore. The ore is treated at the East Malartic mill.

The mines are about 42 km east of Rouyn-Noranda. *See* Map 17 on page 112.

Road log from Highway 117 at **km 146.1** (*see* p. 9):

km	0	Junction, highways 117 and 395; proceed north along Highway 395.
	2.7	Junction; turn left (west) onto the mine road.
	4.3	Bousquet mines office. Bousquet No. 1 mine is adjacent to the office; Bousquet No. 2 mine is about 1 km east.

Refs.: 107 p. 10–11; 117 p. 78–90; 335 p. 3–27; 355 p. 75–115; 356 p. 12–13; 357 p. 91–99; 358 p. 1578–1584; 359 p. 1–3, 44–58; 368 p. 36–42; 370 p. 81–89; 372 p. 41–46; 452 p. 253; 457 p. 256; 460 p. 211; 462 p. 55; 464 p. 63; 465 p. 66.

Maps (T): 32 D/1 Malartic
32 D/8 La Motte
(G): 612A Bousquet–Joannès, Bousquet Township, Abitibi County, Quebec, sheet 1 (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet–Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Cadillac Moly (Anglo American) mine

MOLYBDENITE, BISMUTHINITE, PYRITE, CHALCOPYRITE, FLUORITE, MICA

In granite

Molybdenite, bismuthinite, and pyrite occur in pegmatitic quartz veins. Violet to almost black fluorite, dark green chlorite, and light to dark green mica are associated with the metallic minerals. The main constituents of the veins are pink orthoclase and white to grey quartz.

The property comprises two claims, the M.J. O'Brien claim and the Hervey claim, staked in about 1906. A few years prior to that, J.F.E. Johnston of the Geological Survey of Canada discovered molybdenite-bearing quartz veins on the shore of Preissac (Kewagama) Lake. The St. Maurice Syndicate did some trenching on the deposit in about 1911 and excavated about 317 kg of ore for testing. In 1959, Anglo American Molybdenite Mining Corporation (name changed to 'Cadillac Moly Mines Limited' in 1968) undertook development consisting of an open pit and a 235 m shaft. Production between 1965 and 1970 amounted to about 2 831 250 kg of molybdenite, 389 580 kg of bismuth, and 637 611 g of silver.

Plate 10.

Cadillac Moly mine, on the shore of Preissac Lake, 1972.
Preissac-Lacorne granite outcrops in the foreground. GSC 161440

The mine is about 48 km northeast of Rouyn-Noranda, on the eastern shore of Indian Peninsula, Preissac Lake. *See* Map 17 on page 112.

Road log from Highway 117 at **km 146.1** (*see* p. 9):

km	0	Junction, highways 117 and 395; proceed north along Highway 395.
	2.7	Junction, road to Bousquet mines; continue north along the highway.
	11.7	Junction; turn right (east).
	12.8	Cadillac Moly (Anglo American) mine.

Refs.: 30 p. 17–18; 32 p. 11–13; 191 p. 22–24; 255 p. 25–26; 379 p. 117–120; 396 p. 155, 157; 441 p. 62–63; 443 p. 68–69.

Maps (T): 32 D/8 La Motte
(G): 1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)
2040 Géologie de la région de Preissac-La Pause-Cléricy (MRNQ, 1:50 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Preissac (Indian) mine

MOLYBDENITE, BISMUTHINITE, PYRITE, CHALCOPYRITE, NATIVE BISMUTH, FLUORITE, MUSCOVITE, GARNET, BISMOCLITE, SERPENTINE, CALCITE, COLUMBITE-TANTALITE

In muscovite granite

Molybdenite occurs as aggregates of coarse flakes in quartz-muscovite veins. Acicular crystals of bismuthinite occur with pyrite and chalcopyrite in molybdenite-poor quartz veins. Native bismuth occurs in fractures in quartz and as intergrowths with molybdenite and muscovite. Violet fluorite, light green muscovite, pink feldspar, and tiny orange-red garnet crystals are also present in quartz. Bismoclite occurs as a light green coating on feldspar and quartz. Black serpentine occurs as patches on granite. White calcite associated with fluorite fluoresces pink under long ultraviolet rays. A mineral belonging to the columbite-tantalite series has been reported from the deposit.

The property includes the Huestis, Sweezey, and Doucet claims staked in about 1909. St. Maurice Mines Company Limited explored the deposit between 1916 and 1921 and sank a shaft to 21 m. In 1943–1944, Indian Molybdenum Limited continued exploration and drove an inclined shaft 150 m to the 38 m level. A production of 316 671 kg of molybdenite resulted from these operations. Preissac Molybdenite Mines Limited resumed operations in 1955 from a shaft deepened to 407 m. An on-site mill produced molybdenum and bismuth from 1964 to 1971. The value of the production from both periods of operation was $23 000 000.

The mine is about 48 km northeast of Rouyn-Noranda, on Indian Peninsula, Preissac Lake. *See* Map 17 on page 112.

Road log from Highway 117 at **km 146.1** (*see* p. 9):

km	0	Junction, highways 117 and 395; proceed north along Highway 395.
	11.7	Junction, road to Cadillac Moly mine; continue along Highway 395.
	14.4	Junction; turn left (northwest).
	15.0	Preissac (Indian) mine.

Plate 11.

St. Maurice Mines Company Limited mill at Preissac (Indian) mine, about 1918.
National Archives of Canada PA 15771

Refs.: 30 p. 17–18; 32 p. 11–13; 34 p. 299–311; 83 p. 415–417; 99 p. 125–127; 183 p. 3; 191 p. 22–24; 226 p. 6–8; 379 p. 120–124; 383 p. 36, 38; 391 p. 31, 33; 397 p. 157; 443 p. 307.

Maps (T): 32 D/8 La Motte
(G): 1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)
2040 Géologie de la région de Preissac-La Pause-Cléricy (MRNQ, 1:50 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Height of Land mine

MOLYBDENITE, BISMUTHINITE, BERYL, PHENACITE, FLUORITE, CHALCOPYRITE, PYRITE, SPHALERITE, MUSCOVITE

In granite pegmatite

Molybdenite and bismuthinite occur in quartz veins and in quartz-feldspar-muscovite pegmatite. Molybdenite crystals up to 5 cm across occur in muscovite. Beryl and phenacite occur in quartz, in platy feldspar, and in muscovite. Beryl is green and partly translucent; crystals up to 10 cm across were found in muscovite. Phenacite occurs as minute colourless crystals associated with chlorite in quartz. Violet fluorite, chalcopyrite, pyrite, and sphalerite occur in the pegmatite. Pyrite cubes up to 5 cm across have been reported.

C.S. Richmond staked the property in August 1906. Height of Land Mining Company Limited did surface excavations and sank a shaft to 23 m in 1907–1909. The surface openings intersected some rich pockets of molybdenite, including one that yielded 226 kg of large crystals. The crystals were removed with a hammer from the enclosing muscovite and quartz. In 1914, Mr. Forbes and Mr. Campbell sank another shaft to 17 m and recovered 544 kg of molybdenite. This shaft is about 455 m northeast of the original shaft. The old workings (now overgrown) are scattered along the west bank of the Kinojévis River, just south of the Marchand Rapids, which are below (north of) Preissac.

The mine is about 54 km northeast of Rouyn-Noranda. *See* Map 17 on page 112.

Road log from Highway 117 at **km 146.1** (*see* p. 9):

km	0	Junction, highways 117 and 395; proceed north along Highway 395.
	14.4	Junction, road to Preissac (Indian) mine; continue straight ahead along Highway 395.
	23.1	Preissac, just west of the bridge over Kinojévis River. The Height of Land mine is 1800 m downstream from (north of) the bridge and about 350 m south of the Marchand Rapids.

Refs.: 10 p. 188–195; 65 p. 290–291; 83 p. 417–418; 99 p. 129–131; 191 p. 22–24; 220 p. 82–83; 379 p. 125; 383 p. 32–35.

Maps (T): 32 D/8 La Motte
(G): 44-9A La Motte (west half), Abitibi County, Quebec (GSC, 1:31 680)
1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)

2040 Géologie de la région de Preissac-La Pause-Cléricy (MRNQ, 1:50 000)
2109 Carte géologique des gîtes métallifPres des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Thompson-Cadillac mine

NATIVE GOLD, ARSENOPYRITE, PYRITE, PYRRHOTITE

In porphyritic andesite

Native gold occurred in quartz and in arsenopyrite associated with minor pyrite and pyrrhotite. Some veins contained spectacular pockets of coarse native gold in quartz.

E.J. Thompson discovered the gold mineralization and staked the discovery vein in the summer of 1924. Subsequent exploration by the Anglo-French Exploration Company in 1925 resulted in locating an economic ore zone. Thompson-Cadillac Mines Limited began development of this zone in 1927. Development consisted of the main shaft sunk to 189 m and a prospect shaft to 30 m (275 m west of the main shaft). Production from 1936 to 1939 amounted to 512 kg of gold and 26 kg of silver, from 150 000 t of ore. Alger Gold Mines Limited resumed underground exploration between 1945 and 1948, deepening the main shaft to 340 m.

The Thompson-Cadillac mine is about 45 km east of Rouyn-Noranda, on the north side of Highway 117 at **km 147.7** (*see* p. 9). *See* Map 17 on page 112.

Refs.: 24 p. 33–34; 27 p. 53–57; 61 p. 16–17; 83 p. 197; 368 p. 55–56; 371 p. 33.

Plate 12.

Thompson-Cadillac mine, 1934. GSC 77378

Plate 13.

O'Brien mine, 1934. The discovery vein (foreground) is
about 3.5 m wide. GSC 77381

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

O'Brien mine

NATIVE GOLD, ARSENOPYRITE, PYRRHOTITE, PYRITE, CHALCOPYRITE, GALENA, SPHALERITE, TOURMALINE, RUTILE, SCHEELITE, APATITE, FLUORITE, CHROME MUSCOVITE, EPIDOTE, AXINITE

In conglomerate and andesite porphyry

Native gold occurred as leaves and plates in bluish-grey quartz veins and as grains in arsenopyrite and tourmaline. During mining operations, the mine yielded spectacular specimens of native gold in fractures in quartz; some were set aside for museums. The metallic minerals in the veins were arsenopyrite and pyrrhotite with minor amounts of pyrite, chalcopyrite, galena, and sphalerite. Gangue minerals included dolomite, albite, tourmaline, biotite, muscovite, chlorite, rutile, scheelite, apatite, fluorite, chrome muscovite (fuschite), epidote, and axinite.

At one time, this was the richest gold producer in Quebec. Austin Dumont and W. Hermeston staked the property in 1924 for M.J. O'Brien Company Limited. Exploration in 1929 revealed a shoot of spectacular high-grade ore. Development began immediately, followed by production from 1932 to 1956. Development consisted of three shafts sunk to 35 m, 450 m, and 620 m, and an internal shaft to 1050 m. The mill operated at 180 t/day. The mine produced 1 190 000 t of ore containing 18 299 kg of gold and 1474 kg of silver, valued at $20 500 000; about 4807 t of arsenic concentrate were also recovered. Darius Gold Mines Inc. reopened the mine and produced some gold between 1978 and 1981.

The O'Brien mine is about 46 km east of Rouyn-Noranda. A 0.8 km road leads north from Highway 117 at **km 149.4** (*see* p. 9) to the main shaft; the other shafts are 150 m and 450 m west of the main shaft. *See* Map 17 on page 112.

Refs.: 24 p. 34; 27 p. 47–52; 41 p. 809–811; 83 p. 197–199; 127 p. 49–55; 257 p. 41; 305 p. 1–2, 27–30; 368 p. 50–55; 371 p. 32.

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Kewagama mine

NATIVE GOLD, ARSENOPYRITE, PYRITE

In porphyry and greenstone

Native gold occurs in bluish-grey quartz veins. Arsenopyrite and pyrite are present in small amounts.

Cartier Malartic Gold Mines Limited did some surface work on the property in 1927. In 1932–1933, Canadian Gold Operators Limited did some additional surface exploration and sank a shaft to 43 m. This exploration revealed several gold-bearing quartz veins. Kewagama Gold Mines Limited acquired the property in 1936, deepened the shaft to 160 m, and discovered some high-grade ore. Production in 1940 amounted to 28 117 g of gold and 2208 g of silver, from 2470 t of ore. In 1980–1981, Sulpetro Minerals Limited deepened the shaft to 390 m and recovered 9935 t of ore averaging 9.95 g/t gold.

The mine is about 47 km east of Rouyn-Noranda. *See* Map 17 on page 112.

Road log from Highway 117 at **km 150.0** (*see* p. 9):

km	0	Cadillac, junction of Highway 117 and a road leading north; proceed north along this road.
	0.6	Junction; turn right (east). (The road on left leads 0.6 km to the O'Brien mine.)
	1.5	Junction; turn left (north).
	1.7	Kewagama mine.

Refs.: 24 p. 35; 83 p. 199–200; 126 p. 55–57; 371 p. 32.

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Central Cadillac, Wood Cadillac mines

NATIVE GOLD, PYRITE, ARSENOPYRITE, TOURMALINE, PYRRHOTITE, CHALCOPYRITE, SCHEELITE, MAGNETITE

In iron-formation and sheared volcanic tuff

The mineralization consisted of two types of ore, a sulphide ore consisting of pyrite and native gold in iron-formation, and a quartz vein ore containing native gold, pyrite, arsenopyrite, tourmaline, scheelite, and some pyrrhotite and chalcopyrite. Some coarse gold was encountered during mining operations, but most of it was very fine. Scheelite occurred as large crystals. The iron-formation is a banded rock containing finely granular magnetite. The mine dumps furnish calcite that fluoresces a vivid pink when exposed to short ultraviolet rays.

The two mines are about 350 m apart. Exploration of the deposit shared by the two mines began in 1928–1929. In 1936, Central Cadillac Gold Mines Limited located an ore zone that constituted the western end of the deposit. The company sank three shafts to 69 m, 137 m, and 183 m. Production from 1939 to 1943 amounted to 954 kg of gold and 115 kg of silver, from 185 500 t of ore. Drilling by Wood Cadillac Mines Limited in 1936 located the eastern end of the deposit. The company sank a shaft to 160 m about 400 m east of the Central Cadillac main shaft and extended the development to 305 m using a winze. Production from 1939 to 1942 amounted to 846 kg of gold and 141 kg of silver, from 160 000 t of ore. In 1945, Consolidated Central Cadillac Mines Limited acquired the two mines and resumed operations, deepening the Wood Cadillac shaft to 330 m. Production from 1947 to 1949 amounted to 1010 kg of gold and 130 kg of silver, from 233 300 t of ore. The mines produced some tungsten in 1942–1943.

The mines are about 49 km east of Rouyn-Noranda. *See* Map 17 on page 112.

Road log from Highway 117 at **km 152.6** (*see* p. 9):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.

0.25 Junction. The road on left leads northwest 150 m to the Central Cadillac mine main shaft; another shaft is 60 m to the northwest and another is 335 m to the west. To reach the Wood Cadillac mine from this junction, proceed along the road leading northeast.

0.65 Wood Cadillac mine.

Refs.: 27; 83 p. 200–202; 126 p. 57–60; 171 p. 816–821; 195 p. 182; 368 p. 56–60; 371 p. 34; 422 p. 57.

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Pandora (Amm) mine

NATIVE GOLD, ARSENOPYRITE, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, GALENA, TOURMALINE, MAGNETITE, CALCITE

In sheared greywacke

Native gold occurred in fractures in quartz veins. The most common metallic mineral was arsenopyrite. Pyrite and pyrrhotite were less common, and chalcopyrite, sphalerite, and galena were relatively rare. Some scheelite was also present. Specimens found in the mine dumps include black acicular tourmaline crystals in quartz, magnetite in black banded iron-formation, pink to white calcite (fluoresces pink when exposed to long ultraviolet rays), and arsenopyrite and pyrite.

In 1923, Martin Meers discovered native gold in a quartz vein that he trenched over 366 m. Meers and his associates (Pandora Syndicate) sank No. 1 shaft to 30 m, but failed to locate economic veins. In 1928, Pandora Gold Limited discovered a gold-bearing quartz vein about 800 m northeast of the shaft. In 1931–1933, Pandora Gold Mines Limited sank No. 2 shaft to 152 m. In 1937–1938, Pandora Cadillac Gold Mines Limited sank No. 3 shaft to 115 m, 2.5 km west-northwest of No. 2. shaft. At about the same time, Amm Gold Mines Limited discovered gold mineralization in an adjacent claim, sank No. 4 shaft to 155 m, 1 km east southeast of No. 3 shaft, and installed a 150 t/day mill. Pandora Limited acquired the Amm property in 1940. Production between 1939 and 1942 amounted to 839 874 g of gold and 130 197 g of silver, from 178 231 t of ore.

The Pandora (Amm) mine is about 52 km east of Rouyn-Noranda. The No. 3 shaft is on the south side of Highway 117 at **km 154.3**. Access to No. 4 shaft is by a road, 1 km long, leading south from Highway 117 at **km 155.7**. The No. 2 shaft is on the north side of Highway 117 at **km 156.9**. (*See* the main road log on p. 9 for these points on Highway 117.) *See* Map 17 on page 112.

Refs.: 24 p. 36–37; 83 p. 204–206; 126 p. 60–66; 195 p. 182; 368 p. 60–62.

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)

2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Tonawanda mine

NATIVE GOLD, PYRITE, ARSENOPYRITE

In conglomerate and iron-formation

Native gold occurs as small specks in quartz veins. Pyrite and arsenopyrite are also present in the quartz.

Tonawanda Gold Syndicate discovered gold mineralization and did the initial surface exploration in 1928–1929. Tonawanda Mines Limited conducted further exploration from 1929 to 1936 and sank a prospect shaft on gold-bearing quartz veins in conglomerate.

The Tonawanda mine is about 53 km east of Rouyn-Noranda, on the north side of Highway 117 at **km 157.5** (*see* p. 9). *See* Map 17 on page 112.

Refs.: 83 p. 206; 126 p. 66–67.

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Lapa Cadillac mine

NATIVE GOLD, PYRITE, PYRRHOTITE, ARSENOPYRITE, CHALCOPYRITE, TOURMALINE

In biotite-chlorite schist

Native gold occurred as visible gold in considerable amounts in quartz veins. Finely granular pyrite and minor pyrrhotite, arsenopyrite, chalcopyrite, and tourmaline also occurred in the veins.

Sudbury Contact Mines Limited discovered the gold-bearing veins by drilling in 1933. Zapa Cadillac Mines Limited took over the property in 1934 and undertook development. Production began in 1938 and continued until the ore ran out in 1943. A 215 m shaft serviced the mine. Production amounted to 1470 kg of gold and 57 kg of silver, from 346 000 t of ore.

The Lapa Cadillac mine is about 54 km east of Rouyn-Noranda. Access is by a 0.4 km road leading south from Highway 117 at **km 159.0** (*see* p. 9). *See* Map 17 on page 112.

Refs.: 24 p. 37; 83 p. 207–209; 126 p. 68–71; 128 p. 89–92; 368 p. 63–64.

Maps (T): 32 D/1 Malartic
(G): 399A Cadillac area, Cadillac Township, Quebec (GSC, 1:18 000)
575A Malartic, Malartic and Cadillac townships, Abitibi County, Quebec, sheet 4 (GSC, 1:18 000)

2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2165A Géologie de la région de Bousquet-Cadillac (MRNQ, 1:50 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Mines along Highway 109

Collecting localities along Highway 109 from Rivière-Héva to Matagami are described in the text that follows. The starting point is at the junction of highways 109 and 117 at **km 163.4** (*see* p. 9).

Moly Hill mine

MOLYBDENITE, BISMUTHINITE, BISMUTITE, WULFENITE, ACTINOLITE, QUARTZ CRYSTALS, CHLORITE

In granite pegmatite

Molybdenite occurs as rosettes of hexagonal crystals in white to colourless quartz and in pegmatite. Bismuthinite, as slender crystals and small masses, is associated with the molybdenite. Yellow bismutite occurs as a coating on quartz and on molybdenite. Wulfenite forms white coatings on quartz. Other minerals identified from the deposit include actinolite, as dark green prismatic aggregates, colourless tiny crystals of quartz in massive quartz, dark green chlorite, and silvery grey mica.

Paramount Mining and Developing Syndicate trenched the deposit in 1940. Utufora Mining Company Limited did extensive exploration and development in 1963. From 1964 to 1968, Moly Hill Mining Corporation Limited mined 2611 t of molybdenite ore from an open pit in the main zone; the ore contained 0.104% molybdenite and 0.028% bismuth. Another molybdenite zone is about 450 m north of the pit.

The mine is about 63 km northeast of Rouyn-Noranda, on the east side of a prominent white ridge. *See* Map 18 on page 125.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 in Rivière-Héva; proceed onto Highway 109.
	6.6	Junction; turn left (north).
	7.7	Crossroad; turn left (west).
	9.8	Moly Hill mine.

Refs.: 28 p. 196; 31 p. 71; 39 p. 125–129; 191 p. 25; 194 p. 9; 226 p. 6; 440 p. 225.

Maps (T): 32 D/8 La Motte
(G): 1295 Southwest quarter of La Motte Township, electoral district of Abitibi-East (MRNQ, 1:12 000)
1759 La Motte Township, electoral districts of Rouyn-Noranda and Abitibi-West (MRNQ, 1:24 000)

Part of 32 D/1, 8

1. Moly Hill mine 2. Marbridge mine 3. La Motte (Authier, Colombe) lithium occurrence.

Map 18. La Motte.

2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Marbridge mine

PYRRHOTITE, PYRITE, PENTLANDITE, CHALCOPYRITE, SPHALERITE, MILLERITE, HEAZLEWOODITE, VIOLARITE, VALLERIITE, BORNITE, GERSDORFFITE, SPERRYLITE, MAGNETITE, ILMENITE, MOLYBDENITE, HEXAHYDRITE, GYPSUM, SERPENTINE, TALC, TREMOLITE-ACTINOLITE, EPIDOTE, MORENOSITE, RETGERSITE, PYROAURITE, ANTHOPHYLLITE, STICHTITE, GARNET (ANDRADITE)

In serpentinized peridotite

The ore consisted of massive and disseminated sulphides; the principal sulphides at the No. 1 deposit were pyrrhotite and pentlandite, with minor pyrite, chalcopyrite, and sphalerite. In the No. 2 deposit, millerite, pentlandite, and pyrite were the main constituents with millerite accounting for more than 60% of the nickel production. Individual crystals were up to 15 cm across. Other minerals occurring in the ore were chalcopyrite, heazlewoodite, violarite, valleriite, bornite, gersdorffite, sperrylite, magnetite, ilmenite, and molybdenite. Other minerals reported from the deposit include retgersite and morenosite as bluish-white to blue crusts on massive sulphides, yellowish-white to yellow pyroaurite on serpentine, greyish-green fibrous to splintery anthophyllite in serpentine, light violet stichtite aggregates to 3 mm across on serpentine, and garnet as clear yellowish crystals in massive millerite and as dark green microscopic crystals (andradite) in massive sulphides. Green to dark green and almost black serpentine with yellowish-green veining is associated with the orebody; it can be carved and used as an ornamental stone. The mine dumps provide specimens of secondary minerals including hexahydrite as dull white to light blue powdery and botryoidal crusts, colourless to white platy gypsum, olive-green massive serpentine, white to light green massive, foliated, and flaky talc, light to dark green prismatic aggregates of tremolite-actinolite, and prismatic crystalline aggregates of epidote.

The deposit outcropped as rusty, massive-sulphide-bearing rock. Vasile (Bill) Melnik and John Manchelanko discovered the outcrop during a log-skidding operation in 1957. In the same year, Marchand Mining Company Limited began a program of geophysical surveys and diamond-drilling. Falconbridge Nickel Mines Limited continued the exploration in 1959–1960. Marbridge Mines Limited undertook development in 1960 and began production in 1962 at the No. 1 mine and in 1965 at the No. 2 mine. The underground workings of No. 1 shaft and winze extend to 466 m; No. 2 shaft, sunk to 236 m, is about 900 m southeast of No. 1 shaft. Operations ended in 1968 when the ore ran out. Production amounted to 702 224 t of ore grading 2.28% nickel and 0.1% copper, valued at $18 334 000. The ore was processed at the company's mill at the site of the Canadian Malartic mine. Following the mine closure, Mr. R.C. Staveley of Willowdale, Ontario, extracted about 900 t of serpentine rock from an open cut and shipped it to various points in the Arctic for use as a sculpturing stone by the Inuit. It is commercially referred to as 'soapstone'.

The mine is about 66 km northeast of Rouyn-Noranda. *See* Map 18 on page 125.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed onto Highway 109.

6.6	Junction; turn left (north).
7.7	Crossroad; continue straight ahead (north).
10.9	Junction; turn left (west).
11.6	Junction; turn right (north).
13.7	Junction; turn right (southeast) onto the mine road.
13.85	Marbridge mine (No. 1); the road continues 1.1 km to the No. 2 mine.

Refs.: 39 p. 113–117; 46 p. 529–534; 60 p. 796–805; 121 p. 886–896; 191 p. 26; 194 p. 7–8; 320 p. 174–178; 433 p. 150; 441 p. 224.

Maps (T): 32 D/8 La Motte
(G): 1295 Southwest quarter of La Motte Township, electoral district of Abitibi-East (MRNQ, 1:12 000)
1759 La Motte Township, electoral districts of Rouyn-Noranda and Abitibi-West (MRNQ, 1:24 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

La Motte (Authier, Colombe) lithium occurrence

SPODUMENE, LITHIOPHILITE, BERYL, MOLYBDENITE, GARNET, COLUMBITE-TANTALITE

In granite pegmatite

Spodumene, lithiophilite, and minor amounts of beryl, molybdenite, garnet, and columbite-tantalite occur in pegmatite composed of albite, K-feldspar, quartz, muscovite, and some biotite and hornblende.

Space Age Metals Corporation Limited investigated the occurrence for lithium in 1962–1964, followed by Delta Mining Corporation in 1965. Drilling outlined a deposit containing 5 804 800 t at 1.14% lithium oxide. SOQUEM trenched the lithium showing.

The property is about 68 km northeast of Rouyn-Noranda. *See* Map 18 on page 125.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed onto Highway 109.
	6.6	Junction; turn left (north).
	7.7	Crossroad; continue straight ahead (north).
	10.9	Junction; turn left (west).
	11.6	Junction; turn right (north).
	13.7	Junction, Marbridge mine road; continue straight ahead.
	15.6	Junction, trail on left to the La Motte (Authier, Colombe) lithium occurrence; proceed about 350 m west along this trail to the trench.

Refs.: 31 p. 68–69; 39 p. 132–133; 191 p. 25, 27.

Maps (T): 32 D/8 La Motte
(G): 1759 La Motte Township, electoral districts of Rouyn-Noranda and Abitibi-West (MRNQ, 1:24 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Jay (Amos) mine

CHALCOPYRITE, PYRITE, SPHALERITE, SELENIUM, NATIVE BISMUTH, MALACHITE, CHRYSOCOLLA, LIMONITE

In sericite schist

Chalcopyrite occurs in quartz and in sericite schist. Pyrite and sphalerite are also present. Selenium has been reported from a chalcopyrite-rich sulphide zone, and selenium and native bismuth from a sphalerite zone. The secondary minerals malachite, chrysocolla, and limonite have been reported from the deposit.

Joseph Tremblay discovered copper sulphides on the property in 1913 and staked a claim. Campbell-Forbes Syndicate sank a prospect shaft to 16 m and shipped some copper ore for testing in 1916. In 1928, North Country Mines Limited sank a shaft to 35 m, 30 m north of the original shaft, and made a test shipment of copper-silver ore. Between 1926 and 1929, Jay Copper-Gold Mines Limited discovered another copper-silver zone 450 m to the southeast, sank a shaft to 160 m, and shipped 29 t of ore containing 5% copper and 150 g/t silver. From 1951 to 1957, New Formaque Mines Limited did some diamond-drilling, constructed a headframe, and brought in some mine buildings from the Buffadison mine near Val-d'Or.

The mine is about 80 km northeast of Rouyn-Noranda and 5 km northeast of Amos. *See* Map 19 on page 129.

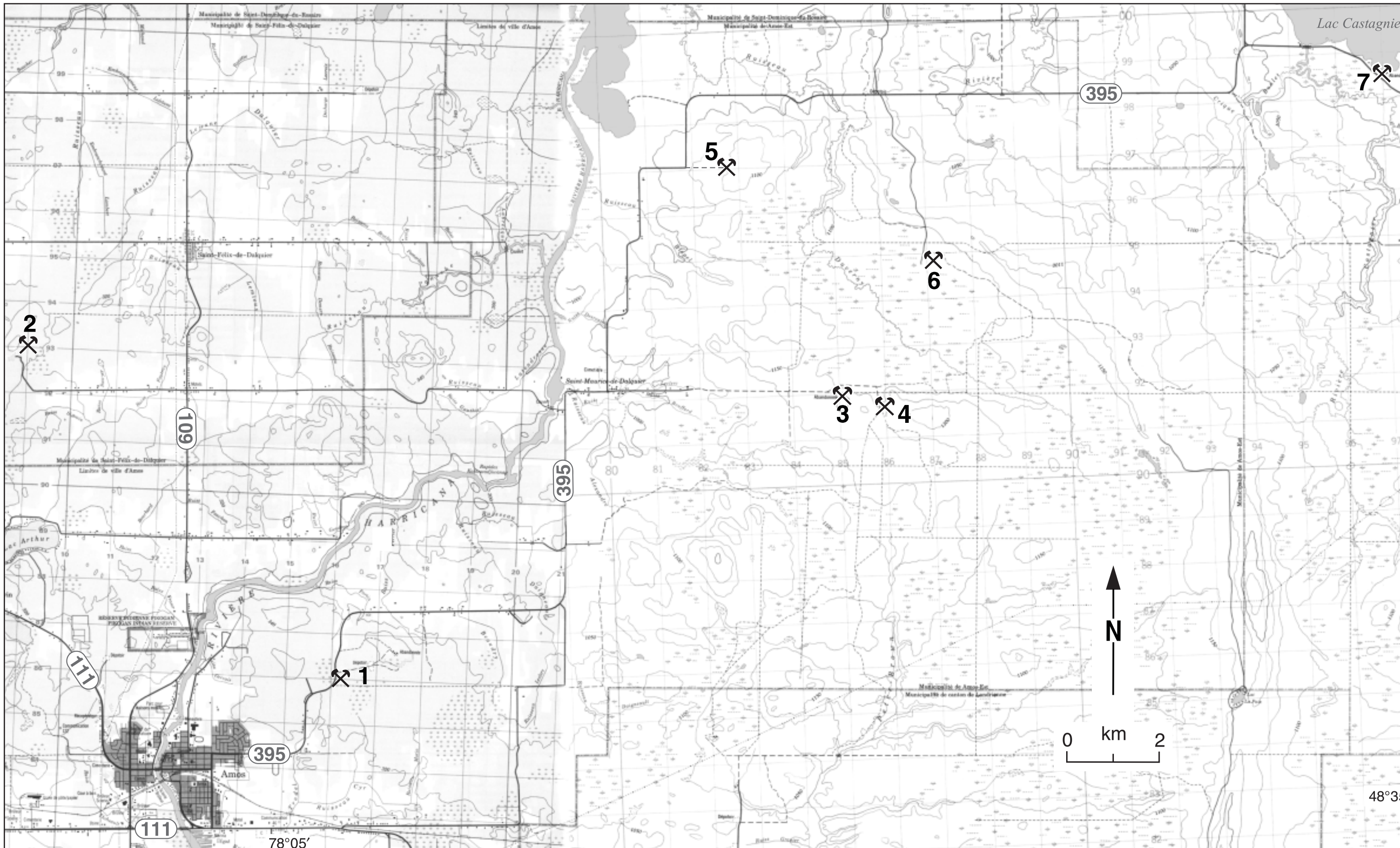
Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	40.4	Amos, junction of highways 109 and 111; turn right (east).
	41.5	Junction, Highway 395; turn left (north).
	41.9	Junction; turn right (east) continuing along Highway 395.
	46.8	Junction; turn right (east) onto the mine road.
	47.7	Junction; follow the road on left leading northeast.
	48.1	Jay (Amos) mine. The two older shafts are about 450 km northwest of this point.

Refs.: 83 p. 103; 253 p. 27–28; 331 p. 55–56; 393 p. 49–52.

Maps (T): 32 D/9 Amos
(G): 327A Amos sheet, Abitibi County, Quebec (GSC, 1:63 360)
1345 Amos–Barraute area, Amos sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Part of 32 D/9 and 32 C/12



1. Jay (Amos) mine 2. Nortrac mine 3. Fontana mine 4. Claverny mine 5. Duvay mine 6. Goldvue mine 7. Trinity mine

Map 19. Amos.

Nortrac mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, EPIDOTE

In volcanic and granitic rocks

Native gold occurs as visible gold in white quartz veins. Some pyrite and chalcopyrite are also present.

Nortrac Mining Company Limited explored the deposit as a gold prospect between 1934 and 1937. The work consisted of drilling, several test pits and trenches, and a 34 m shaft.

The mine is about 78 km northeast of Rouyn-Noranda and 10 km north of Amos. *See* Map 19 on page 129.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	40.4	Amos, junction of highways 109 and 111; continue north along Highway 109.
	49.4	Junction; turn left (west).
	53.6	Gravel pit on left; follow a trail leading north from the gravel pit.
	53.9	Nortrac mine.

Refs.: 83 p. 102; 393 p. 47–49.

Maps (T): 32 D/9 Amos
(G): 327A Amos sheet, Abitibi County, Quebec (GSC, 1:63 360)
1345 Amos–Barraute area, Amos sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Fontana mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, SPHALERITE, ARSENOPYRITE, QUARTZ CRYSTALS

In sheared granodiorite and diorite

Native gold is associated with pyrite and with lesser amounts of chalcopyrite, galena, and sphalerite in quartz veins in silicified and carbonatized intrusive rocks. Arsenopyrite is sparingly present. The gold occurs as visible gold in quartz; some very spectacular pockets were encountered during early exploration of the deposit. Small quartz crystals occur in cavities in massive milky quartz.

E. St. Onge and J. Bernard discoverd the deposit in 1934, the first gold discovery in the area. This generated prospecting interest in the district, resulting in the discovery of several gold showings. Fontana Gold Mines Limited did surface exploration and sank a shaft to 91 m between 1936 and 1937. The high-grade ore uncovered at the surface did not persist at depth, and the investigation ended in 1939.

The mine is about 94 km northeast of Rouyn-Noranda and 17 km northeast of Amos, on the slope of a prominent ridge surrounded by muskeg. *See* Map 19 on page 129.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	40.4	Amos, junction of highways 109 and 111; continue north along Highway 109.
	49.4	Junction; turn right (east).
	58.1	Junction; turn left (north) onto Highway 395.
	59.4	Saint-Maurice-de-Dalquier, at the church; leave Highway 395 and continue straight ahead (east).
	64.4	Fontana mine, on the right (south) side of the road.

Refs.: 83 p. 104, 105–106; 296 p. 16–17; 297 p. 34–35; 393 p. 61.

Maps (T): 32 C/12 Landrienne
(G): 530A Duverny (west half), Abitibi County, Quebec (GSC, 1:63 360)
1346 Amos–Barraute area, Landrienne sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Claverny mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, SPHALERITE

In sheared granodiorite

Native gold occurred with pyrite, chalcopyrite, and minor galena and sphalerite in quartz veins. Gold also occurred in chloritic zones in the sheared rock.

Leo Ouellette of Amos discovered the gold-bearing veins in 1934. Claverny Gold Mines Limited began surface exploration in 1937 followed by underground development in 1938. The development consisted of an inclined shaft to 66 m and another shaft to 19 m on the discovery vein, 300 m farther north. A mill operated on the site from 1939 to 1940, recovering 5054 g of gold from 635 t of ore and concentrates. In 1946, an adit driven 27 m into the base of a hill due north of the northerly shaft intersected some gold-bearing pyrite-chlorite zones.

The mine is about 95 km northeast of Rouyn-Noranda and 18 km northeast of Amos. It is on the slope of a ridge. *See* Map 19 on page 129.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	40.4	Amos, junction of highways 109 and 111; continue north along Highway 109.
	49.4	Junction; turn right (east).
	58.1	Junction; turn left (north) onto Highway 395.
	59.4	Saint-Maurice-de-Dalquier, at the church; leave Highway 395 and continue straight ahead (east).
	64.4	Fontana mine, on the right (south) side of the road; continue straight ahead (east).

65.2 Junction; turn right (south).

65.7 Junction; follow the trail on left leading northeast.

65.9 Claverny mine, main shaft. The northern shaft and adit are 300 m north of this shaft.

Refs.: 83 p. 104, 106; 296 p. 16; 297 p. 35; 393 p. 54–55.

Maps (T): 32 C/12 Landrienne
(G): 530A Duverny (west half), Abitibi County, Quebec (GSC, 1:63 360)
1346 Amos–Barraute area, Landrienne sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Duvay mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SPHALERITE, GALENA

In sheared volcanic rocks

Native gold occurs as visible gold in quartz veins, commonly in spectacular, but erratic, concentrations. Gold is also associated with pyrite and, less commonly, with chalcopyrite, sphalerite, and galena.

Original work in 1944 on the property, known as the 'Authier claim', consisted of a prospect pit and a 21 m trench. Duvay Gold Mines Limited explored the gold mineralization between 1945 and 1948. Exploration consisting of several trenches, drilling, and geophysical surveys resulted in the discovery of additional gold-bearing veins at depth. A 36 t bulk sample taken from the main zone assayed 7.1 g/t gold. The Duvay company jointly with Dorvue Gold Mines Limited (which held the adjacent property to the north) sank a shaft and explored the gold mineralization at the 30 m level. From 1986 to 1989, Exploration Sphinx Inc. did some stripping and drilling and took a bulk sample that assayed 7.5 g/t gold. The company constructed a heap-leaching facility on the site and produced some gold from a 36 280 t sample in 1990.

The mine is about 95 km northeast of Rouyn-Noranda and 18 km northeast of Amos. *See* Map 19 on page 129.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km 0 Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.

40.4 Amos, junction of highways 109 and 111; continue north along Highway 109.

49.4 Junction; turn right (east).

58.1 Junction; turn left (north) onto Highway 395.

59.4 Saint-Maurice-de-Dalquier, at the church; continue along Highway 395.

65.7 Junction; proceed onto a road leading east.

66.4 Duvay mine.

Refs.: 151 p. 45–46; 393 p. 57–60; 461 p. 340.

Maps (T): 32 C/12 Landrienne
(G): 530A Duverny (west half), Abitibi County, Quebec (GSC, 1:63 360)
1346 Amos–Barraute area, Landrienne sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Goldvue mine

NATIVE GOLD, PYRITE, SPHALERITE

In diorite

Native gold occurs with pyrite and sphalerite in quartz veins occupying fractures in diorite. Pyrite occurs as crystals up to 25 mm in diameter.

The Bouvier brothers, Cesar, George, and Marshall, staked the property in 1935 following their discovery of gold-bearing quartz veins in an outcrop on a low hill surrounded by a swampy area. The property was known locally as the '1200 acres'. Dubuisson Mines Limited did some surface exploration in 1936, followed by Central Duverny Gold Mines Limited in 1937. Goldvue Mines Limited explored the deposit from a 389 m shaft between 1946 and 1953. Bulk sampling indicated 7.54 g/t gold over 162 m.

The mine is about 97 km northeast of Rouyn-Noranda and 20 km northeast of Amos. *See* Map 19 on page 129.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	40.4	Amos, junction of highways 109 and 111; continue north along Highway 109.
	49.4	Junction; turn right (east).
	58.1	Junction; turn left (north) onto Highway 395.
	59.4	Saint-Maurice-de-Dalquier, at the church; continue along Highway 395.
	71.5	Junction; turn right (south).
	75.5	Junction; turn left (east).
	75.7	Goldvue mine.

Refs.: 24 p. 75; 83 p. 104–105; 297 p. 36–37; 393 p. 62–63.

Maps (T): 32 C/12 Landrienne
(G): 530A Duverny (west half), Abitibi County, Quebec (GSC, 1:63 360)
1346 Amos–Barraute area, Landrienne sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Trinity mine

CHALCOPYRITE, SPHALERITE, PYRITE, COBALTITE, SMALTITE, GALENA, PYRRHOTITE

In siliceous and chloritic pyroclastic rocks

Chalcopyrite and sphalerite occur with minor pyrite in the host rocks. Cobaltite, pyrrhotite, smaltite, and galena are also present.

The chalcopyrite-sphalerite-pyrite mineralization outcropped near the shore of Castagnier Lake. Paramount Mining and Development Syndicate explored the copper-zinc showing by stripping and trenching in 1947. In 1951, J. Matton continued the surface exploration; he discovered a copper-nickel showing on a point of the lake 200 m west of the copper-zinc showing and did some stripping, trenching, and sampling. North Trinity Mining Corporation took over the ground in 1951, drilled both showings, and sank a shaft to 131 m on the copper-zinc showing. The investigation resulted in an estimated 133 329 t of ore grading 1.18% copper and 0.74% zinc.

The mine is about 107 km northeast of Rouyn-Noranda and 30 km northeast of Amos. It is on the south shore of Castagnier Lake. *See* Map 19 on page 129.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	40.4	Amos, junction of highways 109 and 111; continue north along Highway 109.
	49.4	Junction; turn right (east).
	58.1	Junction; turn left (north) onto Highway 395.
	83.3	Trinity mine, on the north side of the Highway 395.

Refs.: 382 p. 202; 393 p. 64.

Maps (T): 32 C/12 Landrienne
(G): 530A Duverny (west half), Abitibi County, Quebec (GSC, 1:63 360)
1346 Amos–Barraute area, Landrienne sheet, County of Abitibi-East (MRNQ, 1:24 000)
1347 Amos–Barraute area, Barraute sheet, County of Abitibi-East (MRNQ, 1:24 000)
1600-V Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Sleeping Giant mine

NATIVE GOLD, PYRITE, PYRRHOTITE, SPHALERITE, CHALCOPYRITE

In dacite and volcanic rocks

Gold mineralization is associated with pyrite, pyrrhotite, sphalerite, and chalcopyrite in quartz veins at the contact of dacite and volcanic rocks. Gangue minerals include quartz with minor calcite, chlorite, and sericite.

Mattagami Lake Mines Limited discovered the gold mineralization following geophysical surveys and drilling in 1976. From 1984 to 1987, Perron Gold Mines Limited explored the deposit, sank one shaft to 229 m, another to 488 m, and installed a 900 t/day mill. Aurizon Mines Limited began production in 1988 and deepened the shaft to 785 m in 1995. To the end of 1997, the mine produced 10 025 kg of gold.

The mine is about 130 km northeast of Rouyn-Noranda and 65 km north of Amos.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	117.0	Junction, Road N-802 leading east; continue along Highway 109.
	118.0	Junction; turn left (west) onto the mine road.
	119.2	Sleeping Giant mine.

Refs.: 95 p. 34–35; 106 p. 6–12; 460 p. 50; 461 p. 52; 462 p. 48–49; 464 p. 54–55; 465 p. 58.

Maps (T): 32 F/4 Rivière Coigny
(G): 1244 Chaste–Mazarin area, electoral district of Abitibi-East (MRNQ, 1:63 360)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Abitibi Asbestos mine

SERPENTINE (CHRYSOTILE)

In serpentinite

Chrysotile variety of serpentine occurs in veins up to 25 mm across in serpentinite. The chrysotile is the crossfibre variety.

Prospector Ray Carson staked the property in 1957. Rio Tinto Canadian Exploration Limited located asbestos-bearing serpentinite by drilling in 1963. Abitibi Asbestos Mining Corporation Limited sank a shaft to 61 m in 1969. An on-site mill operated in 1973 and produced 139 t of asbestos for testing.

The mine is about 135 km northeast of Rouyn-Noranda and 67 km north of Amos.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	117.0	Junction, Road N-802 leading east; continue along Highway 109.
	125.4	Junction; turn left (west).
	127.5	Abitibi Asbestos mine.

Refs.: 349 p. 11–12; 350 p. 44–45.

Maps (T): 32 E/1 Mont Douaumont
(G): 554A Gale River, Abitibi Territory and Abitibi County, Quebec (GSC, 1:126 720)
1244 Chaste–Mazarin area, electoral district of Abitibi-East (MRNQ, 1:63 360)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)

Eagle (Agnico-Eagle) mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, ARSENOPYRITE

In volcanic rocks

Native gold occurred as microscopic grains and veinlets in pyrite associated with disseminated and massive pyrrhotite. Chalcopyrite, sphalerite, and arsenopyrite were also present. The gold mineralization occurred in a carbonatized zone in felsic tuff, argillite, and pyroclastic rocks.

Equity Exploration Limited outlined the orebody carrying high values in copper and minor silver, gold, and zinc as a result of drilling in 1963. Eagle Gold Mines Limited (renamed 'Agnico-Eagle Mines Limited' in 1972) undertook underground development in 1966. Production began in 1974 and ended in 1993 due to shortage of ore. The mine consists of the 884 m Eagle shaft and the 1189 m Telbel shaft. Production amounted to 35 865 kg of gold and 8629 kg of silver, from 6 222 584 t of ore.

The mine is about 144 km northeast of Rouyn-Noranda and 5 km northwest of Joutel. *See* Map 20 on page 137.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction; turn left (west) onto the road to Joutel.
	169.5	Junction; continue straight ahead (west) to Joutel.
	172.3	Junction; turn right (north).
	177.9	Eagle (Agnico-Eagle) mine.

Refs.: 12 p. 402–426; 86 p. 31; 258 p. 67; 315 p. 373–381; 400 p. 116; 440 p. 126; 444 p. 20–22; 460 p. 28; 461 p. 30; 462 p. 24.

Maps (T): 32 E/8 Ruisseau Kistabiche
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
2169A Géologie de la région de Joutel (Abitibi), feuille 32 E/8-200-0201 (MRNQ, 1:20 000)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)

Joutel Copper mine

PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE

In altered rhyolite

Part of 32 E/8

1. Eagle (Agnico-Eagle) mine 2. Joutel Copper mine 3. Mines de Poirier mine

Map 20. Joutel.

The deposit consists of massive-sulphide ore composed of pyrite with lesser amounts of pyrrhotite, chalcopyrite, and sphalerite.

Brivan Minerals Limited staked the property in 1958 during a prospecting rush in the remote Joutel district; the prospecting methods included aerial and ground geophysical surveys followed by drilling. Prospectors Airways Company Limited did the original exploration from 1959 to 1961 and located economic copper-zinc mineralization. Joutel Copper Mines Limited undertook development in 1962. The company sank a shaft to 375 m and began ore shipments to the nearby Mines de Poirier mill in 1967. The mine closed in 1975. It produced 1 286 292 t of copper and 372 418 t of zinc, from 1 658 710 t of ore.

The mine is about 140 km northeast of Rouyn-Noranda and 3 km west of Joutel. *See* Map 20 on page 137.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction; turn left (west) onto the road to Joutel.
	169.5	Junction; continue straight ahead (west) to Joutel.
	172.3	Junction; continue straight ahead (west).
	172.6	Junction; turn right (west) onto the mine road.
	174.4	Joutel Copper mine.

Refs.: 86 p. 29, 59; 254 p. 59; 255 p. 18; 256 p. 59; 436 p. 163; 438 p. 175–176; 444 p. 172; 445 p. 177–178.

Maps (T): 32 E/8 Ruisseau Kistabiche
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
2169A Géologie de la région de Joutel (Abitibi), feuille 32 E/8-200-0201 (MRNQ, 1:20 000)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)

Mines de Poirier mine

PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE

In argillite tuff

The ore consisted of pyrrhotite with lesser amounts of pyrite, chalcopyrite, and sphalerite.

Rio Tinto Canadian Exploration Limited discovered the deposit as a result of intensive geophysical surveying and drilling in 1959–1960. Underground exploration in 1963 began with shaft sinking. Mines de Poirier Inc. took over the property in 1964 and began production from an 869 m shaft in 1966. Mining ended in 1975 when economic ore ran out. The mine produced 86 165 t of copper, 27 210 t of zinc, and 18 034 639 g of silver.

The mine is about 138 km northeast of Rouyn-Noranda and 6 km southwest of Joutel. *See* Map 20 on page 137.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction; turn left (west) onto the road to Joutel.
	169.5	Junction; continue straight ahead (west) to Joutel.
	177.7	Mines de Poirier mine.

Refs.: 86 p. 29, 59; 255 p. 24–25; 258 p. 149–150; 444 p. 283–284.

Maps (T): 32 E/8 Ruisseau Kistabiche
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
2169A Géologie de la région de Joutel (Abitibi), feuille 32 E/8-200-0201 (MRNQ, 1:20 000)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)

Selbaie (Detour) mine

PYRITE, SPHALERITE, CHALCOPYRITE, GALENA, TETRAHEDRITE, POLYBASITE, NATIVE SILVER, NATIVE GOLD, CHALCOCITE, DIGENITE, COVELLITE, BORNITE, NATIVE COPPER, BISMUTHINITE

In rhyolitic tuff and breccia

The ore consists of fine-grained metallic minerals in a gangue of sugary quartz and quartz-ankerite. Pyrite, sphalerite, and chalcopyrite are the principal ore minerals. Galena, tetrahedrite, polybasite, and native silver are minor components, and native gold is present in trace amounts. Chalcocite, digenite, covellite, bornite, native copper, and bismuthinite occur in chalcopyrite-sphalerite-pyrite ore (B zone).

The deposit consists of three zones, A1, A2, and B. Selco Mining Corporation Limited discovered the copper-zinc-silver-gold mineralization during a program of geophysical surveys followed by drilling along the Harricana River between 1958 and 1975. Underground exploration began in 1978 and production, in 1981. Development consisted of a 305 m shaft (B zone), a 300 m decline (A1 zone), and an open pit (A2 zone) 1000 m long, 800 m wide, and 120 m deep. A mill operated on the site. BP Resources Canada Limited took over operations in 1983 and continued jointly with Billeton Metals Canada Inc. until 1992 when Billeton became the sole operator. Underground operations ended in 1993. The ore milled averaged 0.72% copper, 2.11% zinc, 0.64 g/t gold, and 32.34 g/t silver.

The mine is about 158 km north of Rouyn-Noranda and 60 km northwest of Joutel.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction; turn left (west) onto the road to Joutel.
	169.5	Junction; turn right (north.
	226.5	Junction; follow the road on left leading west toward Selbaie.

250.5 Junction; follow the main road on right leading northwest.

253.8 Junction; turn left (south).

255.3 Selbaie (Detour) mine (B zone shaft). The A2 open pit is about 1300 m east of the B zone shaft; the A1 decline is between them.

Refs.: 81 p. 319–342; 102 p. 363–372; 107 p. 6, 10; 182 p. 1460–1472; 450 p. 302–303; 454 p. 72.

Maps (T): 32 E/15 Collines Gaudet
(G): 1355 Harricana–Turgeon area, Angle River sheet, Abitibi-West County (MRNQ 1:63 360)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
2005 Projet Harricana-Grasset, feuille collines Gaudet 32 E/15 (MRNQ 1:50 000)
M-305 Gîtes minéraux du Québec, région de l'Abitibi, feuille rivière Harricana supérieure 32E (MRNQ, 1:250 000)

Orchan mine

PYRITE, SPHALERITE, PYRRHOTITE, CHALCOPYRITE, MAGNETITE, GALENA, EPIDOTE

In tuffaceous rock and rhyolite

The ore was composed of massive sulphides, mainly pyrite, with dark brown sphalerite, chalcopyrite, and minor magnetite and galena. The gangue minerals were cherty quartz, chlorite, carbonate, and sericite. Epidote occurred in pink to white calcite.

This deposit is one of several in the Matagami mining camp discovered in 1957 by geophysical surveys followed by drilling. Orchan Mines Limited acquired the property in 1958 and brought it to production in 1963. Noranda Mines Inc. took over operations in 1978. Development consisted of an open pit and a 504 m shaft. A concentrator operated on the site. The mine closed in 1982. It produced 4 514 324 t of ore containing 9.84% zinc, 1.02% copper, 37.1 g/t silver, and 0.5 g/t gold.

The mine is about 215 km northeast of Rouyn-Noranda and 7 km southwest of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km 0 Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.

157.5 Junction, road to Joutel; continue along Highway 109.

199.7 Junction, road leading south to Val-d'Or; continue along Highway 109.

215.7 Junction; turn right (east).

217.4 Orchan mine.

Refs.: 187 p. 41; 252 p. 11; 255 p. 15; 310 p. 15; 311 p. 55–61; 444 p. 256; 445 p. 263–264.

Maps (T): 32 F/12 Île Bancroft
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)

Plate 14.
Orchan mine, 1972. GSC 161442

1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1634 Northwest quarter of Galinée Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Bell Allard mine

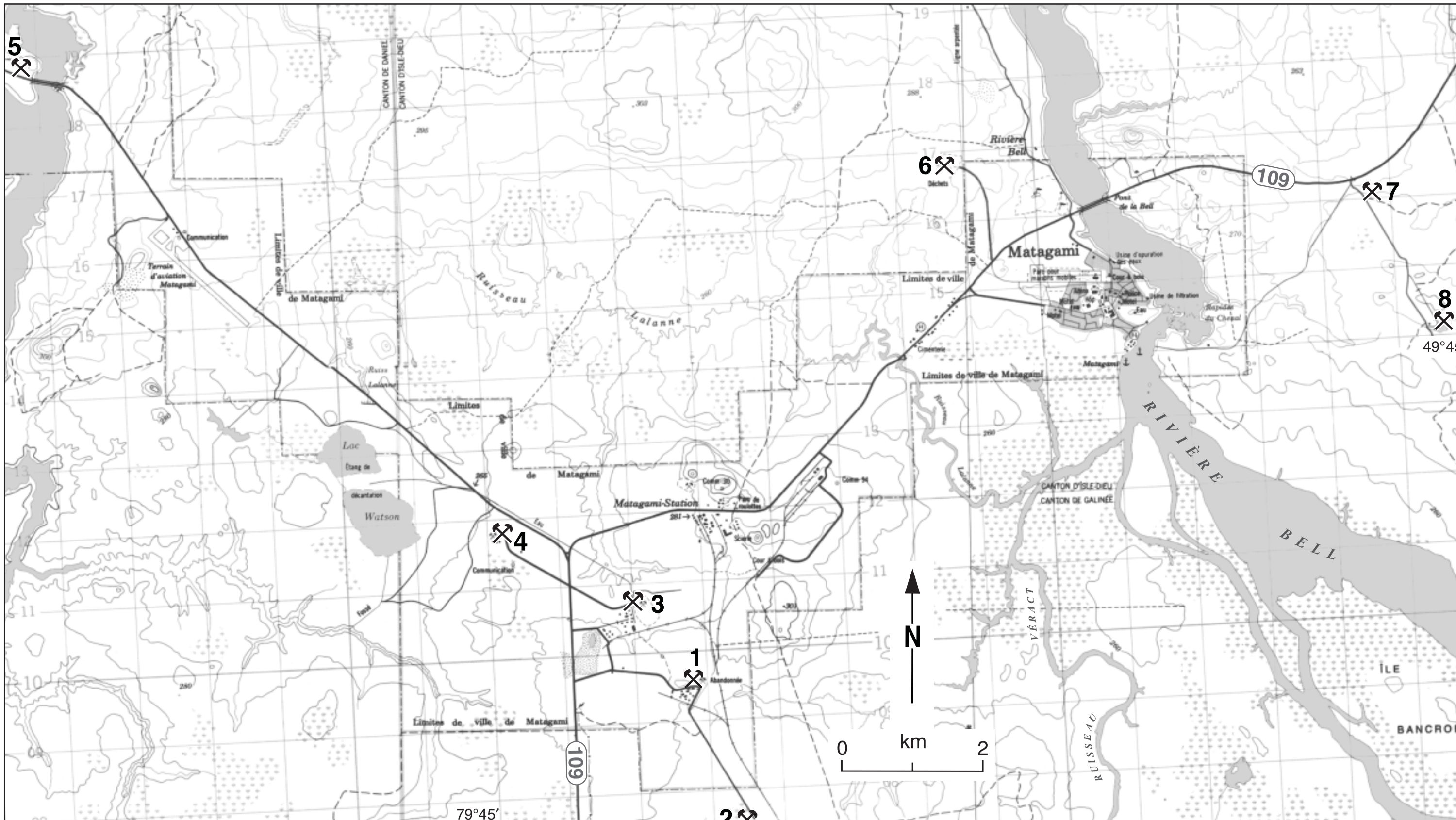
PYRITE, PYRRHOTITE, SPHALERITE, CHALCOPYRITE, MAGNETITE

In tuffaceous rock

The ore consists mainly of pyrite with lesser amounts of pyrrhotite, sphalerite, chalcopyrite, and magnetite. Quartz and chlorite are the main gangue minerals.

Newmont Mining Company Limited discovered the deposit in 1957. Bell Allard Mines Limited took over the property in 1959, conducted geophysical surveys and drilling, and mined the deposit from an open pit between 1968 and 1970. Noranda Inc. acquired the property in 1978 and undertook a drilling program that led to the discovery of an orebody in 1992.

Part of 32 F/12, 13



1. Orchan mine 2. Bell Allard mine 3. Mattagami Lake mine 4. Isle-Dieu mine 5. New Hosco mine 6. Norita mine 7. Garon Lake mine 8. Radiore No. 2 mine

Map 21. Matagami.

The Bell Allard mine is about 215 km northeast of Rouyn-Noranda and 9 km southwest of Matagami. Access is via a 2 km road continuing south from the Orchan mine. *See* Map 21 on page 142.

Refs.: 311 p. 61–63; 434 p. 185; 443 p. 289; 460 p. 248; 464 p. 335–336.

Maps (T): 32 F/12 Île Bancroft
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1634 Northwest quarter of Galinée Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Mattagami Lake mine

PYRITE, PYRRHOTITE, SPHALERITE, CHALCOPYRITE, MAGNETITE, GALENA, ARSENOPYRITE, HEMATITE, EPIDOTE, CLINOZOISITE, ACTINOLITE-TREMOLITE, BIOTITE, SERICITE, CHLORITE, TALC, SERPENTINE, STILPNOMELANE, ALTAITE, MATTAGAMITE, TELLURANTIMONY, COBALTITE, HESSITE

In tuffaceous rocks

The massive-sulphide ore consisted of pyrite, pyrrhotite, dark brown sphalerite, chalcopyrite, and magnetite. Galena, arsenopyrite, hematite, and telluride minerals were present in minor to trace amounts. Associated minerals included epidote, clinozoisite, actinolite-tremolite, biotite, sericite, chlorite, talc, serpentine, stilpnomelane, carbonates, and quartz. Two new telluride minerals, originally described from this deposit, occurred in a telluride zone consisting of altaite with less abundant chalcopyrite, sphalerite, cobaltite, pyrrhotite, pyrite, and hessite in talc or chlorite gangue. The new minerals are mattagamite and tellurantimony; the former occurs as blade-like grains in altaite and as rims on pyrrhotite and chalcopyrite, the latter as lath-shaped crystals in altaite. Both are visible only with the aid of a microscope. The telluride zone occurred at the 252 m and 265 m levels.

This was the largest zinc-copper-silver producer in the Matagami mining camp. The Mattagami Syndicate located the deposit during geophysical prospecting in the area in 1956–1957. In 1958 Mattagami Lake Mines Limited began exploration and development. Production began in 1963. Noranda Inc. acquired the property in 1979. Underground development consisted of a shaft and decline to 610 m. A mill operated on the site. Mining operations ended in 1988. During 25 years of operations, the mine produced 25 645 877 t of ore containing 5.10% zinc, 0.42% copper, 21.6 g/t silver, and 0.34 g/t gold.

The mine is about 215 km northeast of Rouyn-Noranda and 8 km southwest of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction, road to Joutel; continue along Highway 109.
	199.7	Junction, road leading south to Val-d'Or; continue along Highway 109.
	217.1	Junction; turn right (southeast).
	218.1	Mattagami Lake mine.

Refs.: 241 p. 331; 255 p. 14–15; 263 p. 49; 288 p. 115–229; 310 p. 14–15; 311 p. 42–55; 348 p. 55–57; 444 p. 201–202; 445 p. 208; 456 p. 340.

Maps (T): 32 F/12 Île Bancroft
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1634 Northwest quarter of Galinée Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Isle-Dieu mine

SPHALERITE, PYRITE, CHALCOPYRITE, PYRRHOTITE, MAGNETITE, GALENA

In tuffaceous rock

The massive-sulphide ore consisted of yellowish sphalerite with pyrite, chalcopyrite, magnetite, and minor galena in a gangue of cherty quartz, carbonates, chlorite, and talc.

Isle Dieu Mattagami Mines Limited began surface exploration, geophysical surveys, and drilling on the property in 1958. The company discovered a high-grade zinc deposit in 1985. In the following year, Noranda Inc. undertook development and sank a shaft to 648 m. Production began in 1988 and ended in 1997 due to ore depletion.

The mine is about 215 km northeast of Rouyn-Noranda and 8 km southwest of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction, road to Joutel; continue along Highway 109.
	199.7	Junction, road leading south to Val-d'Or; continue along Highway 109.
	217.1	Junction; turn left (northwest).
	218.3	Isle-Dieu mine.

Refs.: 36 p. 47–56; 264 p. 43–44; 330 p. 349–361; 454 p. 290; 455 p. 340; 464 p. 336; 465 p. 332.

Maps (T): 32 F/12 Île Bancroft
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1634 Northwest quarter of Galinée Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

New Hosco mine

PYRITE, PYRRHOTITE, SPHALERITE, CHALCOPYRITE, MAGNETITE, EPIDOTE

In tuffaceous rock

The massive-sulphide ore consisted of pyrite, the main component, with pyrrhotite, sphalerite, chalcopyrite, and magnetite. Associated minerals included epidote, quartz, calcite, and dolomite.

New Hosco Mines Limited located the deposit in 1958 by drilling an anomaly indicated by geophysical surveys. Production began in 1963 and ended in 1970. Development consisted of an open pit and a 323 m shaft. The mine produced 1 695 696 t of ore containing copper, zinc, gold, and silver, valued at $25 068 814.

The mine is about 215 km northeast of Rouyn-Noranda and 15 km northwest of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction, road to Joutel; continue along Highway 109.
	199.7	Junction, road leading south to Val-d'Or; continue along Highway 109.
	217.5	Junction; turn left (northwest).
	228.1	New Hosco mine.

Refs.: 255 p. 8–9; 311 p. 65–71; 442 p. 252.

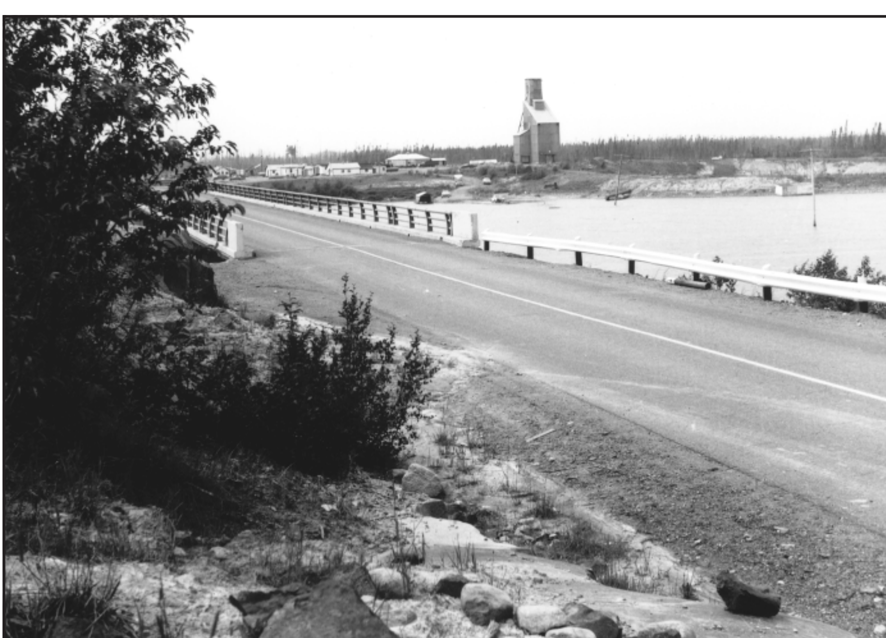


Plate 15.
New Hosco mine, 1972. GSC 161441

Maps (T): 32 F/13 Matagami
(G): 1563 Turgeon-Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1631 Part of east half of Daniel Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Norita mine

PYRITE, SPHALERITE, CHALCOPYRITE, PYRRHOTITE, NATIVE BISMUTH, BISMUTHINITE, NATIVE GOLD

In rhyolite and tuff

The massive-sulphide ore consisted of fine-grained granular pyrite with lesser sphalerite and chalcopyrite and minor pyrrhotite. Native bismuth, bismuthinite, and visible gold were associated with the sulphides.

The property consists of claims originally held by Radiore Uranium Mines Limited and Amagami Mines Limited. Radiore Uranium Mines Limited discovered the deposit in 1957 by electromagnetic surveying followed by drilling. Further investigation in 1965 resulted in the discovery of another massive-sulphide zone. The property was acquired by Norita Quebec Mines Limited in 1966 and by Orchan Mines Limited in 1972. Orchan Mines Limited sank a shaft to 513 m and began production in 1976. Noranda Mines Limited (renamed 'Noranda Inc.' in 1984) acquired the property in 1978 and outlined a new orebody in 1986, 1 km farther west. The company undertook development in 1991 and production in 1992 from the original shaft. Mining ended in 1997 due to ore depletion.

The mine is about 215 km northeast of Rouyn-Noranda and 2 km northwest of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction, road to Joutel; continue along Highway 109.
	199.7	Junction, road leading south to Val-d'Or; continue along Highway 109.
	224.7	Junction, road leading east to Matagami village; continue straight ahead (northeast).
	225.3	Junction; turn left (north).
	226.9	Norita mine.

Refs.: 92 p. 43; 201 p. 59–75; 240 p. 1552–1555; 311 p. 71; 449 p. 191; 454 p. 288; 459 p. 255–256; 460 p. 248; 465 p. 332.

Maps (T): 32 F/13 Matagami
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)

1632 Part of west half of Isle-Dieu Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Garon Lake mine

PYRRHOTITE, PYRITE, CHALCOPYRITE, SPHALERITE, MAGNETITE, CORDIERITE, CHLORITE, ANTHOPHYLLITE, HERCYNITE

In cordierite-anthophyllite hornfels

The ore consisted mainly of pyrrhotite and pyrite, with minor chalcopyrite, sphalerite, and magnetite. The gangue minerals were quartz and chlorite. Cordierite occurred as aggregates up to 3 mm across and was the most abundant mineral in the hornfels, which also contained matted aggregates of chlorite, radiating clusters of anthophyllite, green knotted aggregates of hercynite, and quartz.

Kennco Explorations (Canada) Limited staked the property in 1956 after detecting a geophysical anomaly. Subsequent drilling indicated copper mineralization. In 1958, Garon Lake Mines Limited took over the property and located a copper-zinc ore zone by drilling. Orchan Mines Limited resumed the investigation in 1966, drove a decline 152 m, and shipped some development ore to the Orchan mill in 1972. At start-up the ore reserves were estimated to be 35 826 t averaging 3.4% zinc and 1.7% copper. Regular production began in 1973 and ended in 1975 due to ore exhaustion.

The mine is about 215 km northeast of Rouyn-Noranda and 4 km northeast of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction, road to Joutel; continue along Highway 109.
	199.7	Junction, road leading south to Val-d'Or; continue along Highway 109.
	224.7	Junction, road leading east to Matagami village; continue straight ahead (northeast).
	225.3	Junction; continue straight ahead.
	229.6	Junction; turn right (south).
	229.7	Junction; follow the road on right leading southeast.
	229.9	Garon Lake mine.

Refs.: 162 p. 338–353; 311 p. 82–84; 445 p. 264; 447 p. 252.

Maps (T): 32 F/13 Matagami
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1633 Part of east half of Isle-Dieu Township, Abitibi-East County (MRNQ, 1:12 000)

Radiore No. 2 mine

PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, MAGNETITE, CHLORITE, ANTHOPHYLLITE

In breccia and chlorite schist

The massive-sulphide ore consisted of pyrite with pyrrhotite, chalcopyrite, sphalerite, and magnetite. Chlorite and anthophyllite were associated with the metallic minerals.

Radiore Uranium Mines Limited discovered the deposit in 1961 by geophysical methods and drilling. In 1975, Orchan Mines Limited drove a ramp 513 m to the copper-zinc orebody, but deferred production because of low copper prices. Noranda Mines Limited mined the deposit in 1979–1980; the ore averaged 1.0% zinc, 2.0% copper, 6.86 g/t silver, and 0.343 g/t gold.

The mine is about 215 km northeast of Rouyn-Noranda and 5 km east of Matagami. *See* Map 21 on page 142.

Road log from Highway 117 at **km 163.4** (*see* p. 9):

km	0	Junction, highways 117 and 109 at Rivière-Héva; proceed along Highway 109.
	157.5	Junction, road to Joutel; continue along Highway 109.
	199.7	Junction, road leading south to Val-d'Or; continue along Highway 109.
	224.7	Junction, road leading east to Matagami village; continue straight ahead (northeast).
	225.3	Junction; continue straight ahead.
	229.6	Junction; turn right (south).
	229.7	Junction; follow the road on right leading southeast.
	232.0	Junction; turn left (east).
	232.1	Radiore No. 2 mine.

Refs.: 311 p. 79–82; 447 p. 252; 449 p. 191; 450 p. 256.

Maps (T): 32 F/13 Matagami
(G): 1563 Turgeon–Matagami area, Abitibi-West and Abitibi-East counties (MRNQ, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
1633 Part of east half of Isle-Dieu Township, Abitibi-East County (MRNQ, 1:12 000)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

West Malartic mine

PYRITE, ARSENOPYRITE, PYRRHOTITE, NATIVE GOLD, MAGNETITE, CHALCOPYRITE, MOLYBDENITE, TOURMALINE

In sheared volcanic rocks

Pyrite, the chief metallic mineral, was associated with arsenopyrite and pyrrhotite. Native gold occurred as fine grains in fractures in quartz and associated with arsenopyrite. Magnetite, chalcopyrite, molybdenite, and tourmaline also occurred in the deposit.

J.W. Davis staked the property in the early 1930s. In 1935, Pan-Canadian Gold Mines Limited discovered a gold-bearing vein by trenching and drilling, and sank No. 1 shaft to 7 m on this vein. Panning the weathered schist from some of the trenches yielded native gold. In 1936, the company discovered another vein 1220 m northwest of the shaft and sank No. 2 shaft to 94 m on it. In 1938, the company installed a small mill that treated 5294 t of ore for a recovery of 33 342 g of gold and 3268 g of silver. West Malartic Mines Limited deepened No. 1 shaft to 375 m in 1939 and mined the deposit from 1942 to 1946. A mill operated on the site. Production amounted to 279 657 t of ore containing 1 108 231 g of gold and 73 247 g of silver, valued at $1 353 778.

The mine is about 60 km east of Rouyn-Noranda. *See* Map 22 on page 150.

Road log from Highway 117 at **km 168.1** (*see* p. 9):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	1.8	Junction; follow the road on right leading west.
	4.1	Railway crossing; proceed along a trail leading southwest.
	4.55	West Malartic mine.

Refs.: 83 p. 210; 128 p. 103–105; 420 p. 327.

Maps (T): 32 D/1 Malartic
(G): 572A Malartic (sheet 1), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Canadian Malartic mine

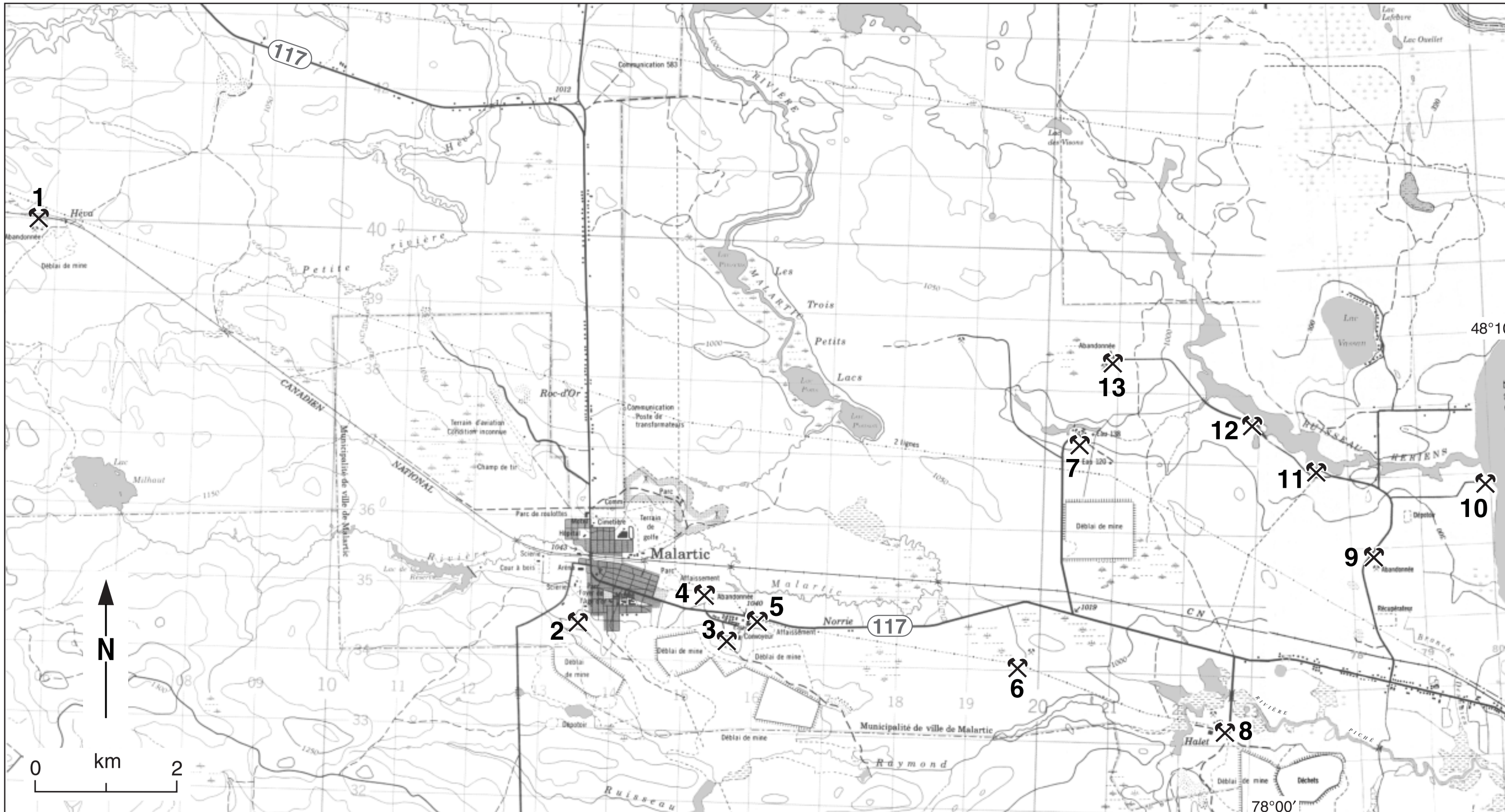
PYRITE, NATIVE GOLD, CHALCOPYRITE, GALENA, SPHALERITE, TOURMALINE, FLUORITE, RUTILE, GARNET, MOLYBDENITE, SCHEELITE, SELENITE, HEMATITE, PETZITE, WEHRLITE, CALAVERITE, MELONITE

In greywacke and porphyry

This deposit comprised two types of ore. One consisted of native gold associated with pyrite, along with minor chalcopyrite, galena, sphalerite, and tourmaline in quartz stringers in silicified greywacke. The other consisted of porphyry cut by gold-bearing quartz veins containing mica, chlorite, pyrite, chalcopyrite, purple fluorite, rutile, tourmaline, garnet, molybdenite, scheelite, selenite, specular hematite, and visible gold. Petzite, wehrlite, calaverite, and melonite occurred as small grains with native gold in white quartz. The gold occurring in the greywacke ore had a higher silver content than the ore in the porphyry.

St. Barbe Sladen, H.S. Kennedy, and J.C. Carrol staked the property in 1923. Porcupine Goldfields Development and Finance Company did initial exploration in 1924–1925, followed by Malartic Gold Mines Limited in 1925–1929. Canadian Malartic Mines Limited mined the deposit from 1933 to 1965. Development consisted of No. 1 shaft and winze to 496 m, No. 2

Part of 32 D/1 and 32 C/4



1. West Malartic mine 2. Canadian Malartic mine 3. Sladen Malartic mine 4. Barnat mine 5. East Malartic mine 6. Rand Malartic mine 7. Camflo mine 8. Malartic Gold Fields mine 9. Marbenor Malartic (Marban) mine 10. Callahan mine 11. Norlartic mine 12. Kierens mine 13. Malartic Hygrade mine

Map 22. Malartic.

production shaft (183 m southwest of No. 1) to 572 m, and No. 3 shaft (1006 m southeast of No. 1) to 231 m. Total production amounted to 33 470 715 g of gold and 20 075 928 g of silver, from 9 928 174 t of ore.

The Canadian Malartic mine is about 68 km southeast of Rouyn-Noranda, in Malartic. Access from Malartic is by proceeding south along Abitibi Avenue 0.6 km from its junction with Highway 117 at **km 179.4** (*see* p. 9). *See* Map 22 on page 150.

Refs.: 65 p. 278–282; 83 p. 213–217; 98 p. 58–61, 73; 128 p. 68–71; 337 p. 348–349, 352, 370, 380; 367 p. 43–48; 436 p. 63.

Maps (T): 32 D/1 Malartic
(G): 573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
1372 Surface geology of the Malartic gold belt, Abitibi-East County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Sladen Malartic mine

NATIVE GOLD, PYRITE, SYLVANITE, PETZITE, PYRRHOTITE, CHALCOPYRITE, MAGNETITE, SPHALERITE, GALENA, HEMATITE

In syenite porphyry, diorite, and greywacke

Native gold occurred as visible gold in quartz-filled fractures in the host rocks and associated with pyrite, sylvanite, and petzite. Pyrrhotite, chalcopyrite, and magnetite occurred in minor amounts, and sphalerite, galena, and hematite, in sparse amounts.

H.S. Kennedy and St. Barbe Sladen staked the property in 1923–1924. Sladen Malartic Mines Limited sank No. 1 shaft to 368 m and No. 2 shaft to 541 m, installed a mill, and began production in 1938. Mining ended in 1951. To the end of 1948, the mine produced about 6220 kg of gold from 1 850 236 t of ore.

The Sladen Malartic mine is about 70 km east of Rouyn-Noranda, just east of Malartic. Access is by a 350 m road leading south from Highway 117 at **km 181.2** (*see* p. 9). *See* Map 22 on page 150.

Refs.: 51 p. 858–864; 83 p. 217–219; 98 p. 58–60; 128 p. 114–123.

Maps (T): 32 D/1 Malartic
(G): 573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
1372 Surface geology of the Malartic gold belt, Abitibi-East County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Barnat mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, GALENA, CHLORITE, CHROME MUSCOVITE

In carbonatized volcanic rocks

The mineralization consisted of native gold in finely granular pyrite associated with minor amounts of chalcopyrite and pyrrhotite. Chlorite and bright green chrome muscovite (fuschite) occur as lenses and streaks in the rock.

National Malartic Gold Mines Limited began development in 1941–1942 by sinking a shaft to 221 m. This shaft became the main production shaft in 1948, when Barnat Mines Limited acquired the property; they subsequently deepened the shaft to 727 and mined the deposit until 1970. East Malartic Mines Limited took over the mine in 1971, deepened the shaft to 915 m, and mined the deposit from 1976 to 1981.

The Barnat mine is about 70 km east of Rouyn-Noranda, just east of Malartic. Access is by a 250 m road leading north from Highway 117 at **km 181.2** (*see* p. 9). *See* Map 22 on page 150.

Refs.: 83 p. 219; 98 p. 65–68; 128 p. 75–76; 418 p. 123; 423 p. 24–25; 442 p. 44–45.

Maps (T): 32 D/1 Malartic
(G): 573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
1372 Surface geology of the Malartic gold belt, Abitibi-East County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

East Malartic mine

PYRITE, NATIVE GOLD, MAGNETITE, HEMATITE, PYRRHOTITE, GALENA, CHALCOPYRITE, SPHALERITE, MOLYBDENITE, RUTILE, TOURMALINE, GRAPHITE, SCHEELITE, BERYL

In diorite, greenstone, and greywacke

The ore occurred in quartz veins. Visible gold occurred sparingly. Pyrite, in massive form and as aggregates of grains and crystals, was the most abundant mineral. Small amounts of magnetite, specular hematite, pyrrhotite, galena, chalcopyrite, sphalerite, and molybdenite were present. Pegmatitic quartz veins in diorite and greywacke contain rutile, tourmaline, graphite, scheelite, and beryl.

J.P. Norrie and L.K. Coffin staked the property in 1932. John Partaven discovered the gold-bearing veins in 1934. East Malartic Mines Limited undertook exploration immediately. Shaft-sinking began in 1936, followed by production in 1938. Development consisted of No. 1 and No. 2 shafts to 107 m each, No. 3 shaft to 540 m, No. 4 shaft to 1215 m with internal No. 5 shaft to 1507 m. Production ended in 1979. Total production amounted to 17 596 281 t of ore containing 87 320 210 g of gold and 17 144 844 g of silver, valued at $141 617 877.

The East Malartic mine is about 71 km east of Rouyn-Noranda, just east of Malartic. Access is by a 150 m road leading south from Highway 117 at **km 181.8** (*see* p. 10). *See* Map 22 on page 150.

Refs.: 67 p. 865–867; 83 p. 220–226; 128 p. 81–88; 367 p. 55–58; 444 p. 120; 449 p. 96.

Maps (T): 32 D/1 Malartic
(G): 573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
1372 Surface geology of the Malartic gold belt, Abitibi-East County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Rand Malartic mine

NATIVE GOLD, PYRITE, ARSENOPYRITE, TOURMALINE, CHROME MUSCOVITE

In quartz-feldspar porphyry

Native gold occurs as coarse grains in altered quartz-feldspar porphyry and as small pellets in quartz veins containing tourmaline and pyrite. Acicular arsenopyrite and bright green chrome muscovite (fuschite) occur in the rock.

Sladen Malartic Mines Limited staked the property in 1933, made a gold discovery, and did some development work in 1936–1937. Between 1937 and 1941, Rand Malartic Mines Limited explored the deposit by stripping, trenching, and sinking a shaft to 12 m. From 1981 to 1991, NSR Resources Inc. continued the exploration, drove a ramp to the 183 m level, and obtained a 4535 t bulk sample for a mill test. The deposit contains estimated reserves of 46 983 t averaging 13.371 g/t gold.

The Rand Malartic mine is about 73 km east of Rouyn-Noranda and 5 km east of Malartic. Access is by a 0.9 km road leading south from Highway 117 at **km 185.2** (*see* p. 10). *See* Map 22 on page 150.

Refs.: 83 p. 226–227; 128 p. 111–113; 186 p. 61–62; 224 p. 7–8; 452 p. 311; 454 p. 297; 455 p. 346; 456 p. 349.

Maps (T): 32 D/1 Malartic
(G): 573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
1372 Surface geology of the Malartic gold belt, Abitibi-East County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Camflo mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA, MOLYBDENITE, SCHEELITE, FLUORITE, TELLURIDES

In porphyritic monzonite, iron-formation, and gabbro

Small specks of native gold occurred in quartz veinlets and in fractures in porphyritic monzonite. It also occurred as isolated grains near pyrite, as fine coatings on pyrite crystals, and as inclusions in pyrite. Some gold was associated with pyrite in magnetite iron-formation and in gabbro, and with traces of chalcopyrite, galena, and molybdenite. Scheelite was uncommon and tellurides were rare. Calcite and fluorite were also present.

Edgar Collins and Associates staked the property in 1958 and sold it to Camflo Matagami Mines Limited (renamed 'Camflo Mines Limited' in 1966) in 1962 for $5000. Production began in 1965. Mining was from a 1235 m shaft. The mine was equipped with a 1130 t mill. Production ended in 1992. The mine produced about 51 703 kg of gold.

The Camflo mine is about 73 km east of Rouyn-Noranda and 6 km northeast of Malartic. Access is by a 2.6 km road leading north from Highway 117 at **km 186.3** (*see* p. 10). *See* Map 22 on page 150.

Refs.: 183 p. 46–48; 185 p. 12–13; 210 p. 1406–1408; 304 p. 245–254; 458 p. 38; 460 p. 36.

Maps (T): 32 D/1 Malartic
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Malartic Gold Fields mine

PYRITE, ARSENOPYRITE, NATIVE GOLD, TOURMALINE, CHALCOPYRITE, GALENA

In diorite

The mineralization consisted of native gold associated with pyrite in diorite and rarely in quartz. Tourmaline, arsenopyrite, chalcopyrite, and galena were also present.

J.P. Norrie and Associates staked the property in 1934. Malartic Gold Fields Limited located the orebody in 1938 after drilling an area where gold-bearing float had been found earlier. Production began in 1939 and ended in 1965. The mine workings consisted of No. 1 shaft to 764 m and No. 2 shaft (915 m to the northwest) to 869 m. A mill operated on the site. Production amounted to 52 951 395 g of gold from 8 955 877 t of ore, valued at $66 727 646.

The Malartic Gold Fields mine is about 77 km east of Rouyn-Noranda and 8 km east of Malartic. Access is by a 0.9 km road leading south from Highway 117 at **km 188.7** (*see* p. 10). *See* Map 22 on page 150.

Refs.: 83 p. 228–230; 98 p. 61–62; 128 p. 95–96; 129 p. 868–870; 183 p. 1; 224 p. 7–8; 367 p. 59–62; 444 p. 197.

Maps (T): 32 D/1 Malartic
32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 3), Abitibi County, Quebec (GSC, 1:12 000)
573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)

1372 Surface geology of the Malartic gold belt, Abitibi-East County (MRNQ, 1:9600)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Marbenor Malartic (Marban) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, TOURMALINE

In diorite

Native gold occurred as visible gold in diorite. Pyrite, chalcopyrite, and tourmaline were also present.

Between 1941 and 1952, Marbenor Malartic Mines Limited outlined three ore shoots by drilling following the discovery of two large boulders containing rich gold values on the property. The property was inactive until 1960 when Marban Gold Mines Limited sank a shaft to 259 m and operated the mine from 1961 to 1971. Production amounted to 10 264 456 g of gold from 1 982 675 t of ore, valued at $17 479 148.

The mine is about 73 km east of Rouyn-Noranda and 7 km east of Malartic. *See* Map 22 on page 150.

Road log from Highway 117 at **km 191.0** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	1.8	Marbenor Malartic (Marban) mine, on the east side of the road.

Refs.: 151 p. 39–41; 183 p. 1; 257 p. 80; 423 p. 125; 433 p. 153; 444 p. 198–199.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Callahan mine

NATIVE GOLD, PYRITE, SPHALERITE, TOURMALINE

In quartz diorite

Native gold occurs as small grains (up to 3 mm across) in quartz-ankerite veins and as microinclusions in pyrite and sphalerite. Tourmaline and chlorite are also present in the veins.

Amlartic Gold Mines Limited and Canadian Malartic Gold Mines Limited did the initial exploration between 1945 and 1975. Falconbridge Limited resumed exploration from 1980 to 1986 and sank a shaft to 278 m. There was no production.

The Callahan mine is about 74 km east of Rouyn-Noranda and 8 km northeast of Malartic. *See* Map 22 on page 150.

Road log from Highway 117 at **km 191.0** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	1.8	Marbenor Malartic (Marban) mine; continue straight ahead.
	2.8	Junction; turn right (east).
	4.2	Callahan mine.

Refs.: 15 p. 1–2, 21–25; 155 p. 141–142; 306 p. 109–114; 453 p. 147.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Norlartic, Kierens mines

NATIVE GOLD, PYRITE, CHALCOPYRITE, PYRRHOTITE, SPHALERITE, MOLYBDENITE, GALENA, MELONITE, RUTILE, TOURMALINE, CHLORITE, ACTINOLITE, CALCITE, CLINOZOISITE

In diorite

Native gold occurred as visible gold associated with pyrite and chalcopyrite in quartz-carbonate veins in sheared diorite. Pyrrhotite, sphalerite, molybdenite, galena, and melonite occurred in trace amounts. Gangue minerals included albite, muscovite, rutile, and tourmaline. Mine dumps near the shaft contain a variety of minerals, including coarse flaky chlorite in calcite, actinolite as massive aggregates of slender prisms, small cubes of pyrite in quartz and in calcite, prismatic aggregates of dark yellowish-green clinozoisite in white quartz, and calcite that fluoresces pink under ultraviolet rays.

Norbenite Malartic Mines Limited (name changed to 'Norlartic Mines Limited' in 1950) outlined the orebody as a result of drilling between 1943 and 1946, and began underground development using a 165 m shaft. Malartic Gold Fields Limited acquired the property in 1958 and resumed development. The company mined the deposit from 1959 to 1966. Ore was hoisted via a 320 m shaft and processed at the mill at the Malartic Gold Fields mine. Production amounted to 1 033 475 t of ore containing 4 528 908 g of gold and 472 423 g of silver, valued at $6 840 867.

Aur Resources Inc. undertook exploration of the property in 1984. Two years later it discovered the Kierens zone, 1065 m northwest of the original Norlartic shaft. Production at the Kierens mine began in 1988 and ended in 1992, with a recovery of 984 938 g of gold. The mine consisted of a 427 m shaft. Between 1991 and 1993, the company deepened the original Norlartic shaft to 491 m and produced 462 346 g of gold.

The mines are about 74 km east of Rouyn-Noranda and 7 km northeast of Malartic. *See* Map 22 on page 150.

Road log from Highway 117 at **km 191.0** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	1.8	Marbenor Malartic (Marban) mine; continue straight ahead.
	2.8	Junction; follow the road on left leading northwest.
	3.0	Junction; continue straight ahead (west).
	3.8	Norlartic mine, on the north side of the road.
	5.1	Kierens mine, on the south side of the road.

Refs.: 61 p. 65–67; 92 p. 39–40; 183 p. 1; 257 p. 259; 306 p. 101–107;453 p. 51–52; 454 p. 47; 455 p. 56; 456 p. 55; 457 p. 63; 458 p. 54; 459 p. 49–50; 460 p. 48; 461 p. 50–51.

Maps (T): 32 C/4 Val-d'Or
32 D/1 Malartic
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Sennetere, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Malartic Hygrade mine

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

In basalt

Native gold occurred with pyrite in quartz veins. Some veins contained spectacular quantities of visible gold. Pyrrhotite, chalcopyrite, pentlandite, and traces of molybdenite, galena, and sphalerite occurred in the deposit.

A prospector discovered gold on the property in the mid-1930s. Subsequent exploration indicated ore of an exceptionally high grade. Exploration by Ascot Gold Mines Limited (1935–1943), Citralam Malartic Mines Limited (1943–1957), and Lavandin Mining Company Limited (1957–1961) indicated an ore deposit of 79 000 t containing 25 g/t gold. The Lavandin company encountered by drilling some spectacular gold-bearing ore. Malartic Hygrade Gold Mines Limited sank a shaft to 135 m and shipped custom ore to the Malartic Gold Fields mill in 1962–1963. Recovery amounted to 559 947 g of gold from 28 333 t of ore, valued at $673 776. In 1980, Malartic Hygrade Gold Mines (Canada) Limited (name changed to 'Republic Goldfields Inc.' in 1991) and American Barrick Resources Corporation undertook joint operations. Initially, ore was removed through the Camflo mine shaft via an underground connection to the Malartic Hygrade deposit, and from 1988 via the old shaft. From 1983 to 1991, the joint venture produced 6 076 811 g of gold.

The mine is about 73 km northeast of Rouyn-Noranda and 7 km northeast of Malartic. *See* Map 22 on page 150.

Road log from Highway 117 at **km 191.0** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road continuing beyond the Marbenor Malartic, Norlartic, and Kierens mines.
	7.5	Malartic Hygrade mine.

Refs.: 91 p. 41; 183 p. 1; 256 p. 57; 257 p. 179; 258 p. 114–115; 303 p. 2, 30–40; 436 p. 191–192; 449 p. 171–172; 452 p. 269–270; 454 p. 255; 455 p. 298; 457 p. 270; 458 p. 335; 459 p. 308.

Maps (T): 32 D/1 Malartic
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
573A Malartic (sheet 2), Malartic, Fournière, Cadillac, and Surimau townships, Abitibi County, Quebec (GSC, 1:18 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-308 Gîtes minéraux du Québec, région de l'Abitibi, feuille Rouyn-Noranda 32D (MRNQ, 1:250 000)

Kiena mine

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

In mafic breccia

Native gold occurred as fine visible gold associated with pyrite in quartz. Chalcopyrite, sphalerite, galena, pyrrhotite, and pentlandite occurred in minor to trace amounts.

Barney A. Parker discovered gold mineralization in 1911 on an island in Lac de Montigny; the island became known as 'Parker Island'. Kiena Gold Mines Limited explored it underground via a 148 m shaft between 1936 and 1941. Using a 404 m shaft, the company explored a newly discovered orebody from 1961 to 1965 and began production in 1981. In 1988, Placer Dome Inc. took over operations. Production to the end of 1996 amounted to 34 797 134 g of gold. Development consisted of shafts to 99 m, 131 m, and 404 m with a decline to the 480 m level. McWatters Mining Inc. acquired the mine in 1997 and produced 2 897 555 g of gold that year.

The Kiena mine is about 84 km southeast of Rouyn-Noranda, on Parker Island in Lac de Montigny. Access is via a 2.3 km road leading north from Highway 117 at **km 195.5** (*see* p. 10). *See* Map 23 on page 159.

Refs.: 7 p. 36–38; 65 p. 245–246; 68 p. 75–77; 83 p. 255–256; 183 p. 50, 52; 224 p. 6–7; 257 p. 80; 306 p. 121–128; 437 p. 177; 451 p. 187–188; 452 p. 248; 455 p. 277; 458 p. 317; 460 p. 269; 462 p. 290–291; 464 p. 368; 465 p. 289.

Maps (T): 32 C/4 Val-d'Or
(G): 41-6A Vassan–Dubuisson, Abitibi County, Quebec (GSC, 1:24 000)
42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)

Part of 32 C/4

1. Kiena mine 2. Elmac Malartic (Crossroads) mine 3. Quebec Explorers mine 4. Shawkey mine 5. Goldex mine 6. Gale (Mine School) mine 7. Joubi mine 8. Sullivan mine 9. Siscoe mine

Map 23. Val-d'Or west.

997A Senneterre, Quebec (GSC, 1:126 720)

2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)

2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)

M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Elmac Malartic (Crossroads) mine

NATIVE GOLD, TOURMALINE, PYRITE, CHALCOPYRITE, PYRRHOTITE, EPIDOTE

In chlorite-biotite schist

Native gold occurs as visible gold in white quartz veins. Tourmaline, pyrite, chalcopyrite, and pyrrhotite occur sparingly in quartz. The dumps provide specimens of epidote and pyrite in quartz.

Prospectors Foisie and Kengrow discovered gold on the property in 1919. Union Mining Corporation explored the gold-bearing vein and sank a shaft to 30 m between 1922 and 1925. Crossroads Gold Mines Limited did some underground exploration in 1935, followed by Elmac Malartic Mines Limited in 1945–1946. There was no production.

The Elmac Malartic (Crossroads) mine is about 86 km southeast of Rouyn-Noranda, on the south side of Highway 117 at **km 196.6** (*see* p. 10). *See* Map 23 on page 159.

Refs.: 23 p. 54; 65 p. 246–247; 83 p. 257; 135 p. 72–73; 414 p. 324; 420 p. 106.

Maps (T): 32 C/4 Val-d'Or
(G): 41-6A Vassan–Dubuisson, Abitibi County, Quebec (GSC, 1:24 000)
47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Quebec Explorers mine

NATIVE GOLD, PYRITE

In diorite

Native gold occurs as visible gold in quartz-carbonate veins. Pyrite is also present.

Quebec Explorers Limited discovered gold by drilling on the property in 1963. Quebec Explorers Corporation Limited continued exploration and drove a 688 m ramp to the 105 m level on the south shore of Piché River in 1981–1982. Underground exploration continued until 1990.

The mine is about 85 km southeast of Rouyn-Noranda. *See* Map 23 on page 159.

Road log from Highway 117 at **km 196.8** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	1.5	Junction; turn left (southeast).
	2.1	Junction; follow the road on left leading east.
	2.7	Quebec Explorers mine.

Refs.: 186 p. 62; 447 p. 268; 449 p. 214; 452 p. 338; 458 p. 326.

Maps (T): 32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)

2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Shawkey mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, MAGNETITE, TETRADYMITE, TOURMALINE, SCHEELITE, CHROME MUSCOVITE

In sheared basalt

Native gold occurred in spectacular amounts in places in quartz veins and along slip planes in the vein walls. Pyrite and trace amounts of pyrrhotite, chalcopyrite, magnetite, and tetradymite were also present in the veins. The gangue included tourmaline, scheelite, chrome muscovite (fuschite), carbonates (ankerite and calcite), and albite. Pyrite crystals, averaging 6 mm across, are common in basalt on the mine dumps.

Fred La Palme discovered the gold mineralization and staked a claim on it in 1911. O. Leblanc stripped the discovery vein in 1916. In 1917–1919, Martin Gold Mining Company Limited explored the vein by stripping and by No. 1 shaft sunk to 38 m, and processed some ore in a small mill installed on the site. Shawkey Gold Mining Company Limited acquired the property in 1932 and mined it until 1938 via a 221 m shaft. A mill operated on the site. Production amounted to 790 451 g of gold from 125 146 t of ore, valued at $879 640. Shawkey (1945) Mines Limited acquired the property in 1945 and sank No. 2 shaft to 227 m at a point 850 m southwest of the original shaft. Operations ended in 1951. Recovery amounted to 1574 t of ore grading 3085 g/t of gold.

The mine is about 87 km southeast of Rouyn-Noranda and 6 km west of Val-d'Or, near the south shore of Lac de Montigny. *See* Map 23 on page 159.

Road log from Highway 117 at **km 197.5** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	1.3	Junction; the road on right leads 300 m to Shawkey mine, No. 2 shaft. Continue straight ahead.
	2.1	Shawkey mine, No. 1 shaft.

Refs.: <u>23</u> p. 42–49; <u>65</u> p. 242–245; <u>83</u> p. 249; <u>183</u> p. 1; <u>251</u> p. 31–32; <u>306</u> p. 135–138.

Maps (T): 32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Goldex mine

NATIVE GOLD, TOURMALINE, PYRITE, CHALCOPYRITE

In granodiorite

Native gold, visible in places, occurs in quartz with tourmaline, pyrite, chlorite, and some chalcopyrite and carbonate in quartz veins.

Several companies explored the deposit beginning in the 1930s. In 1963–1966, Cusco Mines Limited explored it by drilling. In 1972, Goldex Mines Limited drove a decline 732 m to the 122 m level and located nine gold-bearing lenses. Between 1972 and 1975, the company produced a 25 790 t bulk sample yielding 70 759 g of gold valued at $140 000. Exploration between 1983 and 1993 consisted of sinking a shaft to 457 m and resulted in the discovery of a new ore zone. Agnico Eagle Mines Limited acquired the property in 1993 and deepened the shaft to 793 m. Exploration to the end of 1997 indicated that the ore was not economic.

The Goldex mine is about 88 km southeast of Rouyn-Noranda and 5 km west of Val-d'Or. It is about 150 m south of Highway 117 at **km 199.7** (*see* p. 10). *See* Map 23 on page 159.

Refs.: 183 p. 1; 259 p. 19–20; 447 p. 133; 452 p. 179; 454 p. 169; 457 p. 204; 460 p. 167; 461 p. 30; 465 p. 29.

Maps (T): 32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
46-21 Northeast Dubuisson, Abitibi County, Quebec (GSC, 1:12 000)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Gale (Mine School) mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, MAGNETITE, ACTINOLITE, EPIDOTE, TOURMALINE, HORNBLENDE

In volcanic rocks

Visible gold occurred in quartz veins containing pyrite, pyrrhotite, chalcopyrite, sphalerite, magnetite, actinolite, epidote, chlorite, tourmaline, and hornblende.

J.B. Mosso staked the claim in 1912. J.A. Gale restaked the claim after the original claim expired. Several companies did surface exploration on the claim between 1919 and 1934. Gale Gold Mines Limited did some development work from a 84 m shaft between 1934 and 1937. The Quebec Department of Mines then bought the property and used it as a training school for miners. Between 1938 and 1942, the Department deepened the shaft to 163 m, installed an ore dressing and sampling plant, and treated 4535 t of ore, recovering 17 610 g of gold valued at $21 793.

The Gale (Mine School) mine is about 88 km southeast of Rouyn-Noranda and 6 km west of Val-d'Or. Access is by a 0.8 km road leading north from Highway 117 at **km 199.8** (*see* p. 10). *See* Map 23 on page 159.

Refs.: 23 p. 49–52; 24 p. 50–51; 83 p. 249–251; 116 p. 81; 135 p. 77–78; 183 p. 1.

Maps (T): 32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
46-21 Northeast Dubuisson, Abitibi County, Quebec (GSC, 1:12 000)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Joubi mine

NATIVE GOLD, PYRITE

In sheared andesite and tuff

The deposit consists of two zones, the Joubi and the Dubuisson-East zones. The Joubi zone native gold occurs in quartz-carbonate veins and with pyrite in shear zones. The Dubuisson East zone contains native gold associated with finely disseminated pyrite.

Exploration of the deposit began in 1914 when a prospect shaft was sunk to 8 m on the Clowse claim. Several companies subsequently explored the deposit, including Joubi Mining Corporation Limited in 1973–1974. Western Quebec Mines Inc. acquired the property in 1986 and sank a shaft to 324 m, later deepened to 524 m. The company shipped a 20 448 t bulk sample to the Camflo mill, which recovered 201 672 g of gold in 1990. Commercial production began in 1991. To the end of 1997, the mine produced about 1715 kg of gold and 75 kg of silver.

The mine is about 90 km southeast of Rouyn-Noranda and 5 km southwest of Val-d'Or. Access is via a 1.5 km road leading south from Highway 117 at **km 201.9** (*see* page 10). *See* Map 23 on page 159.

Road log from Highway 117 at **km 201.9** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	1.4	Junction; turn left onto a road leading east.
	2.3	Junction; turn left (north).
	2.6	Joubi mine.

Refs.: 23 p. 52–53; 83 p. 251–252; 91 p. 45; 92 p. 41; 93 p. 37; 95 p. 35; 446 p. 173; 455 p. 465; 463 p. 438; 464 p. 478; 465 p. 470.

Maps (T): 32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
46-21 Northeast Dubuisson, Abitibi County, Quebec (GSC, 1:12 000)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Mines along Highway 111

Collecting localities along Highway 111 are described in the text that follows. The starting point is at the junction of highways 111 and 117 at **km 204.2** (*see* p. 10).

Sullivan mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SPHALERITE, GALENA, PYRRHOTITE, MOLYBDENITE, TOURMALINE, SCHEELITE, TELLUROBISMUTHITE, PETZITE

In granodiorite

Native gold occurred as small flakes in quartz veins. Pyrite, the chief metallic mineral, was associated with tourmaline and traces of chalcopyrite, sphalerite, galena, pyrrhotite, and molybdenite. Tellurobismuthite and petzite occurred as disseminations in massive white quartz.

This discovery, by J.J. Sullivan in July 1911, of auriferous quartz veins on the eastern shore of Lac de Montigny was the first recorded gold discovery in the Harricanaw district. Sullivan and Hertel Authier proceeded to stake the claims. Sullivan Gold Mines Limited did some underground exploration from 1928 to 1932. Sullivan Consolidated Mines Limited then acquired the property and began production in 1934. Development consisted of No. 1 shaft to 972 m and

Plate 16.
Sullivan mine, 1972. GSC 161438

No. 2 shaft to 949 m. A mill operated on the site. Operations ended in 1968. The mill treated 4 613 500 t of ore containing 35 281 kg gold and 9140 kg silver, valued at $45 712 498. About 268 kg of scheelite were recovered in 1942.

The mine is about 90 km east of Rouyn-Noranda and 4 km northwest of Val-d'Or, in the village of Sullivan. *See* Map 23 on page 159.

Road log from Highway 117 at **km 204.2** (*see* p. 10) in Val-d'Or:

km	0	Junction, Highway 117 (Tetrault Boulevard) and Highway 111; proceed northwest along Highway 111.
	1.9	Junction; turn left (northwest).
	2.3	Sullivan mine.

Refs.: 23 p. 32–42; 65 p. 253–255; 83 p. 247–248; 136 p. 56–63; 183 p. 1; 195 p. 184; 257 p. 79; 306 p. 25–29; 337 p. 352, 369, 380; 440 p. 320, 322.

Maps (T): 32 C/4 Val-d'Or
(G): 46-21 Northeast Dubuisson, Abitibi County, Quebec (GSC, 1:12 000)
47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Siscoe mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, PYRRHOTITE, GALENA, SPHALERITE, TOURMALINE, MAGNETITE, PETZITE, TETRADYMITE, SCHEELITE, ACTINOLITE

In granodiorite and talc-chlorite schist

Native gold occurred as fine to coarse grains and as veinlets in quartz veins. Mining operations revealed gold-bearing pockets in quartz containing up to 31 000 g of gold, and massive apple-green talc containing ribbons of finely disseminated native gold and gold-leaf plating along slip planes. Native gold also occurred as disseminated grains and as wires and plates. Pyrite, the main metallic mineral, was associated with tourmaline and traces of chalcopyrite, pyrrhotite, galena, sphalerite, magnetite, and petzite. Tetradymite occurred as 1 mm grains associated with coarse native gold and tourmaline in quartz. Scheelite was relatively common in some veins. The mine dumps contain black massive tourmaline and radiating prismatic masses of actinolite.

Stanley Siscoe (Stanislaw Szyszko) and Joe Samulski staked Siscoe Island in 1912 for the Siscoe Mining Syndicate, which spent the next seven years exploring gold-bearing veins. In 1923, Siscoe Gold Mines Limited undertook development, resulting in the main production shaft to 754 m and two inclined shafts to 11 m and 122 m. Production began in 1929, the earliest date of production of any gold mine in the area. The mine ended operations in 1949 having produced 2 975 734 t of ore containing 27 442 kg of gold and 9500 kg of silver, valued at about $30 392 801.

The mine is about 89 km east of Rouyn-Noranda and 6 km northwest of Val-d'Or. It is on Siscoe Island in Lac de Montigny. *See* Map 23 on page 159.

Road log from Highway 117 at **km 204.2** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 111; proceed northwest along Highway 111.
	6.4	Junction; proceed straight ahead (west) to Siscoe Island.
	8.7	Siscoe mine.

Refs.: 7 p. 23–28; 9 p. 467–475; 83 p. 240, 243–247; 136 p. 74–78; 159 p. 876–882; 183 p. 1; 306 p. 69–74; 336 p. 285–298; 337 p. 372, 380; 361 p. 39–40; 423 p. 183–184.

Maps (T): 32 C/4 Val-d'Or
(G): 42-12 Vassan–Dubuisson (sheet 4), Abitibi County, Quebec (GSC, 1:12 000)
46-21 Northeast Dubuisson, Abitibi County, Quebec (GSC, 1:12 000)
47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Lacorne mine

MOLYBDENITE, NATIVE BISMUTH, BISMUTHINITE, TOURMALINE, BERYL, FLUORITE, APATITE, EPIDOTE, HEMATITE, SCHEELITE, POWELLITE, CALCITE, SERPENTINE, PYRITE, CHALCOPYRITE, PYRRHOTITE, COLUMBITE, RUTILE, MOLYBDITE

In granodiorite and biotite schist

The ore minerals, molybdenite, native bismuth and bismuthinite, occurred in veins composed predominantly of quartz with some plagioclase, microcline, and light green muscovite. Molybdenite occurred as crystals and aggregates of crystals. Black prismatic aggregates of tourmaline and light green, blue, and greenish-blue crystals and crystal aggregates of beryl occurred in pegmatitic quartz veins. Accessory minerals included violet to pink and white fluorite, green and blue apatite, epidote, specular hematite, scheelite, powellite, calcite, amber serpentine, pyrite, chalcopyrite, pyrrhotite, black platy columbite, and yellow powdery rutile. Granular patches of epidote occurred in granodiorite. Molybdite has been reported from the deposit.

Hugh Gilligan of Cobalt staked the deposit in 1915. In 1923, L.N. Benjamin shipped about 180 t of ore to Ottawa for testing. The Molybdenite Reduction Company produced some concentrates at an on-site mill in 1927–1929. Operations were from a 9 m shaft. Wartime Metals Corporation produced molybdenite from 1942 to 1945. In 1951, Molybdia Corporation Limited resumed mining and began producing molybdenite and bismuth. From 1954 to 1971, Molybdenite Corporation of Canada Limited operated the mine via a 305 m shaft. The Quebec Department of Natural Resources extended operations for a one-year period beginning in September 1971. The mine produced about 6 930 900 kg of molybdenite and 996 600 kg of bismuth. Some beryl was recovered by hand-picking.

Plate 17.
Lacorne mine, 1972. GSC 161439

The mine is about 77 km east of Rouyn-Noranda and 25 km northwest of Val-d'Or. *See* Map 24 on page 168.

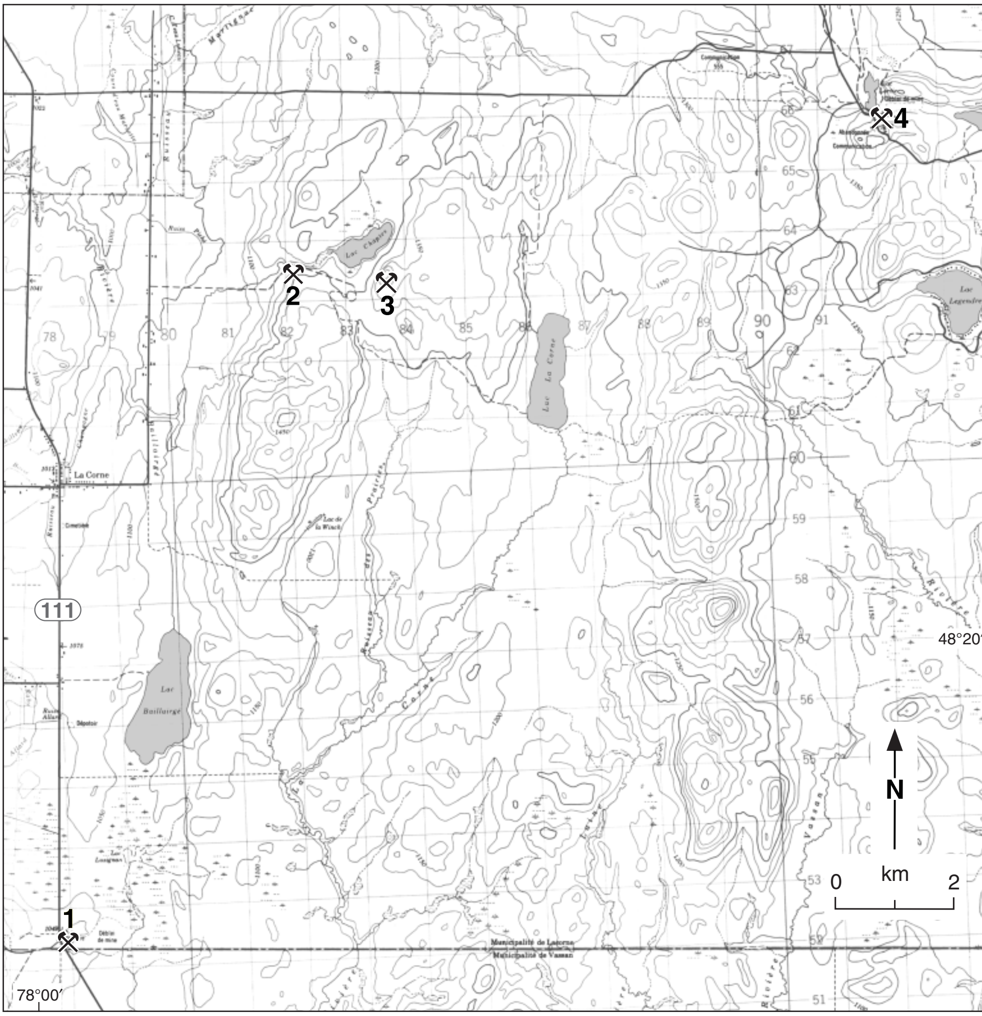
Road log from Highway 117 at **km 204.2** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 111; proceed northwest along Highway 111.
	6.4	Junction, road to Siscoe Island; continue along Highway 111.
	28.9	Lacorne mine, on the east side of the road.

Refs.: 8 p. 19; 33 p. 5–9; 34 p. 304; 38 p. 10; 65 p. 292–301; 80 p. 54; 135 p. 109–118; 364 p. 78–87; 379 p. 107–112; 444 p. 229; 445 p. 234–235.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)
1338 Southwest quarter of Lacorne Township, electoral district of Abitibi-East (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)

Part of 32 C/5 and 32D/8



1. Lacorne mine 2. Massberyl occurrence 3. Valor Lithium occurrence 4. Quebec Lithium mine

Map 24. La Corne.

2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Massberyl occurrence

BERYL, GARNET, MOLYBDENITE, COLUMBITE-TANTALITE

In granite pegmatite

Light blue to yellowish-green beryl crystals up to 7 cm in diameter and several centimetres long occur in white pegmatite. Red garnet, molybdenite, and columbite-tantalite are present in small amounts. The pegmatite is composed of perthite, plagioclase, quartz, and muscovite.

P.F. Massicotte and partners staked the property in 1948. Massberyl Lithium Company Limited did some exploration including stripping, trenching, and drilling in 1955. Morono Copper Mines Limited did further stripping, blasting, and bulk sampling from 1969 to 1972.

The occurrence is about 83 km northeast of Rouyn-Noranda and 33 km northwest of Val-d'Or. *See* Map 24 on page 168.

Road log from Highway 117 at **km 204.2** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 111; proceed northwest along Highway 111.
	28.9	Lacorne mine; continue along Highway 111.
	36.4	La Corne, at the junction of a road leading east; turn right (east).
	41.2	Junction; turn right (east).
	43.6	Junction, trail on right leading south; proceed along this trail for about 300 m to the Massberyl occurrence in an outcrop area on the north side of a ridge.

Refs.: 31 p. 65–66; 33 p. 5–8; 220 p. 83–84; 300 p. 15–16; 364 p. 89; 432 p. 166.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Valor Lithium occurrence

SPODUMENE, BERYL, TOURMALINE, GARNET, POLLUCITE, PETALITE, LEPIDOLITE

In granite pegmatite and aplite

Light green, white, and light pink spodumene crystals up to 120 cm long are embedded in cleavelandite-quartz-lepidolite aggregates in aplite and pegmatite. Light yellowish-green beryl crystals are associated with muscovite, black tourmaline, and quartz. Orange-red garnet crystals are scattered through the aplite. Massive white to greyish-white pollucite occurs with quartz, cleavelandite, spodumene, beryl, and lepidolite. The pollucite contains veinlets and patches of white spodumene and purplish lepidolite. Pollucite weathers dull greyish white resembling limestone. Petalite occurs in a quartz-poor zone consisting of cleavelandite rosettes, metre-size spodumene crystals, and lepidolite.

Valor Lithium Mines Limited explored the deposit by stripping and trenching in 1954–1955.

The occurrence is about 85 km northeast of Rouyn-Noranda and 33 km northwest of Val-d'Or. *See* Map 24 on page 168.

Road log from Highway 117 at **km 204.2** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 111; proceed northwest along Highway 111.
	36.4	La Corne, at the junction of a road leading east; turn right (east).
	41.2	Junction; turn right (east).
	43.6	Junction, trail to the Massberyl occurrence; continue straight ahead.
	45.0	End of the road. A trail continues about 300 m to the Valor Lithium trenches and strippings, and an outcrop area on the south slope of a wooded ridge.

Refs.: 31 p. 66–68; 33 p. 5–9; 218 p. 4; 219 p. 48–49; 220 p. 84; 301 p. 145–147.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Quebec Lithium mine

SPODUMENE, BERYL, LEPIDOLITE, SPESSARTINE, COLUMBITE-TANTALITE, MOLYBDENITE, BISMUTHINITE, NATIVE BISMUTH, BETAFITE, FLUORITE, POLYCRASE, CHALCOPYRITE, SPHALERITE, HOLMQUISTITE

In granite pegmatite

Spodumene occurs as white, light green, and greenish-yellow granular and prismatic masses and crystals 3 to 20 cm long. The pegmatite is composed of white feldspar (albite, microcline), quartz, and muscovite. The principal accessory minerals include beryl, lepidolite, spessartine, columbite-tantalite, molybdenite, bismuthinite, native bismuth, and betafite. Fluorite, polycrase, chalcopyrite, and sphalerite are also present. Holmquistite is found as purplish-blue columnar, lamellar, or fibrous pods, as sheaf-like aggregates, or as disseminated acicular crystals within or near the contact of the pegmatite and amphibole-bearing country rock; the pods are small, rarely measuring up to 5 cm across (D.D. Hogarth, pers. comm., 1970).

The property, originally known as the 'Dumont property', was staked in 1940 for molybdenum. Sullivan Consolidated Mines Limited did some surface exploration. Later, Lithium Exploration Company Limited discovered a lithium deposit. In 1955, Quebec Lithium Corporation began mining from a 171 m shaft. An on-site mill produced spodumene, feldspar, and mica concentrates. A refinery produced lithium carbonate, lithium hydroxide monohydrate, and anhydrous lithium chloride. Operations ended in 1966.

The mine is about 94 km northeast of Rouyn-Noranda and 34 km north of Val-d'Or. *See* Map 24 on page 168.

Road log from Highway 117 at **km 204.2** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 111; proceed northwest along Highway 111.
	36.4	La Corne, at the junction of a road leading east; turn right (east).
	44.4	Junction; turn right (east) onto the road to Mount Vidéo.
	56.2	Junction; turn right (south).
	57.8	Quebec Lithium mine.

Refs.: 33 p. 5–9; 219 p. 43–46; 223 p. 506–507; 438 p. 277; 444 p. 312.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1179A Preissac-Lacorne batholith, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2168 Géologie du batholite de Preissac-La Corne, Abitibi, feuilles Val-d'Or, Barraute, Malartic et La Motte (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Mines along Highway 397

Collecting localities along Highway 397 are described in the text that follows. The starting point is at the junction of highways 111 and 117 at **km 207.0** (*see* p. 10).

Vendome (Mogador) mine

PYRITE, PYRRHOTITE, SPHALERITE, CHALCOPYRITE, GYPSUM, ROZENITE, GOETHITE, EPIDOTE, CALCITE

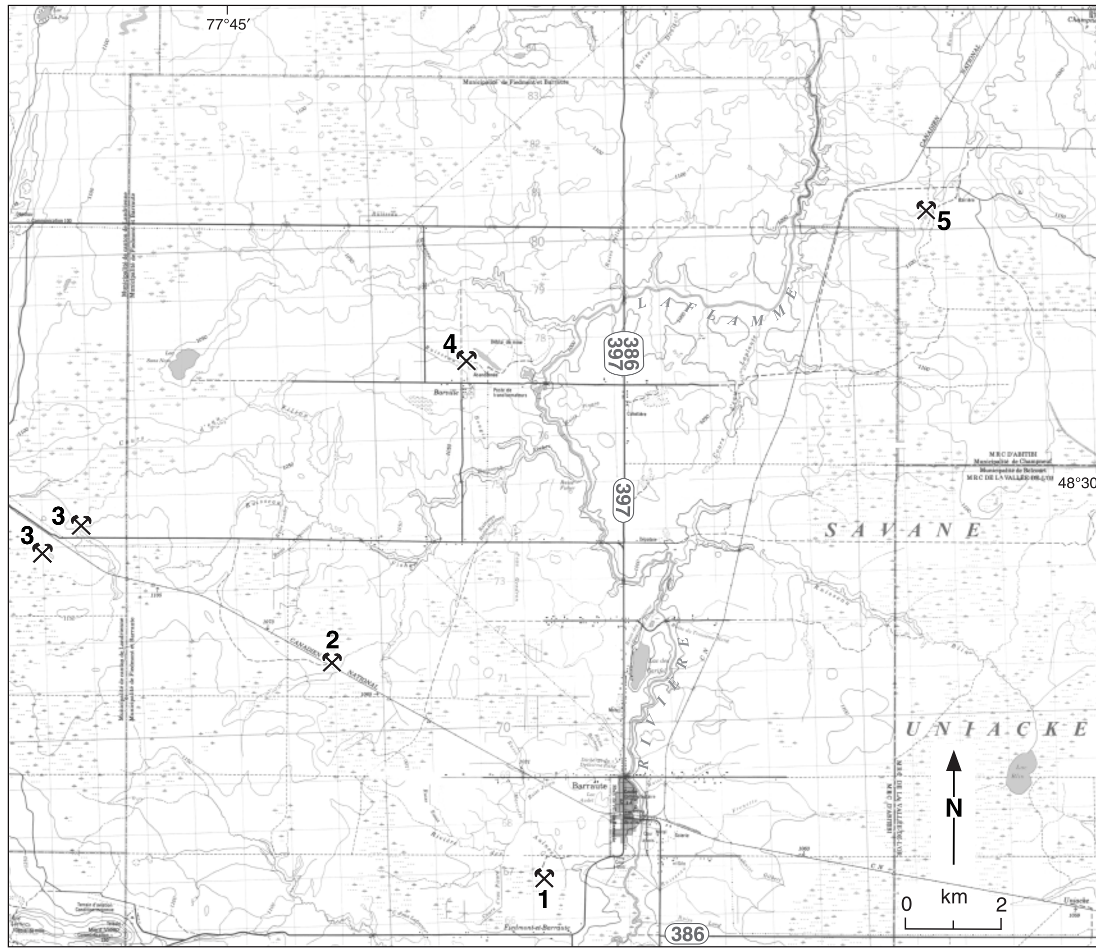
In silicified and sheared andesite

The ore consists of massive and disseminated pyrite, pyrrhotite, and dark brown sphalerite, with some chalcopyrite. Epidote occurs as yellowish- to brownish-green prismatic aggregates in quartz and in white calcite. Under long ultraviolet rays, the calcite fluoresces orange-pink. Secondary minerals coating ore mineral specimens include colourless to white crystalline gypsum, white rozenite, and rusty brown goethite.

The discovery of several sulphide-bearing boulders led to the investigation of this property. Mogador Mines Limited discovered a zinc-copper-lead-gold-silver orebody as a result of extensive drilling and surface work in 1951–1952. Vendome Mines Limited carried out underground exploration from 1953 to 1958 via a 160 m shaft.

The mine is just southwest of Barraute, about 105 km northeast of Rouyn-Noranda and 38 km northeast of Val-d'Or. *See* Map 25 on page 172.

Part of 32 C/5, 12



1. Vendome (Mogador) mine 2. Venus mine 3. Randall-Fisher mine 4. Barvue (Abcourt) mine 5. Bolduc mine

Map 25. Barraute.

Road log from Highway 117 at **km 207.0** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 397; proceed north along Highway 397.
	42.9	Junction, Highway 386; continue along Highway 397.
	46.0	Barraute, at a junction; turn left (south). (Highway 397 turns right.)
	47.0	Junction; continue straight ahead (west) along the mine road.
	48.7	Vendome (Mogador) mine.

Refs.: 42 p. 10; 109 p. 180–186; 382 p. 150; 424 p. 132; 425 p. 130; 428 p. 201; 436 p. 317.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1218 Northeast quarter of Fiedmont Township, electoral district of Abitibi-East (MRNQ, 1:24 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Venus mine

NATIVE GOLD, PYRITE, TOURMALINE, BORNITE, CHALCOPYRITE

In sheared volcanic rocks

Native gold occurs as visible gold with pyrite and tourmaline in quartz veins, and on pyrite crystals in altered volcanic rocks. Native gold occurs as coatings and partial crusts on pyrite cubes. Thin films of bornite also occur on pyrite cubes. Chalcopyrite, chlorite, and carbonates are common accessories.

Prospector Ephrem Foisie discovered visible gold in quartz veins and staked the original claim in 1925. From 1926 to 1930, Venus Gold Mines Limited explored the surface veins by several pits and trenches and did underground exploration by a 70 m shaft. Consolidated Venus Gold Mines Limited continued the exploration in 1931–1932, extending the underground workings to 92 m. A test mill operated on the site. In 1983, Barexor Minerals Inc. drove an adit 48 m on one of the veins and shipped a 1630 t sample to the Kerr Addison mill in Virginiatown. In 1987, the company extended the undergound development to the 145 m level.

The mine is about 101 km northeast of Rouyn-Noranda, 40 km north of Val-d'Or, and 7 km northwest of Barraute. *See* Map 25 on page 172.

Road log from Highway 117 at **km 207.0** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 397; proceed north along Highway 397.
	46.0	Barraute; continue along Highway 397.
	51.6	Junction; turn left (west).
	59.7	Junction; turn left (south) onto the mine road.
	64.1	Venus mine.

Refs.: 20 p. 40–51; 65 p. 287–289; 82 p. 7–8; 83 p. 109–110; 183 p. 53–54; 261 p. 83; 364 p. 96–99; 456 p. 316; 464 p. 61.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1523 Southwest quarter of Barraute Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Randall-Fisher mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, TOURMALINE, TELLURIDES

In altered volcanic rocks

Native gold occurs as visible gold in quartz veins containing pyrite, chalcopyrite, tourmaline, and dolomite. Pyrite and dolomite occur as well formed crystals. Tellurides have been reported from the Randall veins.

The 1924 discovery of large quartz boulders carrying visible gold led to intensive prospecting in the area. Prospectors Sweet and Swanson discovered gold-bearing veins in 1925. Fisher Quebec Gold Mines Limited did surface exploration on the veins and sank a shaft to 66 m in 1926–1927. In 1932, Alfred Tremblay discovered native gold in quartz about 1100 m to the southwest, on a claim staked by E.M. Loring in 1926. Between 1933 and 1937, Randall Mines Corporation Limited explored the veins by several pits, trenches, and a 183 m shaft. A mill operated on the site in 1936–1938.

The mine is about 95 km northeast of Rouyn-Noranda, 43 km north of Val-d'Or, and 13 km northwest of Barraute. *See* Map 25 on page 172.

Road log from Highway 117 at **km 207.0** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 397; proceed north along Highway 397.
	46.0	Barraute; continue along Highway 397.
	51.6	Junction; turn left (west).
	59.7	Junction, road to the Venus mine; continue straight ahead.
	62.8	Trail on right leads north 200 m to the Fisher shaft. To reach the Randall shaft, continue straight ahead.
	63.8	Junction, mine road; turn left (south).
	64.7	Randall shaft.

Refs.: 65 p. 284–286; 82 p. 7, 8; 83 p. 107–108; 364 p. 89–92, 99–100.

Maps (T): 32 C/5 Barraute
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
999A Fiedmont, Quebec (GSC, 1:63 360)
1515 Southeast quarter of Landrienne Township, Abitibi-East County (MRNQ,

1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Barvue (Abcourt) mine

SPHALERITE, PYRITE, CHALCOPYRITE, GALENA, RUBY SILVER, ARSENOPYRITE, SIDERITE, RHODOCHROSITE, MAGNETITE, TALC, GUNNINGITE, LEONHARDTITE, BEUDANTITE, ANGLESITE, CHROME MUSCOVITE

In chloritic tuff-agglomerate

Sphalerite and pyrite, the chief ore minerals, were associated with chalcopyrite, galena, ruby silver, arsenopyrite, siderite, rhodochrosite, and magnetite. Gangue minerals included talc, epidote, and calcite (fluoresces pink under ultraviolet light). The mine dumps contain secondary minerals occurring as coatings and encrustations on the ore minerals; included are white gunningite, white leonhardtite, brown beudantite, and grey anglesite. Layers of bright green chrome muscovite (fuschite) occur in rocks on the dumps.

A Quebec Department of Mines geological survey field party discovered the sphalerite-pyrite mineralization in 1950. Barvue Mines Limited drilled the property and outlined an economic orebody. Production from 1952 to 1957 resulted in the recovery of 119 244 t of zinc and 123 514 kg of silver, from 5 080 359 t of ore. Some lead was also produced. Mining was from an open pit until the end of 1956; in 1957, a spiral tunnel was driven from the bottom of the pit (76 m deep) to the 152 m level. A mill operated on the site. Abcourt Mines Inc. drove a new ramp from the 23 m level to the 198 m level and began commercial production in 1986. Operations ended in 1990. Production during this period amounted to 26 201 t of zinc and 66 381 kg of silver.

The mine is in Barville, about 105 km northeast of Rouyn-Noranda and 47 km north of Val-d'Or. *See* Map 25 on page 172.

Road log from Highway 117 at **km 207.0** (*see* p. 10) in Val d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 397; proceed north along Highway 397.
	46.0	Barraute. Continue along Highway 397.
	55.0	Junction, turn left (west) onto the road to Barville.
	58.1	Barville. The Barvue (Abcourt) mine is on the north side of the village.

Refs.: 90 p. 43; 262 p. 69; 263 p. 50; 264 p. 44–45; 392 p. 419–422; 393 p. 43–44; 452 p. 283; 455 p. 315; 457 p. 33.

Maps (T): 32 C/12 Landrienne
(G): 529A Duverny (east half), Abitibi County, Quebec (GSC, 1:63 360)
1347 Amos–Barraute area, Barraute sheet, County of Abitibi-East (MRNQ, 1:24 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Bolduc mine

CHRYSOTILE, SERPENTINE, BRUCITE, TALC (SOAPSTONE), MAGNETITE

In serpentinite

Chrysotile asbestos occurs as fibres up to 2 cm long in fractures in serpentinite. Serpentine (picrolite), brucite, talc (soapstone), and magnetite are also present.

Canadian Johns-Manville mined the deposit from an open pit between 1974 and 1977. Production amounted to 19 630 t of asbestos concentrate from 766 000 t of ore.

The mine is about 114 km northeast of Rouyn-Noranda, 54 km northeast of Val-d'Or, and 14 km northeast of Barraute. *See* Map 25 on page 172.

Road log from Highway 117 at **km 207.0** (*see* p. 10) in Val-d'Or:

km	0	Junction, Highway 117 (Tétrault Boulevard) and Highway 397; proceed north along Highway 397.
	46.0	Barraute. Continue along Highway 397.
	62.7	Junction, road to Champneuf; turn right (east).
	72.9	Champneuf; proceed along the road leading south.
	78.6	Junction, mine road; turn left (south).
	80.3	Bolduc mine.

Refs.: <u>184</u> p. 83; <u>350</u> p. 36–37; <u>447</u> p. 82–83; <u>448</u> p. 61.

Maps (T): 32 C/12 Landrienne
(G): 529A Duverny (east half), Abitibi County, Quebec (GSC, 1:63 360)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Sigma (Sigma No. 1) mine

NATIVE GOLD, PETZITE, CALAVERITE, TELLUROBISMUTHITE, PYRITE, CHALCOPYRITE, PYRRHOTITE, TOURMALINE, SCHEELITE

In volcanic rocks and feldspar porphyry

Native gold occurs in fractures in sheared volcanic rocks and in quartz veins. Petzite, calaverite, and tellurobismuthite are associated with gold. Pyrite, chalcopyrite, and pyrrhotite occur in minor amounts. The veins are composed chiefly of quartz and tourmaline with smaller amounts of calcite, scheelite, chlorite, muscovite, apatite, and biotite.

Heber Bambrick discovered gold mineralization on the property in 1933 on claims owned by Read-Authier Mines Limited. Sigma Mines Limited undertook development in 1934 and began production in 1937. Development consisted of the main shaft to 1819 m and another shaft to 69 m. Placer Dome Inc. took over operations in 1988. Total production to the end of 1995 amounted to 22 813 575 t of ore averaging 5.61 g/t gold. Some scheelite was produced during World War II. McWatters Mining Inc. acquired the mine in 1997 and began open-pit operations.

The Sigma (Sigma No. 1) mine is at the eastern end of Val-d'Or, on the north side of Highway 117 at **km 209.7** (*see* p. 10). *See* Map 26 on page 178.

Refs.: 22 p. 27–35; 83 p. 264–265; 95 p. 32–33; 149 p. 12–13; 183 p. 102–106; 281 p. 2–6; 282 p. 69–74; 286 p. 72–80; 306 p. 51–60; 456 p. 370, 413; 465 p. 289.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Lamaque mine

PYRITE, CHALCOPYRITE, NATIVE GOLD, TELLUROBISMUTHITE, CALAVERITE, PETZITE, TETRADYMITE, HESSITE, KRENNERITE, TOURMALINE, SCHEELITE, SELENITE, FLUORITE, CHROME MUSCOVITE

In diorite and granodiorite

Native gold occurred as visible specks and patches in quartz and associated with pyrite in quartz veins. Pyrite, the most abundant metallic mineral, occurred as cubes several centimetres in diameter. Chalcopyrite was relatively uncommon. Telluride minerals found in white quartz included tellurobismuthite as small plates, massive calaverite, petzite as an intimate intergrowth with a 4 mm gold crystal, tetradymite as minute flecks, hessite, and krennerite. The most common constituents of the veins were black tourmaline, ankerite, calcite, and scheelite with some selenite, fluorite, and green chrome muscovite (fuchsite). Quartz crystals, studded with coarse native gold and tellurides, have been found lining cavities in the veins.

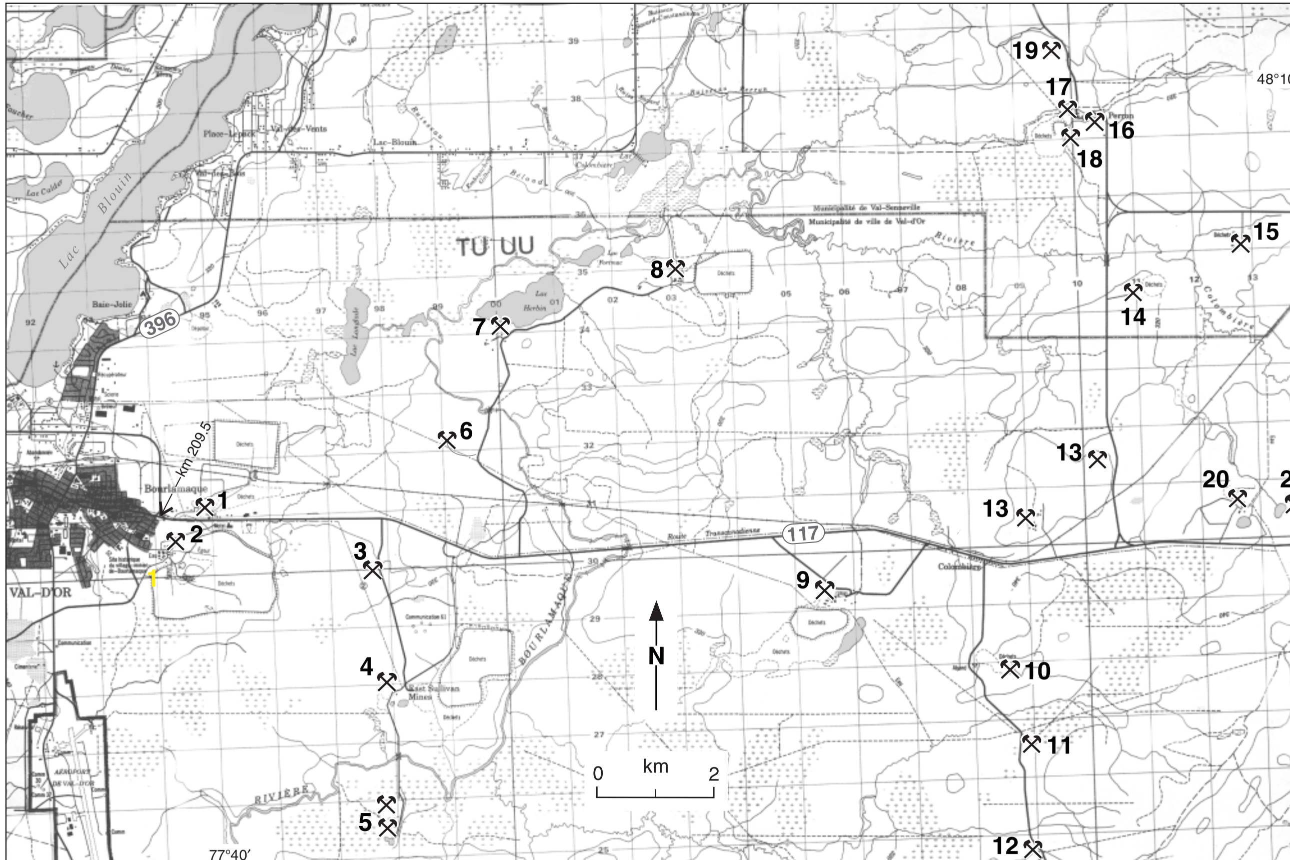
R.C. Clark discovered a quartz vein containing a pocket of coarse gold on the property and staked the original claim in 1923. During prospecting of the claim, a boulder composed of quartz and tourmaline containing visible gold was encountered. Read-Authier Mines Limited drilled the property in 1929, followed by Teck-Hughes Gold Mines Limited in 1932. The encouraging results led to development of the deposit beginning in 1933 by Lamaque Gold Mines Limited. Production began in 1935 and ended in 1985. Development consisted of No. 1 mine, with seven shafts to a maximum 1098 m, No. 2 mine, about 1100 m northeast of No. 1, with a 410 m shaft, and No. 3 mine, about 1525 m southeast of No. 1, with a 232 m shaft. During 50 years of production, the mine produced about 141 390 kg of gold from 23 803 000 t of ore.

The Lamaque mine is in the eastern end of Val-d'Or. Access is via a road leading south 1.1 km from Highway 117 at **km 210.4** (*see* p. 10). *See* Map 26 on page 178.

Refs.: 16 p. 115–124; 22 p. 35–47; 76 p. 111–122; 83 p. 258–264; 119 p. 15–16; 257 p. 24; 260 p. 48; 306 p. 61–67; 337 p. 348, 352, 369, 371, 380; 363 p. 75; 394 p. 511–516; 395 p. 882–891; 444 p. 318; 445 p. 328; 452 p. 392.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)

Part of 32 C/4



1. Sigma (Sigma No. 1) mine 2. Lamaque mine 3. Aumaque mine 4. East Sullivan mine 5. Orenada mine 6. Bidlamaque mine 7. Dumont (Payore) mine 8. Ferderber mine 9. Manitou-Barvue (Golden Manitou) minel 10. Rainville (Dunraine) mine 11. Louvicourt Goldfield (Simkar) mine 12. Akasaba (Obaska) mine 13. Beacon (D'Or Val) mine 14. Bussières (Cournor) mine 15. New Pascalis (Lucien C. Béliveau) mine 16. Pascalis mine 17. Perron mine 18. Beaufor mine 19. Senore (Resenor) mine 20. Louvem mine 21. Louvicourt mine

Map 26. Val-d'Or east.

2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Aumaque mine

NATIVE GOLD, PYRITE, GALENA, SPHALERITE, CHALCOPYRITE, CHROME MUSCOVITE, SZOMOLNOKITE, ROZENITE

In chlorite and sericite schist

Native gold occurred in quartz and in massive sulphides consisting of pyrite with small amounts of galena, sphalerite, and chalcopyrite in quartz veins. The rock dumps contain bright green chrome muscovite (fuchsite) in sericite schist, pyrite crystals in quartz and in chlorite schist, and white powdery szomolnokite and white botryoidal rozenite on sulphide-bearing schist.

W.J. Sparks, F. Bidgood, and J. Donovan staked the original claims, later acquired by Herbin Lake Gold Syndicate Limited and Lamaque Contact Gold Mines Limited. These companies did the original surface work and drilling on the claims. From 1944 to 1947, Aumaque Gold Mines Limited explored the property by way of a 190 m shaft. The results were disappointing and work ended.

The mine is about 5 km east of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 213.3** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	1.0	Junction; turn right (west).
	1.3	Aumaque mine.

Refs.: 22 p. 52–54; 135 p. 83–84; 151 p. 16–18; 419 p. 15; 425 p. 14.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

East Sullivan mine

PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, GALENA, HESSITE, TOURMALINE

In chloritized and brecciated volcanic rocks

The ore consisted of massive and disseminated pyrite, pyrrhotite, chalcopyrite, sphalerite, and minor galena. Hessite occurred as disseminated grains in quartz and associated with tourmaline, pyrite, chalcopyrite, and native gold.

East Sullivan Mines Limited discovered the copper-zinc-gold-silver orebody as a result of drilling and geophysical surveys conducted in 1944–1945. Underground development began in 1946 and production, in 1949. Sullico Mines Limited took over operations in 1960, continuing until closure in 1966. Mining was via a 1242 m shaft. A mill operated on the site. Production amounted to 141 000 t of copper, 73 000 t of zinc, 119 000 kg of silver, and 3683 kg of gold from 14 952 000 t of ore, valued at $124 619 800.

The mine is about 6 km southeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 214.7** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	3.0	Junction; follow the road on right leading southwest.
	3.3	East Sullivan mine.

Refs.: 24 p. 27–30; 69; 257 p. 25; 337 p. 356, 380; 440 p. 127, 320.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Orenada mine

CHALCOPYRITE, PYRRHOTITE, PYRITE, ARSENOPYRITE, TOURMALINE, MAGNETITE, SPHALERITE, RUTILE, NATIVE GOLD

In volcanic rocks and feldspar porphyry

The deposit consisted of copper-gold mineralized zones and gold-bearing zones. The copper-gold mineralization consisted of disseminated chalcopyrite, pyrrhotite, pyrite, arsenopyrite, and magnetite in volcanic rocks. The gold-bearing zones consisted of quartz-tourmaline-arsenopyrite-albite-carbonate veins in volcanic rocks altered to chlorite schist. Gold was associated with arsenopyrite, the most abundant metallic mineral. Pyrrhotite, chalcopyrite, sphalerite, pyrite, and rutile were minor components. Some veins contained coarse visible gold.

Charles Hughes discovered and staked the copper showings in 1923 and did some work on the property. Quebec Gold Belt Mines Limited discovered gold on the property in 1933. Orenada Gold Mines Limited acquired the property in 1938 and did some drilling at various times between 1940 and 1976 in zones No. 1 and No. 4. Mid-Canada Gold & Copper Mines Limited drove a ramp to the 107 m level and carried out underground exploration in 1979–1981. The company extracted ore from a small open pit and shipped some ore to the Lamaque mill, which recovered 186 618 g of gold, and some ore to the Manitou mill for copper recovery. Operations ended in 1982. Aur Resources Inc. explored the No. 4 zone between 1985 and 1991 via a 275 m shaft.

The mine is about 7 km southeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 214.7** (*see* p. 10):

km 0 Junction, Highway 117 and a road leading south; proceed south along this road.

3.0 Junction; follow the road on right leading southwest.

3.3 East Sullivan mine; continue along the road leading south.

4.9 Orenada No. 1 mine; the road continues south 600 m to Orenada No. 4 mine.

Refs.: 135 p. 87–88; 186 p. 51, 53; 225 p. 14; 261 p. 87; 285 p. 259–267; 453 p. 52; 455 p. 56; 456 p. 313; 458 p. 55.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Bidlamaque mine

NATIVE GOLD, PYRRHOTITE, PYRITE, CHALCOPYRITE, TOURMALINE

In volcanic rocks

Native gold is associated with pyrrhotite, pyrite, and chalcopyrite in quartz-tourmaline veins.

F.C. Bidgood staked the property for gold in about 1933. Bidlamaque Gold Mines Limited did some surface exploration in 1933–1934. New Bidlamaque Gold Mines Limited conducted underground exploration of the gold-bearing veins from a 119 m shaft in 1945–1946. Dufresnoy Societé d'Exploration Minière Inc. did some stripping and further drilling and surveying between 1983 and 1987. The deposit was estimated to contain 213 000 t of ore grading 1.2% copper and 5.83 g/t gold.

The mine is about 6 km east of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 215.0** (*see* p. 10):

km 0 Junction, Highway 117 and a road leading northeast; proceed northeast along this road.

2.6 Junction; continue straight ahead (west).

3.2 Bidlamaque mine.

Refs.: 22 p. 57–58; 83 p. 266; 188 p. 57; 225 p. 8, 12; 454 p. 128–129, 281.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC,

1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Dumont (Payore) mine

NATIVE GOLD, TOURMALINE, PYRITE, SCHEELITE

In quartz diorite

Native gold was associated with pyrite in quartz-tourmaline veins. Pyrite occurred as aggregates of crystals. Spectacular native gold was encountered in a quartz-filled fracture in the host rock.

W.J. Sparks discovered gold-bearing quartz veins and staked the original claims in 1928. Payore Gold Mines Limited acquired the property in 1934 and proceeded to develop it using a 119 m shaft. An on-site mill recovered 14 494 g of gold and 684 g of silver, from 4365 t of ore. Bras d'Or Mines Limited acquired the property in 1974 and began production in 1980. This company was merged into Belmoral Mines Limited in 1985 and the mine renamed the 'Georges H. Dumont' mine. Operations were from a 503 m shaft and ended in 1994. The mine produced 1 323 136 t of ore averaging 5.83 g/t gold.

The mine is about 7 km northeast of Val-d'Or. See Map 26 on page 178.

Road log from Highway 117 at **km 215.0** (see p. 10):

km	0	Junction, Highway 117 and a road leading northeast; proceed northeast along this road.
	2.6	Junction, road to Bidlamaque mine; continue along the main road leading north.
	4.9	Dumont (Payore) mine.

Refs.: 22 p. 55–57; 83 p. 257; 94 p. 35; 135 p. 84–87; 306 p. 23–24.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Ferderber mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, TOURMALINE, TETRADYMITE, TELLUROBISMUTHITE, HESSITE

In sheared quartz diorite

Native gold occurred in microfractures in pyrite associated with chalcopyrite in quartz-tourmaline-calcite lenses in schist within sheared quartz diorite. Tetradymite, tellurobismuthite, and hessite were also present. Visible gold occurred with tetradymite. Gangue minerals included calcite, ferroan dolomite, and mica.

Belmoral Mines Limited discovered gold mineralization using geophysical methods in 1975 on claims staked the previous year by Peter Ferderber. The company began production in 1978. Development consisted of a ramp driven to the 151 m level and a 380 m production shaft. A mill operated on the site. Operations ended in 1994. Production amounted to 1 710 102 t of ore averaging 6.46 g/t gold.

The mine is about 10 km northeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 215.0** (*see* p. 10):

km	0	Junction, Highway 117 and a road leading northeast; proceed northeast along this road.
	2.6	Junction, road to Bidlamaque mine; continue along the main road leading north.
	4.9	Dumont (Payore) mine; continue straight ahead (northeast).
	8.0	Ferderber mine.

Refs.: 79 p. 34–35; 94 p. 35; 306 p. 15–21; 380 p. 237–243; 381 p. 37–44.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Manitou-Barvue (Golden Manitou) mine

PYRITE, SPHALERITE, GALENA, TENNANTITE, CHALCOPYRITE, ARSENOPYRITE, PROUSTITE, PYRARGYRITE, NATIVE SILVER, NATIVE GOLD

In sericite schist

The ore consisted of massive pyrite and sphalerite and minor amounts of galena, chalcopyrite, arsenopyrite, tennantite, and tetrahedrite. Argentite, proustite, pyrargyrite, arsenopyrite, native silver, and native gold were rare. Native silver occurred in wire and leaf forms in vugs within quartz-calcite-filled fractures.

Chalcopyrite-pyrite mineralization was discovered on the property in 1923. Caribou Copper Corporation explored the showing for copper in 1926–1928 and encountered zinc-silver-lead mineralization south of the copper zone. Quebec Manitou Mines Limited sank a shaft on the zinc zone in 1937 and did some underground exploration. Golden Manitou Mines Limited mined the two zones and operated a mill from 1942. Manitou-Barvue Mines Limited carried out operations from 1958 until 1976. Louvem Mining Company Inc. then acquired the property and continued operations until 1979. Development consisted of a 1281 m shaft. A concentrating mill operated on the site. Production amounted to 33 000 t of copper, 300 000 t of zinc, 1104 kg of silver, 9265 kg of gold, and some lead and cadmium, from 11 222 000 t of ore.

The Manitou-Barvue (Golden Manitou) mine is about 13 km east of Val-d'Or. Access is via a 1.4 km road leading southeast from Highway 117 at **km 220.3** (*see* p. 10). An alternate road, 2 km long, leads southwest from Highway 117 at **km 223.0**. *See* Map 26 on page 178.

Refs.: 69; 83 p. 441–442; 225 p. 9–13; 244 p. 92–94; 265 p. 19–20; 448 p. 184–185, 189.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Rainville (Dunraine) mine

PYRITE, CHALCOPYRITE, SPHALERITE, NATIVE GOLD, PYRRHOTITE, TOURMALINE, BROCHANTITE, MALACHITE, SIDEROTIL

In sheared volcanic rocks and diorite

The ore consisted of pyrite, chalcopyrite, and sphalerite, with some native gold and pyrrhotite. The mine dumps furnish pyrite crystals, chalcopyrite, tourmaline as smoky brown prismatic aggregates in quartz, bright green brochantite and malachite, and bluish-white siderotil as coatings and encrustations.

Various companies explored this deposit intermittently from 1932 to 1951 when Rainville Copper Mines Limited undertook underground development and obtained production in 1956–1958. Development consisted of No. 1 production shaft to 221 m and No. 2 shaft to 354 m. A mill operated on the site. Production amounted to 254 657 t of ore containing 3608 t of copper, 46 219 g of gold, and 793 375 g of silver, valued at $2 241 280.

The mine is about 16 km southeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 224.0** (*see* p. 11):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	2.1	Junction; follow the road on left leading east.
	2.15	Rainville (Dunraine) mine. No. 1 shaft is on the north side of the road. The road continues east 550 m to No. 2 shaft.

Refs.: 183 p. 3, 74–75; 257 p. 25, 173; 312 p. 41–42; 382 p. 231; 431 p. 227.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Louvicourt Goldfield (Simkar) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, PYRRHOTITE, TELLUROBISMUTHITE, CALAVERITE, TOURMALINE

In diorite

Native gold occurred as fine specks associated with calcite and pyrite in quartz veins. The most abundant metallic mineral in the ore was pyrite; chalcopyrite and pyrrhotite were minor constituents, and sphalerite, molybdenite, and marcasite were rare. Calaverite and tellurobismuthite occurred with visible gold associated with calcite and tourmaline in quartz. Black tourmaline was common in massive form and as acicular crystals in quartz.

J.J. Simard and Charles Karpis discovered the vein carrying free gold in 1939 and staked the original claims, known as the 'Simkar group'. Louvicourt Goldfield Corporation began exploration and development in 1944 and mined the deposit in 1947–1949. The mine consisted of a 297 m shaft. A mill operated on the site. Production amounted to 257 452 t of ore containing 992 652 g of gold, valued at $1 390 142. A Louvicourt Gold Mines Inc. and Ronrico Explorations Limited joint venture resumed production in 1991–1992, with a recovery of 612 kg of gold from 71 068 t of ore.

The mine is about 17 km southeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 224.0** (*see* p. 11):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	2.1	Turnoff to the Rainville (Dunraine) mine; continue along the main road leading southeast.
	3.5	Junction; follow the road on left leading southeast.
	3.7	Louvicourt Goldfield (Simkar) mine.

Refs.: 91 p. 45; 92 p. 42; 183 p. 72–73; 257 p. 174; 306 p. 83–88; 312 p. 43–45; 333 p. 91; 337 p. 348, 369, 380.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)

1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Akasaba (Obaska) mine

NATIVE GOLD, PYRRHOTITE, PYRITE, CHALCOPYRITE, SPHALERITE, MAGNETITE, ARGENTOPENTLANDITE, MACKINAWITE, PENTLANDITE, VIOLARITE, COBALTITE, HEDLEYITE, TELLUROBISMUTHITE, HESSITE, COLORADOITE, ELECTRUM, MOLYBDENITE, EPIDOTE, ACTINOLITE, ANDRADITE

In volcanic breccia and tuff

The ore consisted of native gold associated with pyrrhotite, and minor pyrite, chalcopyrite, sphalerite, and magnetite disseminated in the host volcanic rocks. Native gold also occurred in chlorite. Traces of argentopentlandite, mackinawite, pentlandite, violarite, cobaltite, hedleyite, tellurobismuthite, hessite, coloradoite, electrum, and molybdenite occurred in the ore. Epidote, actinolite, and andradite occurred in altered tuff.

Prospectors Rickaby and McNiven staked the original claims in 1923. Five years later, prospectors Heisey and Cleary discovered a pyrrhotite zone carrying copper and gold values. In 1944–1945, Obaska Lake Mines Limited did a magnetic survey and drilling, which indicated two orebodies. In 1951–1952, the company explored the discovery via a 92 m shaft. Akasaba Gold Mines Limited mined the deposit from 1960 to 1963, shipping the ore to the Bevcon mill for treatment. Production amounted to 1 236 158 g of gold and 396 439 g of silver from 262 512 t of ore, valued at $1 726 272.

The mine is about 17 km southeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 224.0** (*see* p. 11):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	2.1	Turnoff to the Rainville (Dunraine) mine; continue along the main road leading southeast.
	3.5	Turnoff to Louvicourt Goldfield (Simkar) mine; continue along the main road leading south.
	5.7	Akasaba (Obaska) mine.

Refs.: 58 p. 81–84; 183 p. 70–71; 257 p. 173; 306 p. 149–155; 312 p. 26–28; 434 p. 5.

Maps (T): 32 C/4 Val-d'Or
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
1625 Southwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)

2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Beacon (D'Or Val) mine

NATIVE GOLD, PYRITE, TOURMALINE, CHALCOPYRITE, BORNITE, TELLURIDES

In granodiorite

Native gold occurred in pyrite and in quartz. Surface exposures showed abundant fine visible gold in parts of the quartz veins. Tourmaline was common, and chalcopyrite and bornite were rare. Tellurides occurred in the Beacon veins.

The deposit consisted of the LeRoy zone and the Beacon zone, 1570 m to the northeast. Prospector Georges Bussières discovered the LeRoy gold-bearing vein in 1930. This was the first significant gold discovery in Louvicourt Township. That same year, Karl Springer staked the property on which the Beacon zone was later discovered. In 1931–1932, LeRoy Gold Mines Limited brought in mining equipment from Barraute, built a camp on the site, and sank a shaft to 82 m on the LeRoy zone. Beaucourt Gold Mines Limited did some surface work in 1936. Drilling by Beacon Mining Company Limited in 1947 located the gold-bearing Beacon zone (Beacon No. 1). The company sank a shaft to 128 m. D'Or Val Mines Limited acquired the Beacon property in 1979 and shipped 6015 t of ore from the dumps to the Darius mill, which recovered 14 867 g of gold. The company discovered a new ore zone (Beacon No. 2) 122 m north of the LeRoy shaft and brought it to production in 1987–1988. This mine produced 319 863 g of gold from 132 328 t of ore. Development consisted of a ramp to the 170 m level and a shaft to 457 m.

The mine is about 16 km east of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 225.3** (*see* p. 11):

km	0	Junction, Highway 117 and a road leading north; proceed north along this road.
	0.8	Beacon (D'Or Val) mine (LeRoy and Beacon No. 2 shafts). The original Beacon No. 1 shaft is about 250 m west of the road to the Bussières (Cournor) mine, at a point 1.5 km north of its junction with Highway 117 (*see* the road log to the Bussières (Cournor) mine).

Refs.: 25 p. 91–95; 83 p. 275–276; 183 p. 43–44; 263 p. 46, 47; 312 p. 29–33; 450 p. 122; 455 p. 149.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Bussières (Cournor) mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, TOURMALINE

In granodiorite

Native gold occurred as films on pyrite crystals and in fractures in pyrite and quartz. Pyrite, as friable aggregates and as cubes up to 30 cm across, was the chief sulphide. The highest gold values were obtained from the pyrite cubes. Chalcopyrite was a minor constituent of the gold-bearing quartz veins. Black tourmaline occurred as aggregates of microscopic prisms in layers 2 to 3 cm wide in the gold-bearing quartz veins. Specimens available from the mine dumps include tourmaline crystals and pyrite crystals (commonly 10 mm across) in quartz and pink massive calcite that fluoresces pink when exposed to ultraviolet rays.

George Bussières, Massicotte, and associates staked the property in 1930–1931. Bussières Mining Company Limited did the original investigation of the deposit and began production in 1932 from a 206 m shaft. In 1934, Quebec Gold Mining Corporation extended the underground workings by a winze to the 236 m level. A mill operated on the premises. Cournor Mining Company Limited continued operations from 1937 to 1942 from a shaft deepened to 245 m. Operations ended due to wartime conditions. The mine produced 2 448 272 g of gold from 387 221 t of ore, valued at $2 872 121.

The mine is about 18 km northeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 226.2** (*see* p. 11):

km	0	Junction, Highway 117 and the road to Perron; proceed north along the road to Perron.
	1.5	Turnoff (left) to the Beacon original No. 1 shaft (the shaft is 250 m west of the road). The road log continues north.
	3.7	*Roadcut* on the left (west) side of the road exposes chrysotile asbestos veinlets (3 mm wide) and magnetite in green serpentinite.
	4.4	Junction; turn right (east).
	4.9	Bussières (Cournor) mine.

Refs.: 25 p. 98–104; 83 p. 272–274; 183 p. 1; 257 p. 173–174; 306 p. 37–41; 312 p. 38–39.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

New Pascalis (Lucien C. Béliveau) mine

NATIVE GOLD, PYRITE, TETRADYMITE, TOURMALINE, CHALCOPYRITE

In diorite

Native gold occurred as visible grains in quartz-carbonate and as globules and fracture fillings in pyrite. Some tetradymite and chalcopyrite were also present. The ore zone consisted of gold-bearing quartz-tourmaline-pyrite veins.

Prospectors Cockshutt and McLeod staked the property in 1931. Noranda Mines Limited did some surface exploration and drilling in 1931–1932. Pascalis Gold Mines Limited acquired the property in 1942 and optioned it to Société québecoise d'exploration minière (SOQUEM), which carried out exploration from a 666 m ramp from 1981 to 1984. Cambior Inc. took over development in 1986, sank a shaft to 300 m, and produced 5 534 312 g of gold from 1989 to 1993.

The mine is about 20 km northeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 226.2** (*see* p. 11):

km	0	Junction, Highway 117 and the road to Perron; proceed north along the road to Perron.
	4.4	Junction; turn right (east).
	5.7	Junction; turn right (east) onto the road to Obaska.
	8.2	Junction; turn right (south).
	8.7	New Pascalis (Lucien C. Béliveau) mine.

Refs.: 25 p. 116–117; 89 p. 66–68; 90 p. 42; 93 p. 37; 458 p. 82; 460 p. 74; 461 p. 79.

Maps (T): 32 C/4 Val-d'Or
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Pascalis mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, TOURMALINE, SCHEELITE, TETRADYMITE

In granodiorite

Native gold occurs with pyrite and minor pyrrhotite and chalcopyrite in quartz-tourmaline veins. Scheelite is also present. Trenching during early exploration revealed numerous highly mineralized veins carrying visible gold, commonly in spectacular and abundant patches; tetradymite was associated with some of the gold.

Prospectors Hard Rock Bill Smith and Phil St. Louis discovered the original gold mineralization and staked the claims in 1930. Pascalis Gold Mines Limited acquired these claims and additional claims staked by prospectors Willans, Cockshutt, Smith, and Watson. The company did some drilling and sank a shaft to 488 m in 1940–1942. Subsequent underground investigation by La Société Minière Louvem Inc. from 1983 to 1987 indicated ore reserves to be 233 500 t, averaging 6.8 g/t gold.

Plate 18.

Beryl crystal and massive beryl with molybdenite and pyrite in white pegmatite, Lacorne mine. The specimen is from the National Mineral Collection. Specimen is 10 cm across. GSC 202294

The mine is about 19 km northeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 226.2** (*see* p. 11):

km	0	Junction, Highway 117 and the road to Perron; proceed north along the road to Perron.
	7.8	Pascalis mine, on the left (south) side of the road.

Refs.: 18 p. 29–30; 25 p. 104–110; 83 p. 271–272; 195 p. 186; 208 p. 14–15; 260 p. 66; 261 p. 88; 292 p. 98; 455 p. 418.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)

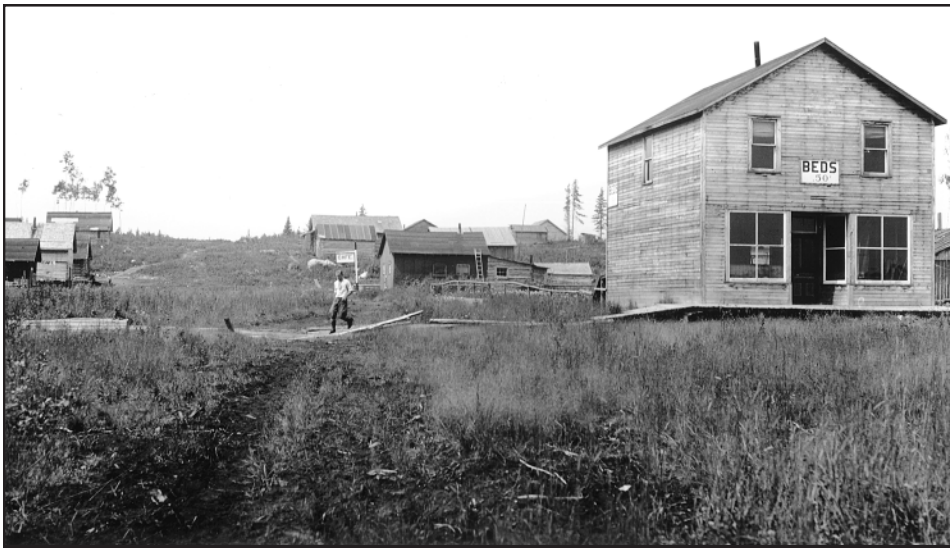


Plate 19.
Pascalis mine camp, 1935. GSC 79039

997A Senneterre, Quebec (GSC, 1:126 720)
859 S.W. quarter of Pascalis Township, County of Abitibi East/Quart S.W. du canton de Pascalis, comté d'Abitibi Est (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Perron, Beaufor mines

NATIVE GOLD, PYRITE, TOURMALINE, CHALCOPYRITE, PYRRHOTITE, BORNITE, TETRADYMITE, SCHEELITE, CHROME MUSCOVITE

In granodiorite

Gold occurred in a quartz-vein system containing abundant pyrite, tourmaline, and carbonates (calcite, ankerite, dolomite) and minor chalcopyrite, pyrrhotite, bornite, and tetradymite. Native gold occupied fractures in pyrite and in quartz; in the latter, it was sometimes found as coarse grains associated with tetradymite. Pyrite occurred as crystals up to 2 cm across and as finely granular aggregates. Bright green chrome muscovite (fuchsite) and pink-fluorescing calcite have been reported from the deposit. The host granodiorite rock is composed of greenish-white feldspar, light bluish-violet quartz, and dark green to black ferromagnesian minerals; the rock takes a good polish.

These mines operated a north-south gold-bearing vein system. The northern part of the deposit became the Perron mine and the southern part, the Beaufor mine. Prospector Jack Matthews staked the Perron claims in 1931. The discovery vein carried spectacular quantities of visible gold. Noranda Mines Limited did some surface exploration and drilling in 1931–1932.

Matthews Gold Mines Limited resumed exploration in 1932–1934 and discovered a vein containing spectacular amounts of coarse visible gold about 670 m northwest of the Matthews vein. The company sank a prospect shaft to 16 m on this vein and another shaft to 53 m on the Matthews vein. Perron Gold Mines Limited took over operations in 1934. The company deepened the Matthews vein shaft to 107 m, sank No. 4 shaft to 191 m on the Beaufor property, and sank its main production shaft to 686 m. An aerial tramway transported the ore from this shaft to the mill on the Beaufor property to the south. The mine closed in 1951. From 1933 to 1951, the Perron mine produced 1 604 607 t of ore containing 13 607 904 g gold and 864 632 g silver. Some scheelite was produced in 1942–1943. La Société Minière Louvem Inc. acquired the production shaft and carried out underground exploration from 1984 to 1991.

In 1930, George Bussières staked the claims that became the Beaufor mine. Beaufor Gold Mines Limited discovered several gold-bearing veins on the property between 1931 and 1935, and sank a shaft to 137 m. In 1935–1939, Perron Gold Mines Limited sank its No. 4 shaft to 191 m on Beaufor property, 275 m south of the original Beaufor shaft. From 1939 to 1942, Cournor Mining Company Limited mined the deposit via the No. 4 shaft, extracting 1191 kg of gold from 144 000 t of ore.

The mines are about 19 km northeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 226.2** (*see* p. 11):

km	0	Junction, Highway 117 and the road to Perron; proceed north along the road to Perron.
	7.8	Pascalis mine on the left (south) side of the road; continue straight ahead.
	8.1	Perron, at a junction at a bend in the road; turn left (south).
	8.3	Perron mine; the Beaufor mine adjoins it to the south.

Refs.: 6 p. 893–895; 18 p. 32–43; 24 p. 68–70; 25 p. 110–116; 69; 83 p. 267–272; 195 p. 186; 208 p. 13–15; 312 p. 38; 366 p. 1–7, 19-23; 425 p. 154; 452 p. 373; 458 p. 56.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
859 S.W. quarter of Pascalis Township, County of Abitibi East/Quart S.W. du canton de Pascalis, comté d'Abitibi Est (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Senore (Resenor) mine

NATIVE GOLD, PYRITE

In granodiorite

Native gold is associated with coarse pyrite in quartz veins in altered granodiorite.

The property was staked in 1931. Between 1936 and 1941, Senore Gold Mines Limited explored the gold-bearing veins from a 152 m shaft. Resenor Gold Mines Limited continued underground investigation from 1945 to 1948 and El Coco Exploration Limited, from 1974 to 1983.

The mine is about 19 km northeast of Val-d'Or. *See* Map 26 on page 178.

Road log from Highway 117 at **km 226.2** (*see* p. 11):

km	0	Junction, Highway 117 and the road to Perron; proceed north along the road to Perron.
	7.8	Pascalis mine on the left (south) side of the road; continue straight ahead.
	8.1	Perron, at the turnoff to the Perron and Beaufor mines; continue along the main road leading north.
	9.5	Senore (Resenor) mine on left, about 100 m west of the road.

Refs.: 83 p. 275; 208 p. 15; 452 p. 129.

Maps (T): 32 C/4 Val-d'Or
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
859 S.W. quarter of Pascalis Township, County of Abitibi East/Quart S.W. du canton de Pascalis, comté d'Abitibi Est (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Louvem mine

PYRITE, CHALCOPYRITE, SPHALERITE, RUTILE, COBALTITE, MOLYBDENITE, GALENA, CHLORITE, CHALCOCITE, CHALCANTHITE, SIDEROTIL, ANTLERITE, QUARTZ CRYSTALS

In rhyolitic tuff and agglomerate

The principal ore minerals were pyrite, chalcopyrite, and sphalerite, with minor rutile, tetradymite, cobaltite, molybdenite, galena, chalcocite, and chlorite. Secondary minerals associated with the deposit included light blue chalcanthite, white siderotil, and green antlerite. Quartz crystals occurred in cavities in massive quartz.

Quebec Mining Exploration Company (SOQUEM) discovered the deposit in 1968. La Société Minière Louvem Inc. began development in 1969 and mined the deposit from 1970 to 1981. Development consisted of an open pit and a 354 m shaft. The ore was treated at the Manitou Barvue mill. The mine produced 1 599 000 t of ore yielding 18 000 t of copper, 60 000 t of zinc, 31 375 kg of silver, and 1170 kg of gold.

The Louvem mine is about 20 km east of Val-d'Or. Access is via a road leading north 1 km from Highway 117 at **km 228.0** (*see* p. 11). *See* Map 26 on page 178.

Refs.: 69; 124 p. 1596–1608; 186 p. 51, 52–53; 444 p. 192–193; 450 p. 314.

Maps (T): 32 C/4 Val-d'Or
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)

Plate 20.
Louvem mine, 1972. GSC 161436

2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Louvicourt mine

PYRITE, CHALCOPYRITE, SPHALERITE

In volcanic tuff and lapilli

The ore consists of pyrite, chalcopyrite, pyrrhotite, and sphalerite, with minor magnetite, arsenopyrite, galena, native gold, and tellurides. The ore minerals occur in veinlets and as massive lenses in the volcanic rocks.

Aur Resources Inc. and La Société Minière Louvem Inc. discovered an economic massive copper-zinc deposit in 1989. Aur Resources Inc. began development in 1992, followed by production in 1995. Production to the end of 1997 amounted to 4 458 227 t of ore yielding 103 012 200 kg of copper, 55 729 000 kg of zinc, 80 215 kg of silver, and 3129 kg of gold. Development consisted of a 750 m exploration shaft and a 965 m production shaft.

The Louvicourt mine is about 1400 m east of the Louvem mine and about 21 km east of Val-d'Or. *See* Map 26 on page 178.

Refs.: 94 p. 39; 95 p. 36–37; 264 p. 60; 360 p. 28–46; 464 p. 52; 465 p. 55.

Maps (T): 32 C/4 Val-d'Or
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
1623 Northwest quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)

2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Vicour (Sigma No. 2) mine

NATIVE GOLD, PYRITE, PYRRHOTITE, ARSENOPYRITE, CHALCOPYRITE

TOURMALINE

In granodiorite

The mineralization consists of quartz veins containing native gold, pyrite, and pyrrhotite with some arsenopyrite, chalcopyrite, and tourmaline. Visible gold occurred in some veins that outcropped on the discovery claim. Large crystals of arsenopyrite occur in the wall rock adjacent to the gold-bearing quartz-tourmaline veins.

Charles Hughes discovered an important gold showing in 1932 on a claim he had staked earlier. He did some trenching and stripping of the veins. Initial exploration of the deposit by Vicour Gold Mines Limited consisted of trenching and sinking a shaft to 145 m in 1935–1942. Sigma Mines (Quebec) Limited acquired the property in 1977 from Quebec Gold Belt Mines Limited. Open-pit operations by Sigma began in 1984. Placer Dome Inc. took over operations in 1988 and sold the mine to McWatters Mining Inc. in 1997.

The mine is about 24 km southeast of Val-d'Or. *See* Map 27 on page 196.

Road log from Highway 117 at **km 229.8** (*see* p. 11):

km	0	Junction, Highway 117 and a road leading south; proceed south along this road.
	0.4	Junction; continue straight ahead (south).
	5.2	Vicour (Sigma No. 2) mine.

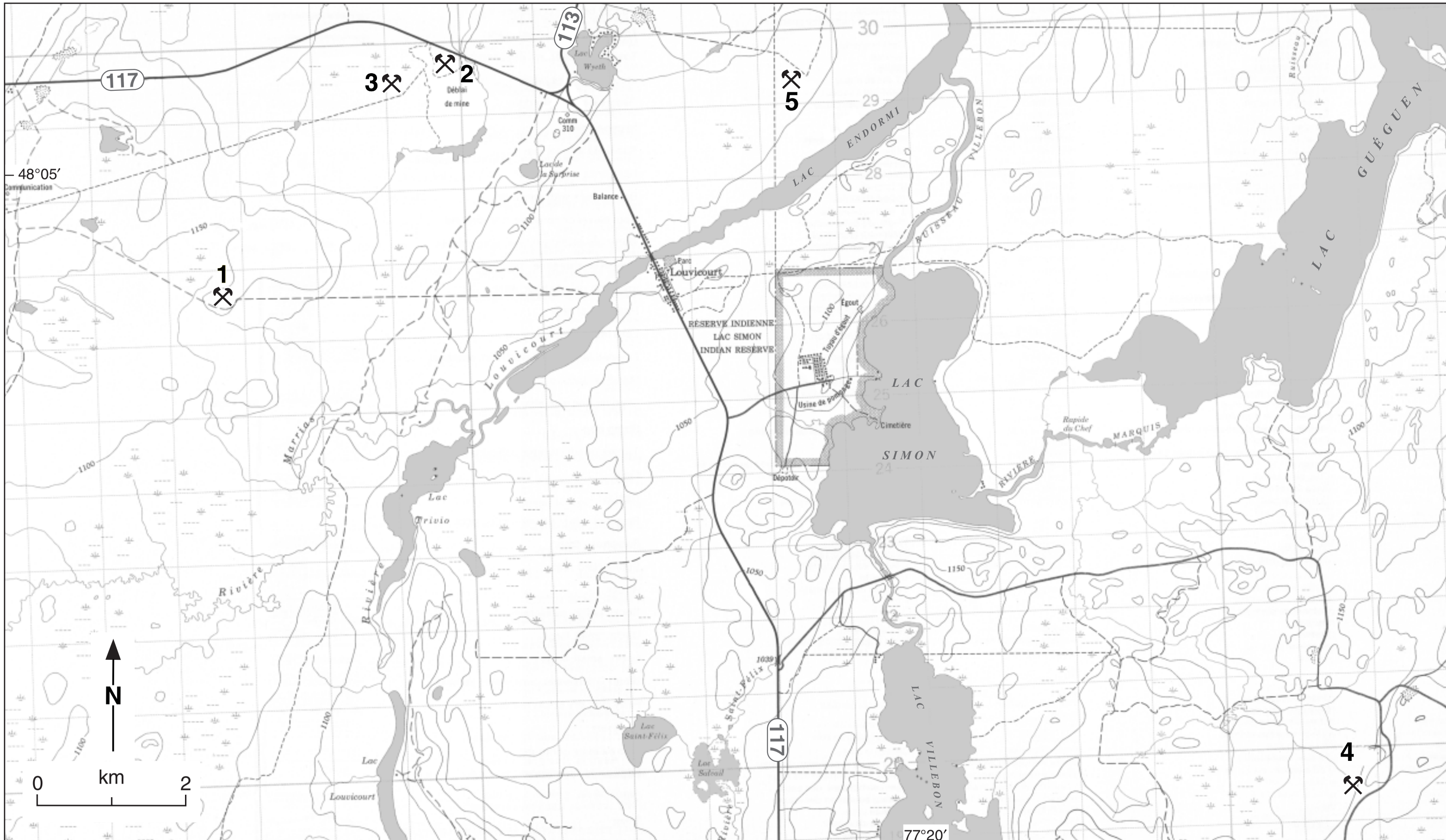
Refs.: 18 p. 48–52; 25 p. 119–120; 83 p. 277–278; 95 p. 33; 189 p. 52–53; 312 p. 44; 452 p. 367; 456 p. 370, 413; 464 p. 290–291.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
1626 Southeast quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Bevcourt, Buffadison mines

NATIVE GOLD, PYRITE, CHALCOPYRITE, SCHEELITE, TELLUROBISMUTHITE, CALAVERITE, PETZITE, ALTAITE, WEHRLITE, SELENITE, TOURMALINE, EPIDOTE, ANHYDRITE, MAGNETITE

Part of 32 C/3



1. Vicour (Sigma No. 2) mine 2. Bevcourt mine 3. Buffadison mine 4. Chimo mine 5. Regcourt mine

Map 27. Louvicourt.

In granodiorite

Native gold occurred as thin plates along cleavage planes in pyrite and as visible grains in quartz. The chief constituents of the quartz veins were quartz, ankerite, tourmaline, chlorite, and pyrite; chalcopyrite, scheelite, tellurobismuthite, calaverite, petzite, altaite, wehrlite, and selenite occurred locally. Minerals found in quartz in the mine dumps include epidote with chlorite and magnetite, pyrite cubes up to 15 mm across, black massive tourmaline, epidote, and light violet cleavable aggregates of anhydrite. Specimens of a porphyry composed of white feldspar phenocrysts in a greenish-grey matrix are also available from the mine dumps.

The property comprises the former Bevcourt and Buffadison mines. S.B. Jowsey discovered gold-bearing veins on a claim he staked in 1931. This claim became the Buffadison mine. Various companies investigated the mineralization between 1932 and 1945. Buffadison Gold Mines Limited carried out drilling and underground exploration from a 300 m shaft between 1945 and 1948. Bevcourt Gold Mines Limited (name changed in 1955 to 'Bevcon Mines Limited') outlined an adjacent orebody during extensive drilling and underground exploration in 1944–1948. The company sank a 697 m shaft 640 m northeast of the Buffadison shaft, constructed a mill on the premises, and mined the Bevcourt and Buffadison sections between 1952 and 1965. The mines produced 3 170 000 t of ore yielding 12 670 kg of gold and 4530 kg of silver.

The mines are about 27 km east of Val-d'Or. Access to the Buffadison mine is via a 0.6 km road leading south from Highway 117 at **km 235.0** (*see* p. 11). The Bevcourt mine is on the south side of Highway 117 at **km 235.5** (*see* p. 11). *See* Map 27 on page 196.

Refs.: 21 p. 15–19; 25 p. 97–98; 61 p. 40–44; 153 p. 30–32; 164 p. 416–419; 306 p. 43–47; 312 p. 33–36; 337 p. 352, 380; 363 p. 269.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-20 Dubuisson–Bourlamaque–Louvicourt, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
1626 Southeast quarter of Louvicourt Township, Abitibi-East County (MRNQ, 1:12 000)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Chimo mine

NATIVE GOLD, ARSENOPYRITE, PYRRHOTITE, PYRITE, CHALCOPYRITE, SPHALERITE, MARCASITE, PENTLANDITE, GRUNERITE, CHLORITE, GARNET, APATITE, TOURMALINE

In sheared volcanic rocks and iron-formation

Native gold occurred as millimetre-size grains in arsenopyrite and in bluish quartz. Pyrrhotite, pyrite, and traces of chalcopyrite, sphalerite, marcasite, and pentlandite were associated with the gold mineralization in quartz-carbonate veins and lenses in volcanic rocks altered to schist. Gold also occurred in massive arsenopyrite in a magnetite iron-formation associated with the volcanic rocks. Grunerite, iron-bearing chlorite, garnet, apatite, and tourmaline occurred in the iron-formation.

Quemartic Mines Limited discovered quartz veins containing fairly coarse native gold in the area and did some surface work on them in 1937–1938. Chimo Gold Mines Limited discovered an economic gold deposit between 1945 and 1964 and mined it from a 190 m shaft in 1966–1967, recovering 1 817 473 g of gold from 128 703 t of ore valued at $2 436 515. Société Minière Louvem Inc. discovered new ore zones in 1984 and undertook mining operations. Cambior Inc. acquired the mine in 1990 and operated it until the ore ran out in 1996. The mine produced about 8833 kg of gold from 1985 to 1996. Development consisted of a 460 m shaft.

The mine is about 41 km southeast of Val-d'Or. *See* Map 27 on page 196.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed along Highway 117 toward Louvicourt.
	2.7	Louvicourt; continue south along Highway 117.
	8.9	Junction; turn left (east).
	19.4	Junction; follow the road on right leading south.
	19.8	Junction, mine road on right; proceed south along this road.
	20.1	Chimo mine.

Refs.: 83 p. 294–295; 90 p. 40–42; 155 p. 145–147; 183 p. 1; 189 p. 50–51; 227 p. 15–16; 261 p. 65–66; 263 p. 47, 48; 306 p. 157–163; 353 p. 15–16; 378 p. 18–27; 457 p. 93; 460 p. 74; 462 p. 77; 464 p. 92.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-12A Vauquelin–Pershing–Haig townships, Abitibi County, Quebec (GSC, 1:63 360)
495 West part of Vauquelin Township, Abitibi County (south sheet) (MRNQ, 1:12 000)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Mines along Highway 113

Collecting localities along Highway 113 are described in the text that follows. The starting point is at the junction of highways 113 and 117 at **km 237.3** (*see* p. 11).

Regcourt mine

NATIVE GOLD, PYRITE, TOURMALINE

In granodiorite

Native gold occurs with coarse pyrite and some chalcopyrite in quartz-tourmaline veins. Visible gold is found in quartz and in massive tourmaline.

Regcourt Gold Mines Limited discovered the gold mineralization as a result of drilling in 1944–1946. The company undertook underground development from a shaft sunk to 166 m. Development work ended in 1948.

The mine is about 32 km east of Val-d'Or. *See* Map 27 on page 196.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113.
	1.5	Junction; turn right (east), continuing beyond the turnoff to Wyeth Lake.
	4.9	Regcourt mine.

Refs.: 154 p. 38–39; 155 p. 88–89; 227 p. 14; 257 p. 263.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-12A Vauquelin–Pershing–Haig townships, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Smith Tiblemont mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, SPHALERITE

In quartz diorite

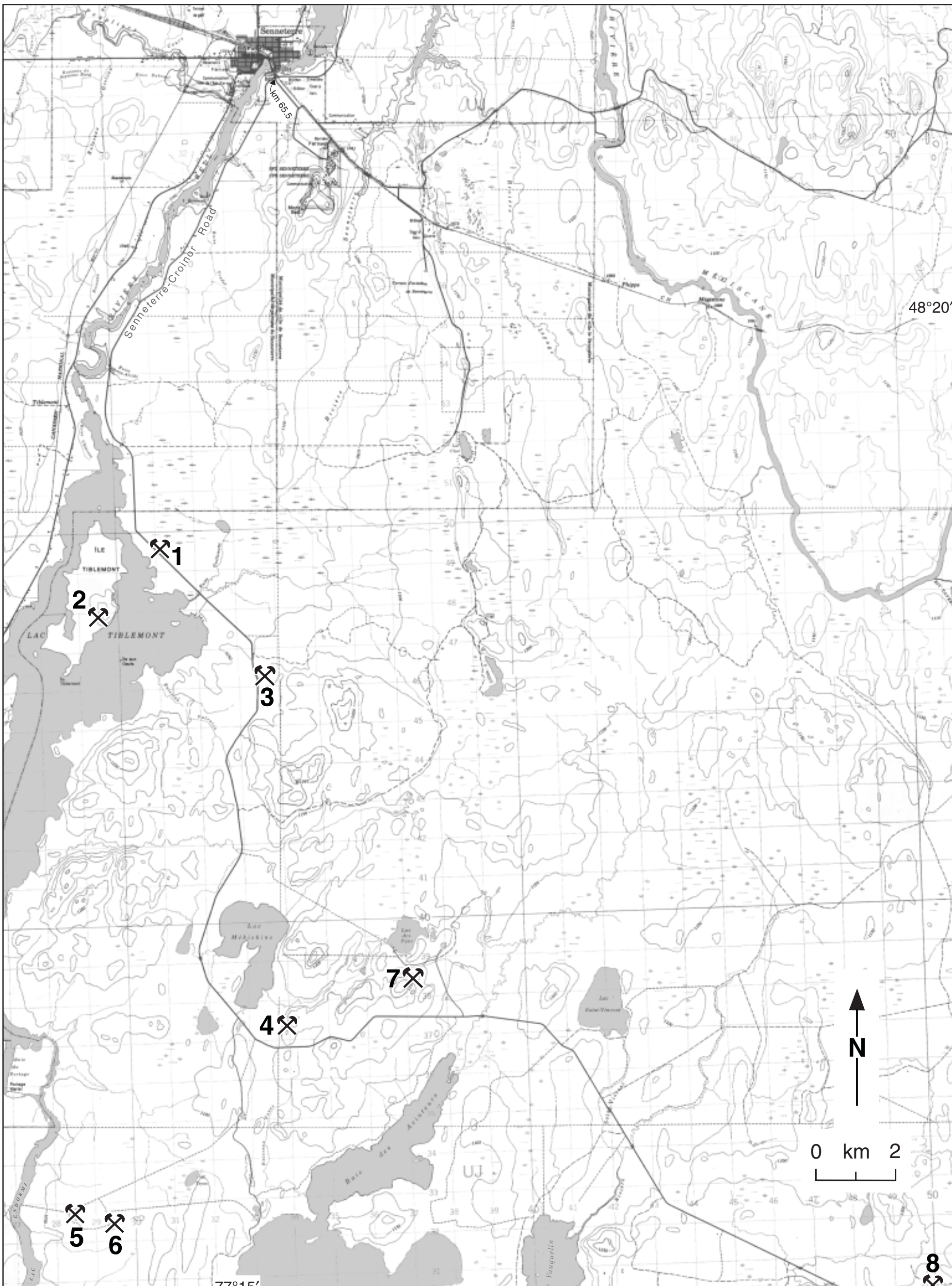
Native gold occurs as free gold in quartz veins in sheared diorite. It is also associated with pyrite. Chalcopyrite and sphalerite occur in minor amounts.

Jacob Smith discovered gold-bearing quartz veins while engaged in trenching near the east side of Tiblemont Lake in 1933. Visible gold occurred abundantly in parts of the quartz veins. Smith Tiblemont Limited acquired the property and sank a shaft to 52 m in 1936. Valiant Gold Mines Limited did some drilling and geophysical surveys on the property in 1959–1961.

The mine is about 48 km northeast of Val-d'Or and 13 km south of Senneterre. *See* Map 28 on page 200.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	37.3	Junction; turn right (south).
	37.7	Junction; turn right (west) onto the Senneterre–Croinor road leading south.
	51.5	Smith Tiblemont mine, on the east side of the road.



1. Smith Tiblemont mine 2. Tiblemont Island mine 3. Wood-Etcheverry mine
4. South Tiblemont mine 5. Bruell mine 6. Avocalon (Aurora) mine
7. Blair-Martyn mine 8. Croinor Pershing mine

Map 28. Tiblemont.

Refs.: 26 p. 51–53; 83 p. 283–284; 259 p. 68–69.

Maps (T): 32 C/6 Senneterre
(G): 261 Senneterre area, County of Abitibi (MRNQ, 1:5 068 800)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Tiblemont Island mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, TETRADYMITE

In granodiorite and diorite

Native gold occurs as fine to coarse visible gold in quartz veins. Pyrite, chalcopyrite, and tetradymite also occur in the quartz.

Quartz veins containing coarse native gold outcropped on a granite ridge on the east side of Tiblemont Island where they were discovered in the winter of 1932–1933. The gold-bearing quartz veins extended over 500 m. Tiblemont Island Mining Company Limited undertook development in 1933. The company drove an adit 360 m into the granite ridge, sank a shaft to 157 m, and did some bulk sample testing in a pilot mill installed at the site. Tiblemont Consolidated Mines Limited continued the underground exploration in 1938–1939 and discovered additional gold mineralization. The onset of World War II postponed further development.

The Tiblemont Island mine is about 46 km northeast of Val-d'Or and 15 km southwest of Senneterre. It is on the west side of a ridge, about 400 m from the eastern shore of Tiblemont Island in Tiblemont Lake. Access is by boat. *See* Map 28 on page 200.

Refs.: 24 p. 76–78; 26 p. 49–50; 83 p. 284; 297 p. 43; 298 p. 42–43.

Maps (T): 32 C/6 Senneterre
(G): 261 Senneterre area, County of Abitibi (MRNQ, 1:5 068 800)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Wood-Etcheverry mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE

In granite

Native gold occurs as coarse gold in quartz veins occupying fractures in granite. Octahedral crystals of gold were reportedly common. Pyrite, pyrrhotite, and chalcopyrite are also present in the veins.

Gold mineralization was discovered in 1932 on claims held by J.M. Wood. Hollinger Consolidated Gold Mines Limited trenched and drilled the discovery claims in 1932–1933. Murwood Gold Mines Limited sank a shaft to 36 m in 1934. Wahu Mines Limited installed a mill in 1936 and extracted a small amount of gold from the gold-bearing quartz blasted out in earlier Hollinger operations.

The mine is about 50 km northeast of Val-d'Or and 15 km south of Senneterre. *See* Map 28 on page 200.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	37.3	Junction; turn right (south).
	37.7	Junction; turn right (west) onto the Senneterre–Croinor road leading south.
	55.5	Turnoff (left) to Wood-Etcheverry mine; proceed east 200 m to the mine.

Refs.: 24 p. 78; 26 p. 44–48; 83 p. 284–285.

Maps (T): 32 C/3 Lac Guéguen
(G): 261 Senneterre area, County of Abitibi (MRNQ, 1:5 068 800)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

South Tiblemont mine

NATIVE GOLD, PYRITE, SPHALERITE, TETRADYMITE

In granite

Fine and coarse native gold occurs in quartz veins and lenses in sheared granite. Minor amounts of pyrite, sphalerite, and tetradymite are also present.

South Tiblemont Mining Company Limited discovered gold mineralization in 1933. The company explored the gold-bearing veins by a series of trenches and a 73 m shaft. The underground investigation ended in 1935 because of disappointing results.

The mine is about 42 km northeast of Val-d'Or and 23 km south of Senneterre. *See* Map 28 on page 200.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	37.3	Junction; turn right (south).
	37.7	Junction; turn right (west) onto the Senneterre–Croinor road leading south.
	65.0	Junction; turn left (east).

	65.3	Junction, at the south end of Mékiskine Lake; turn right (east).
	66.3	South Tiblemont mine, on the west side of a ridge.

Refs.: 26 p. 58–60; 83 p. 285–286.

Maps (T): 32 C/3 Lac Guéguen
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Bruell mine

NATIVE GOLD, PYRITE, SPHALERITE, HEMATITE, TOURMALINE

In andesite

Native gold, including coarse visible gold, occurs with minor pyrite, sphalerite, and hematite (specularite) in tourmaline-bearing quartz veins. Gold also occurs with pyrite in sheared andesite.

The property consists of the Spence and Burton claims staked and prospected in 1932. Bruell Gold Mines Limited explored the claims by a series of pits, trenches, and two shafts from 1934 to 1938. The shafts are 14 m and 26 m deep, and 455 m apart. The initial prospect pit, 6.7 m deep, sunk on the discovery vein revealed abundant free gold.

The mine is about 37 km east of Val-d'Or and 30 km south of Senneterre. *See* Map 28 on page 200.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	37.3	Junction; turn right (south).
	37.7	Junction; turn right (west) onto the Senneterre–Croinor road leading south.
	65.0	Junction; turn left (east).
	65.3	Junction, at the south end of Mékiskine Lake; continue straight ahead (south).
	65.4	Junction; turn right (south).
	68.2	Junction; turn right (southwest).
	73.1	Bruell mine.

Refs.: 18 p. 90–91; 24 p. 78; 83 p. 291; 227 p. 12; 299 p. 25–26; 352 p. 16–18.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-12A Vauquelin–Pershing–Haig townships, Abitibi County, Quebec (GSC, 1:63 360)
494 West part of Vauquelin Township, Abitibi County (north sheet) (MRNQ, 1:12 000)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Avocalon (Aurora) mine

NATIVE GOLD, PYRITE, TOURMALINE

In andesite

Native gold occurs with minor pyrite in quartz-tourmaline veins. Visible gold was found in several places in the veins on the surface and underground.

R.S. Potter staked claims in 1934 on some gold-bearing showings. Avocalon Mining Syndicate Limited explored the discovery claims from 1934 to 1936. The company opened several pits and trenches and sank a shaft to 37 m. Aurora Mines Limited acquired the property in 1938 and trenched and drilled the area east of the shaft.

The Avocalon (Aurora) mine is about 38 km east of Val-d'Or and 30 km south of Senneterre. Access is by a 1.4 km road leading south, then east from the Bruell mine. *See* Map 28 on page 200.

Refs.: 24 p. 79–80; 83 p. 291–292; 227 p. 12; 352 p. 18–20.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-12A Vauquelin–Pershing–Haig townships, Abitibi County, Quebec (GSC, 1:63 360)
494 West part of Vauquelin Township, Abitibi County (north sheet) (MRNQ, 1:12 000)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Blair-Martyn mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, GALENA

In granite

Native gold occurs as visible gold in quartz veins occupying fractures in granite. Some veins were found to be richly sprinkled with free gold. Pyrite, chalcopyrite, and galena are present in minor amounts.

Quartz veins exposed on the property showed spectacular gold, but of limited extent. Hayes Cadillac Mines Limited and Capital-Rouyn Mines Limited jointly investigated the veins in 1937–1938. The work consisted of several test pits, a 32 m shaft, and surface and underground sampling.

The mine is about 45 km northeast of Val-d'Or and 24 km southeast of Senneterre. *See* Map 28 on page 200.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	37.3	Junction; turn right (south).
	37.7	Junction; turn right (west) onto the Senneterre–Croinor road leading south.
	65.0	Junction, road to Mékiskine Lake; continue straight ahead.
	71.5	Junction; turn left (north) onto the road to Lac à Morin (formerly Lac des Pins).
	73.2	Junction; turn left (west).
	73.8	Blair-Martyn mine, on the northeastern end of a ridge about 350 m south of the road.

Refs.: 83 p. 286–287; 297 p. 43–44.

Maps (T): 32 C/3 Lac Guéguen
(G): 997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d'Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d'or de la région de Val-d'Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l'Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Croinor Pershing mine

NATIVE GOLD, PYRITE, CHALCOPYRITE, PYRRHOTITE, TOURMALINE

In schist and diorite

Native gold, often visible, is associated with pyrite and minor chalcopyrite and pyrrhotite in quartz veins in siliceous carbonate schist and diorite. Black tourmaline is also present.

D.D. Duffy and W. Denis staked claims in 1931 following the discovery of gold-bearing quartz in a carbonatized shear zone in volcanic rock. Brett-Trethewey Mines Limited did some surface work in 1931 and panned some coarse gold from the altered carbonate schist. Ventures Limited and Consolidated Mining and Smelting of Quebec Limited jointly did some drilling from 1932 to 1938. Croinor Pershing Mines Limited later discovered the main zone and explored it via a 195 m shaft between 1944 and 1948. Sullivan Mining Group Limited carried out an underground investigation from 1983 to 1986 and raised a 1542 t bulk sample for mill tests. In 1997, Huntington Exploration Inc. obtained 165 841 g of gold from a 50 792 t bulk sample.

The mine is about 57 km east of Val-d’Or and 35 km southeast of Senneterre. *See* Map 28 on page 200.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	37.3	Junction; turn right (south).
	37.7	Junction; turn right (west) onto the Senneterre–Croinor road leading south.
	65.0	Junction, road to Mékiskine Lake; continue straight ahead.
	71.5	Junction, road to Lac à Morin; continue straight ahead (east).
	85.4	Croinor Pershing mine.

Refs.: 25 p. 89–90, 121–122; 83 p. 297; 110 p. 12–15; 151 p. 15–20; 189 p. 59–60; 227 p. 13; 451 p. 325; 452 p. 383; 454 p. 367; 465 p. 230.

Maps (T): 32 C/3 Lac Guéguen
(G): 47-12A Vauquelin–Pershing–Haig townships, Abitibi County, Quebec (GSC, 1:63 360)
997A Senneterre, Quebec (GSC, 1:126 720)
2109 Carte géologique des gîtes métallifères des districts de Rouyn-Noranda et de Val-d’Or (MRNQ, 1:250 000)
2167 Localisation des gîtes d’or de la région de Val-d’Or (MRNQ, 1:100 000)
M-309 Gîtes minéraux du Québec, région de l’Abitibi, feuille Senneterre 32C (MRNQ, 1:250 000)

Grevet (Langlois) mine

SPHALERITE, PYRITE, PYRRHOTITE, MAGNETITE, GALENA, CHALCOPYRITE, ARSENOPYRITE

In mafic and felsic volcanic rocks

The zinc-copper-silver mineralization consists of three types of ore — massive ore, stringer and breccia ore, and disseminated ore. The massive ore consists of black sphalerite and pyrite, with lesser amounts of pyrrhotite, magnetite, galena, chalcopyrite, and arsenopyrite. The stringer and breccia ore consists of pyrite, black and honey-coloured sphalerite, chalcopyrite, pyrrhotite, and magnetite. The disseminated ore consists mainly of pyrite and minor sphalerite. The gangue minerals include chlorite, quartz, sericite, and carbonate.

Serem Québec Inc. and VSM Exploration Inc. discovered the deposit in 1989 as a result of geological and geophysical surveying beginning in 1978. Cambior Inc. undertook development in 1992. The company sank a shaft to 905 m and installed a 2100 t/day mill. Commercial production began in 1996. To the end of 1997, the mine produced 50 100 t of zinc concentrates, 2500 t of copper concentrates, and 192 838 g of gold.

The mine is about 150 km northeast of Val-d’Or and 25 km northeast of Lebel-sur-Quévillon.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113 to Senneterre.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	104.9	Junction, Highway 397; continue north along Highway 113.
	121.1	Junction; turn right (east) toward Lebel-sur-Quévillon.
	123.2	Turnoff to Lebel-sur-Quévillon; continue straight ahead (southeast) and follow logging Road 101.
	165.0	Turnoff, right (east) to the Grevet (Langlois) mine.

Refs.: 92 p. 45; 94 p. 41; 95 p. 36, 37; 174 p. 19–39; 175 p. 81–91; 176 p. 1559–1577; 462 p. 77; 463 p. 85; 465 p. 96.

Maps (T): 32 F/2 Lac Quévillon
(G): 406 Grevet area, Abitibi Territory (MRNQ, 1:63 360)
570A Puskitamika Lake, Abitibi Territory, Quebec (GSC, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Flordin (Florence River) mine

NATIVE GOLD, PYRITE

In altered volcanic rocks

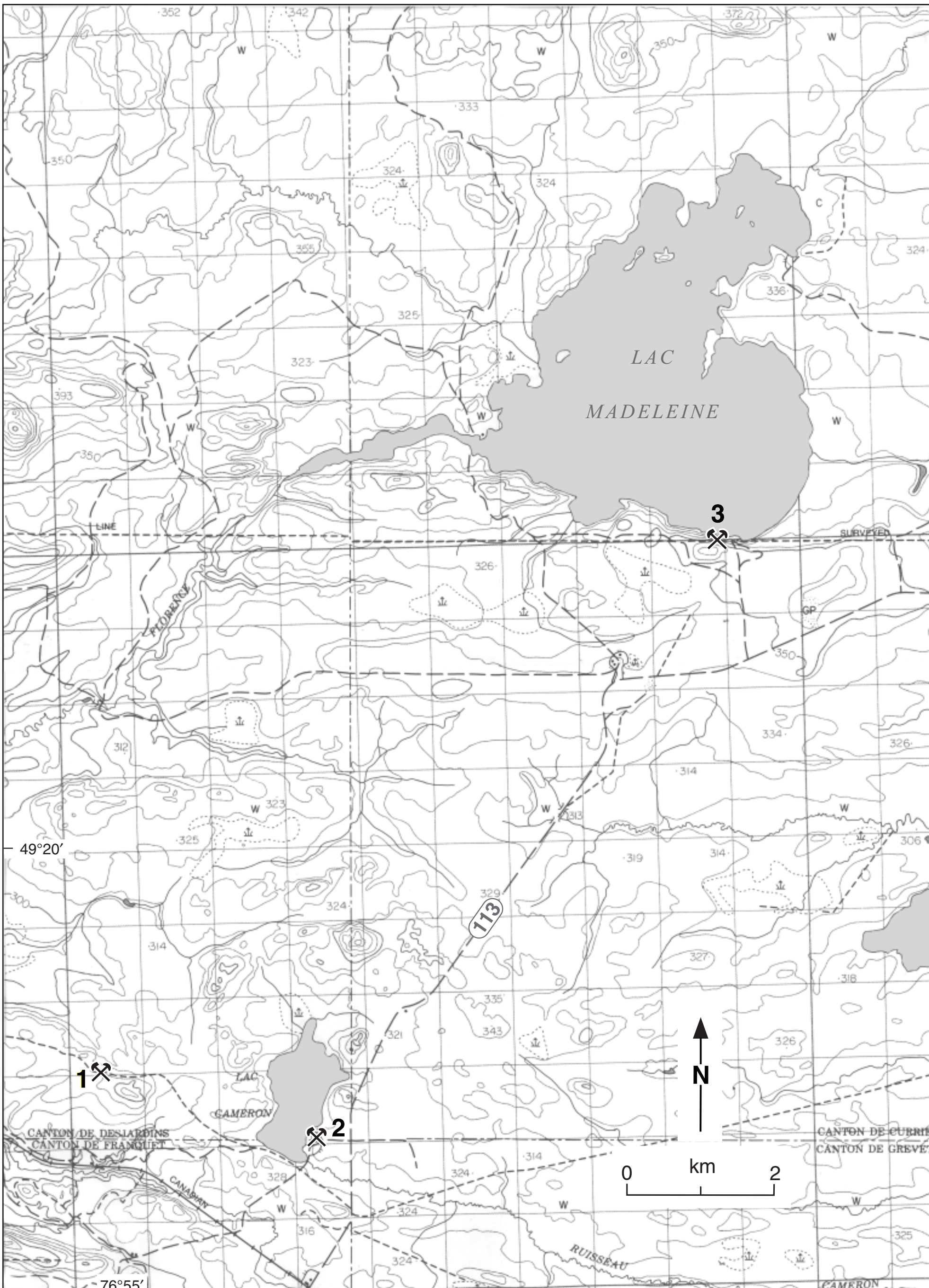
Native gold occurred as visible gold in quartz and associated with pyrite in quartz veins and in the adjacent host rock.

Jack M. Wood, K.G. Miller, and R. O'Neill discovered gold-bearing quartz veins in 1935. That same year, Florence River (Quebec) Gold Mines Limited undertook surface exploration and drilling. In 1938–1941, Flordin Mines Limited continued the exploration and sank a shaft to 144 m. In 1986–1988, Bachelor Lake Gold Mines Limited undertook further development and drove a ramp 203 m to the 45 m level, 1600 m west of the shaft. The company processed 1360 t of ore at its mill in Desmaraisville. Western Premium Resource Corporation extended the ramp and did some bulk sampling in 1988–1989.

The mine is about 150 km northeast of Val-d'Or. *See* Map 29 on page 208.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	121.1	Junction, road to Lebel-sur-Quévillon; continue along Highway 113.
	154.3	Junction; turn left onto a road leading northwest to Cameron Lake.
	158.4	Flordin (Florence River) mine shaft; continue west 1.6 km along the mine road to the ramp.



1. Flordin (Florence River) mine 2. Cameron Lake occurrence 3. Lake Rose mine

Map 29. Madeleine Lake

Refs.: 83 p. 34–35; 186 p. 56–57; 203 p. 107–108; 261 p. 82; 454 p. 50; 455 p. 58; 457 p. 451.

Maps (T): 32 F/7 Lac Esther
(G): 353 Currie area, Abitibi Territory (MRNQ, 1:63 360)
570A Puskitamika Lake, Abitibi Territory, Quebec (GSC, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Cameron Lake occurrence

CHALCOPYRITE, PYRITE, PYRRHOTITE

In volcanic tuff

Chalcopyrite occurs with pyrite and pyrrhotite as disseminations and in massive form in the host rock.

Mining Corporation of Canada discovered copper mineralization as a result of drilling in 1949. Mattagami Lake Mines Limited did a geological survey on the property in 1977. Macamic Resources Inc. examined the property between 1985 and 1987.

The mine is about 152 km northeast of Val-d'Or. *See* Map 29 on page 208.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	121.1	Junction, road to Lebel-sur-Quévillon; continue along Highway 113.
	154.3	Junction, road leading northwest to Cameron Lake; continue along Highway 113.
	155.2	Junction; turn left (west).
	155.8	Cameron Lake occurrence.

Refs.: 257 p. 110; 453 p. 250; 455 p. 389.

Maps (T): 32 F/7 Lac Esther
(G): 353 Currie area, Abitibi Territory (MRNQ, 1:63 360)
570A Puskitamika Lake, Abitibi Territory, Quebec (GSC, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

Lake Rose mine

NATIVE GOLD, PYRITE, PYRRHOTITE, CHALCOPYRITE, SPHALERITE, TETRADYMITE

In volcanic rocks and quartz diorite

Plate 21.
Lake Rose mine, 1936. GSC 81982

Native gold occurred as visible gold in fractures in quartz. Pyrite and pyrrhotite occurred in the quartz veins along with sparse amounts of chalcopyrite and sphalerite and specks of tetradymite.

John Wabanoni, an Amerindian trapper, discovered a gold-bearing quartz vein on the south shore of Madeleine Lake in 1934. Prospectors Airways Company Limited acquired the property the same year and formed Lake Rose Mines Limited to develop it. Development consisted of a 290 m adit driven south into a ridge on the south side of Madeleine Lake, and a winze sunk from the adit to 81 m. In 1938–1939, the mill produced 105 303 g of gold from 5212 t of ore, valued at $118 900. Eider Mining Resources Inc. did some drilling, surveying, underground development, and bulk sampling in 1985–1986.

The mine is about 162 km northeast of Val-d'Or. *See* Map 29 on page 208.

Road log from Highway 117 at **km 237.3** (*see* p. 11):

km	0	Junction of highways 117 and 113; proceed north along Highway 113.
	37.0	Senneterre, at the junction of Highway 386; turn right, continuing along Highway 113.
	121.1	Junction, road to Lebel-sur-Quévillon; continue along Highway 113.
	154.3	Junction, road (on left) leading northwest to Cameron Lake.
	164.4	Junction; turn left onto a road leading north to Madeleine Lake.
	166.1	Junction; turn left (west).
	166.4	Lake Rose mine.

Refs.: 83 p. 35–37; 203 p. 101–103; 247 p. 39–40; 319 p. 17; 332 p. 127–131; 453 p. 138; 454 p. 134.

Maps (T): 32 F/7 Lac Esther
(G): 353 Currie area, Abitibi Territory (MRNQ, 1:63 360)
570A Puskitamika Lake, Abitibi Territory, Quebec (GSC, 1:253 440)
1600-III Metallic mineralization in Noranda, Matagami, Val d'Or, and Chibougamau areas (MRNQ, 1:253 440)
M-306 Gîtes minéraux du Québec, région de l'Abitibi, feuille lac Waswanipi 32F (MRNQ, 1:250 000)

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GLOSSARY

Acanthite. Ag_2S. H = 2–2.5. Iron-black, metallic, prismatic aggregates. Sectile. Low-temperature form of silver sulphide, argentite being the high-temperature form. Ore of silver associated with other silver minerals.

Acmite. Not a valid mineral name; renamed 'aegirine'.

Actinolite. $Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$. H = 5–6. Bright green to greyish-green, columnar, fibrous, or radiating prismatic aggregates. Occurs in metamorphic rocks. Commonly associated with epidote. Monoclinic variety of amphibole.

Adularia. Transparent to translucent, generally colourless variety of K-feldspar; may exhibit an opalescent effect, or schiller, as in moonstone. Occurs as pseudorhombohedra in low-temperature hydrothermal veins in schist and gneiss.

Aegirine. $NaFeSi_2O_6$. H = 6. Dark green to almost black or greenish-brown; prismatic, commonly elongated and striated crystals. Monoclinic variety of pyroxene.

Agate. Patterned and variously coloured variety of microcrystalline quartz (chalcedony). Translucent to opaque; colours are due to metallic oxide mineral impurities. Used as an ornamental stone.

Agglomerate. Rock formed by the consolidation of angular fragments ejected by volcanoes.

Agrellite. $NaCa_2Si_4O_{10}F$. H = 5.5. White, greyish, or greenish flat prismatic crystals with excellent cleavage; pearly lustre. Occurs in alkalic rocks. Originally described from the Kipawa area, Quebec.

Akermanite. $Ca_2MgSi_2O_7$. H = 5. Colourless, greyish-green, brown to black; generally massive. Vitreous to resinous lustre. Subconchoidal fracture. Not readily distinguished in the hand specimen from other members of group. Melilite group.

Aktashite. $Cu_6Hg_3As_4S_{12}$. Grey, metallic. Occurs as grains with other mercury sulphide minerals.

Alaskite. Granitic rock composed of microcline, orthoclase, and quartz with few or no dark minerals such as amphibole, biotite, or pyroxene.

Albertite. Hydrocarbon. H = 1–2. Black with brilliant lustre. Occurs in shale in Albert County, New Brunswick. Also known as 'albert coal'. Name is derived from the locality.

Albite. $NaAlSi_3O_8$. H = 6. White, tabular, striated crystals, or cleavable masses. Vitreous lustre. Variety of plagioclase feldspar. Used in the manufacture of ceramics.

Allanite. $(Ce,Ca,Y)_2(Al,Fe)_3(SiO_4)_3(OH)$. H = 6.5. Black or dark brown tabular aggregates, or massive with conchoidal fracture. Vitreous or pitchy lustre. Generally occurs in granitic rocks, in pegmatite, and is commonly surrounded by an orange halo. Distinguished by its weak radioactivity.

Allargentum. $Ag_{1-x}Sb_x$. Grey, metallic grains occurring in native silver or as veinlets in calcite containing high-grade silver ore.

Allemontite. A mixture of stibarsen and arsenic or antimony. Not a valid mineral species.

Alloclasite. (Co,Fe)AsS. Light grey, metallic; compact radiating crystal aggregates. Occurs in cobalt deposits.

Allophane. Amorphous hydrous aluminosilicate. H = 3. Light 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. Not a valid mineral species.

Alluaudite. $(Na,Ca)Fe(Mn,Fe,Mg)_2(PO_4)_3$. H = 5–5.5. Yellow to brownish-yellow, massive granular or compact radiating fibrous aggregates. Generally opaque. Occurs as an alteration of varulite-hühnerkobelite in pegmatite.

Almandine. $Fe_3Al_2(SiO_4)_3$. H = 7–7.5. Dark red transparent to opaque dodecahedral or trapezohedral crystals; also massive. Generally occurs in mica schist or gneiss; also in granite and pegmatite. Used as an abrasive (sand paper); transparent variety used as a gemstone. Garnet group.

Altaite. PbTe. H = 3. Light grey, metallic, with bronze tarnish. Generally massive, but may occur as cubic or cubo-octahedral crystals. Sectile with perfect cleavage. Occurs with native gold and with other tellurides and sulphides in vein deposits.

Alunogen. $Al_2(SO_4)_3$•$17H_2O$. H = 1.5–2. White fibrous crusts; powdery. Vitreous to silky lustre. Acid, sharp taste. Secondary mineral associated with pyrite or marcasite.

Amazonite. $KAlSi_3O_8$. H = 6. Green variety of microcline feldspar. Colour is due to natural irradiation of microcline containing Pb and H_2O. Occurs in pegmatite. Used as a gemstone and for ornamental purposes.

Amethyst. Violet variety of quartz. Colour is due to natural irradiation of quartz containing Fe. Generally occurs in igneous and volcanic rocks. Transparent variety is used as a gemstone.

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

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

Amygdaloidal lava. Fine-grained lava (basalt) with cavities (amygdales) that may be filled with quartz, calcite, chlorite, zeolites, etc.

Analcime (Analcite). $NaAlSi_2O_6$•H_2O. H = 5–5.5. Colourless, white, yellowish, or greenish vitreous, transparent, trapezohedral crystals, or massive granular. Distinguished from garnet by its inferior hardness. Often associated with other zeolites.

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

Ancylite. $SrCe(CO_3)_2(OH)$•H_2O. H = 4–4.5. Light yellow, yellowish-brown, or grey translucent prismatic crystals or rounded crystal aggregates. Splintery fracture. Soluble in acids. Rare mineral.

Andalusite. Al_2SiO_5. H = 7.5. White, grey, rose red, or brown prismatic crystals with almost square cross-section. Vitreous to dull lustre. Transparent to opaque. Chiastolite variety has carbonaceous inclusions arranged in crossed lines that are evident in cross-section. Occurs in metamorphosed shale. Used in the manufacture of mullite refractories, spark plugs; transparent variety used as a gemstone.

Andesite. A dark-coloured volcanic rock composed mainly of plagioclase feldspar with amphibole or pyroxene.

Andorite. $PbAgSb_3S_6$. H = 3–3.5. Dark grey, metallic, striated prismatic or tabular crystals; massive. Conchoidal fracture. Black streak. Soluble in HCl. Associated with sulphides and other sulphosalts.

Andradite. $Ca_3Fe_2(SiO_4)_3$. H = 7. Yellow, green, brown or black dodecahedral or trapezohedral crystals; massive. Occurs in chlorite schist, serpentinite, crystalline limestone. Gem varieties are demantoid (green), topazolite (yellow), and melanite (black). Garnet group.

Anglesite. $PbSO_4$. H = 2.5–3. Colourless to white, greyish, yellowish, or bluish tabular or prismatic crystals, or granular. Adamantine to resinous lustre. Characterized by high specific gravity (6.37) and adamantine lustre. Effervesces in HNO_3. Secondary mineral, generally formed from galena. Ore of lead.

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

Ankerite. $Ca(Fe,Mg,Mn)(CO_3)_2$. Variety of dolomite from which it cannot be distinguished in the hand specimen.

Annabergite. $Ni_3(AsO_4)_2{\bullet}8H_2O$. H = 1.5–2.5. Light green, finely crystalline or earthy encrustations. Soluble in acids. Secondary mineral formed by oxidation of cobalt and nickel arsenides. Colour and association with nickel minerals are distinguishing characteristics. Referred to as 'nickel bloom'.

Anorthite. $CaAl_2Si_2O_8$. H = 6. White or greyish cleavable masses; prismatic, striated crystals. Plagioclase feldspar.

Anorthoclase. $(Na,K)AlSi_3O_8$. H = 6–6.5. Colourless, white with reddish, greenish, or yellowish tint. May exhibit polysynthetic twinning. Occurs in volcanic and other igneous rocks. Feldspar group.

Anorthosite. An igneous rock composed almost entirely of plagioclase.

Anthophyllite. $(Mg,Fe)_7Si_8O_{22}(OH)_2$. H = 6. White, light grey to brown fibrous or prismatic aggregates with vitreous or silky lustre. Distinguished from tremolite by its fibrous habit and silky lustre. Fibrous variety resembles asbestos, but is more brittle. Used in asbestos cement, for boiler coverings, and fireproof paints because of its resistance to heat. Orthorhombic variety of amphibole.

Anthraxolite. Hydrocarbon. H = 3–4. Black, massive. Submetallic to pitchy lustre. Uneven to conchoidal fracture. Friable, combustible. Exposed surface partly altered to orange powder.

Antigorite. $Mg_3Si_2O_5(OH)_4$. H = 2.5. Green translucent variety of serpentine with lamellar structure.

Antimony. Sb. H = 3–3.5. Light grey, metallic, cleavable, massive, also radiating or botryoidal. Perfect cleavage. Occurs in hydrothermal veins with silver, antimony, and arsenic ores. Minor source of antimony for use in alloys of lead and tin, and for flame-proofing textiles, paints, and ceramics.

Antiperthite. Lamellar intergrowth of potassium and sodium feldspars in which sodium feldspar is dominant.

Antlerite. $Cu_3SO_4(OH)_4$. H = 3.5. Emerald-green to dark green, tabular, prismatic, or acicular microscopic crystals. Vitreous lustre. Secondary mineral occurring in copper deposits. 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 to sugary massive. Vitreous lustre. May be fluorescent. Distinguished from beryl and quartz by its inferior hardness; massive variety is distinguished from calcite and dolomite by lack of effervescence in HCl, and from diopside and olivine by its inferior hardness. Used in the manufacture of fertilizers and in the production of detergents. Apatite is a mineral group that includes the species fluorapatite, chlorapatite, hydroxylapatite, carbonate-fluorapatite.

Aplite. A light-coloured igneous (dyke) rock with fine-grained granitic texture and composition similar to granite.

Aplowite. $(Co,Mn,Ni)SO_4 \bullet 4H_2O$. H = 3. Pink, powdery, with vitreous lustre and white streak. Occurs as coatings on barite-siderite-sulphide specimens. Soluble in water. Originally described from the Magnet Cove barite mine, Walton, Nova Scotia, and named in honour of A.P. Low, director of the Geological Survey of Canada (1906–1907).

Apophyllite. $KCa_4(Si_4O_{10})_2(F,OH) \bullet 8H_2O$. H = 5. Colourless, grey, white, green, yellow, or less commonly, pink square, prismatic, or pyramidal crystals with pearly or vitreous lustre. Perfect basal cleavage and pearly lustre on cleavage face are diagnostic. Commonly associated with zeolites in basalt.

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

Arfvedsonite. $Na_3(Fe,Mg)_4FeSi_8O_{22}(OH)_2$. H = 5–6. Greenish-black to black tabular or long prismatic crystals. Vitreous lustre. Occurs in alkalic igneous rocks. Monoclinic variety of amphibole.

Argentite. Ag_2S. H = 2–2.5. Dark grey, metallic, cubic or octahedral crystals; arborescent, massive. Very sectile. Occurs in sulphide deposits with other silver minerals. Inverts to acanthite at temperatures below 180°C.

Argentopentlandite. $Ag(Fe,Ni)_8S_8$. Bronze-brown metallic octahedral crystals; massive. Associated with pyrite, cubanite, and chalcopyrite in veins and in sulphide deposits.

Argillite. A clayey sedimentary rock without slaty cleavage or shaly fracture.

Arizonite. $Fe_2Ti_3O_9$. H = 3.5. Brown to black, platy or granular. Opaque; submetallic lustre. Reddish-brown streak. Alteration product of ilmenite.

Arkose. A sandstone in which feldspar grains predominate over quartz.

Armenite. $BaCa_2Al_6Si_9O_{30}•2H_2O$. H = 7.5. Colourless, white, or greyish-green prismatic crystals. Vitreous lustre. Associated with axinite, zoisite.

Arsenic. As. H = 3.5. Light grey to black, submetallic. Massive, reniform, or stalactitic. Volatile without fusion, giving off garlic odour. Occurs in veins with silver, cobalt, and nickel ores.

Arsenolite. As_2O_3. H = 1.5. White, botryoidal, stalactitic, earthy encrustations. Vitreous to silky lustre. Sweetish astringent taste. Secondary mineral formed by oxidation of arsenopyrite, smaltite, and other arsenic minerals.

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

Artinite. $Mg_2(CO_3)(OH)_2•3H_2O$. H = 2.5. White acicular crystals; fibrous aggregates forming botryoidal, spherical masses and crossfibre 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 (crossfibre) to the vein walls. Used in the manufacture of asbestos cement sheeting, shingles, roofing, and floor tiles, millboard, thermal insulating paper, pipe covering, clutch and brake components, reinforcing in plastics, etc.

Asbolite. A mixture of manganese oxides (wad) containing cobalt oxide with or without oxides of nickel and copper. Occurs as dull-black earthy or compact masses.

Ashcroftine. $K_9Na_9(Y,Ca)_{12}Si_{28}O_{70}(OH)_2(CO_3)_8•3H_2O$. Pink fibrous, prismatic, or powdery aggregates. Occurs in alkalic igneous rocks.

Asterism. Intersecting lines or bands of light forming a star, as seen in transmitted light in mica, or in reflected light in cabochon-cut sapphire, garnet, etc. Caused by light reflected from microscopic inclusions arranged along crystallographic directions.

Astrophyllite. $(K,Na)_3(Fe,Mn)_7Ti_2Si_3O_{24}(O,OH)_7$. H = 3. Golden-yellow to bronze-brown elongated crystals or blades, often radiating; also micaceous with pearly or splendent lustre. More brittle than mica. Generally occurs in nepheline syenite.

Atacamite. $Cu_2Cl(OH)_3$. H = 3–3.5. Green, prismatic, tabular aggregates; granular massive, fibrous. Adamantine to vitreous lustre. Soluble in acids. Associated with other secondary copper minerals.

Augite. $(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)_2O_6$. Dark green to black. Important constituent of basic and ultrabasic rocks. Monoclinic variety of pyroxene.

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.

Aurichalcite. $(Zn,Cu)_5(CO_3)_2(OH)_6$. H = 1–2. Light green or blue silky to pearly acicular or lath-like crystals forming tufted, feathery, plumose, laminated, or granular encrustations. Transparent. Soluble in acids and in ammonia. Secondary mineral occurring in oxidized zones of copper and zinc deposits, associated with other secondary copper and zinc minerals.

Aurostibite. $AuSb_2$. H = 3. Dark grey, metallic. Occurs as grains with gold and sulphide minerals. Resembles galena. Not readily identified in hand specimen.

Axinite. $(Ca,Mn,Fe,Mg)_3Al_2BSi_4O_{15}(OH)$. H = 7. Violet, pink, yellow to brown wedge-shaped crystals or massive, lamellar. Vitreous lustre. Fuses readily with intumescence. Occurs commonly in contact-altered calcareous rocks. Transparent varieties are used as gemstones.

Azurite. $Cu_3(CO_3)_2(OH)_2$. H = 3.5–4. Azure-blue to inky blue tabular or prismatic crystals; also massive, earthy, stalactitic with radial or columnar structure. Vitreous lustre; transparent. Secondary copper mineral. Effervesces in acids. Ore of copper.

Baddeleyite. ZrO_2. H = 6.5. Cream-white, yellowish, or amber scaly, finely granular, powdery aggregates. Greasy to dull lustre. Associated with fluorite, dawsonite at the Francon Quarry, Montréal.

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

Barylite. $BaBe_2Si_2O_7$. H = 7. Colourless, white, or bluish tabular, prismatic crystals, or massive. Transparent, vitreous. Perfect cleavage.

Basalt. Dark, fine-grained volcanic rock or lava composed predominantly of an amphibole or a pyroxene with plagioclase. Amygdaloidal basalt contains cavities that may be hollow or occupied by one or more minerals.

Basaluminite. $Al_4(SO_4)(OH)_{10}•5H_2O$. White, powdery to compact, massive. Dull lustre. Conchoidal fracture. Secondary mineral, associated with gypsum, aragonite.

Bassanite. $2CaSO_4•H_2O$. White microscopic prisms, fibres, plates. Silky to dull lustre. Associated with gypsum on which it may form chalky coatings. Dehydration product of gypsum; also occurs in volcanic rocks.

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

Batholith. A very large body of coarse-textured igneous rocks such as granite or diorite.

Baumhauerite. $Pb_3As_4S_9$. H = 3. Grey, metallic, striated prismatic or tabular crystals. Brown streak. Occurs with other lead sulphosalt minerals.

Bavenite. $Ca_4Be_2Al_2Si_9O_{26}(OH)_2$. H = 5.5. White; greenish-, pinkish-, or brownish-white prismatic crystals; also fibrous or radiating lamellar aggregates. Vitreous lustre. Associated with beryl in granite pegmatite.

Behoite. $Be(OH)_2$. H = 4. Colourless, white pseudo-octahedral crystals. Vitreous lustre. Occurs in granitic pegmatite and in syenite.

Berthierite. $FeSb_2S_4$. H = 2–3. Dark steel-grey, metallic, striated prismatic crystals; fibrous or granular masses. Tarnished surface is iridescent or brown. Generally associated with stibnite and not readily distinguished from it in hand specimen.

Bertrandite. $Be_4Si_2O_7(OH)_2$. H = 6–7. Colourless or light yellow tabular or prismatic crystals. Vitreous or pearly lustre. Associated with beryl in granite pegmatite.

Beryl. $Be_3Al_2Si_6O_{18}$. H = 8. White, yellow, green, or blue hexagonal prisms, or massive with conchoidal or uneven fracture. Vitreous lustre; transparent to translucent. Distinguished from apatite by superior hardness, from topaz by its lack of perfect cleavage; massive variety distinguished from quartz by its higher density. Ore of beryllium with numerous uses in nuclear energy, space, aircraft, electronic, and scientific equipment industries; used as alloying agent with copper, nickel, iron, aluminum, and magnesium. Gem varieties include emerald and aquamarine.

Betafite. $(Ca,Na,U)_2(Ti,Nb,Ta)_2O_6(OH)$. H = 4–5.5. Brown to black, waxy to submetallic octahedral or modified octahedral crystals. Metamict. Occurs with euxenite, fergusonite, cyrtolite in granite pegmatite and in calcite veins.

Beta-uranophane. $(H_3O)_2Ca(UO_2)_2(SiO_4)_2{\bullet}3H_2O$. H = 2.5–3. Yellow to yellowish-green aggregates of acicular crystals or short prismatic crystals. Silky to waxy lustre. May fluoresce green in ultraviolet light. Secondary mineral occurring in granitic rocks and calcite veins containing uranium minerals.

Beudantite. $PbFe_3(AsO_4)(SO_4)(OH)_6$. H = 3.5–4.5. Dark green, brown, or 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 specimens from other yellowish secondary minerals.

Beyerite. $(Ca,Pb)Bi_2(CO_3)_2O_2$. H = 2–3. White, yellow, greenish-yellow to green or grey platy, tabular crystals, or earthy. Vitreous to dull lustre. Occurs as encrustations, or fillings in cavities and fractures. Secondary mineral formed from bismuth minerals.

Bindheimite. $Pb_2Sb_2O_6(O,OH)$. H = 4–4.5. 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.

Biomicrite. Limestone composed of skeletal fossil debris and carbonate mud (micrite). Described by major fossil type present, e.g. crinoid biomicrite.

Biotite. $K(Mg,Fe)_3(Al,Fe)Si_3O_{10}(OH,F)_2$. H = 2.5–3. Dark brown or greenish-black, transparent, hexagonal, platy crystals; platy or scaly aggregates. Splendent lustre. Occurs in pegmatite, calcite veins, pyroxenite. Constituent of igneous rocks (granite, syenite, diorite, etc.) and metamorphic rocks (gneiss, schist). Elasticity of individual plates or sheets distinguishes it from chlorite. Sheet mica is used as electrical insulators and for furnace and stove doors (isinglass); ground mica is used in the manufacture of roofing materials, wallpaper, lubricants, and fireproofing material. Mica group.

Birnessite. $Na_4Mn_{14}O_{27}{\bullet}9H_2O$. H = 1.5. Black opaque grains, granular aggregates, earthy. Dull lustre. Secondary mineral associated with other manganese minerals. Difficult to identify except by X-ray methods.

Bismoclite. BiOCl. H = 2–2.5. Cream-white to grey, brownish; greasy to silky, or dull lustre. Massive, earthy, columnar, fibrous, or scaly. Soluble in acids. Secondary mineral formed by alteration of bismuthinite or native bismuth.

Bismuth. Bi. H = 2–2.5. Light grey, metallic, reticulated crystal aggregates; also foliated or granular. Iridescent tarnish. Used as a component of low melting-point alloys and in medicinal and cosmetic preparations.

Bismuthinite. Bi_2S_3. H = 2. Dark grey, striated, prismatic, acicular crystals; also massive. Iridescent on tarnished surface. Ore of bismuth.

Bismutite. $Bi_2(CO_3)O_2$. H = 2.5–3.5. Yellowish-white to brownish-yellow, light green, or grey earthy or pulverulent masses; also fibrous crusts, spheroidal aggregates, scaly, or lamellar. Dull, vitreous, or pearly lustre. Effervesces in HCl. Uncommon secondary mineral formed by alteration of bismuth minerals.

Bitumen. Natural mixture of hydrocarbons that may be liquid (petroleum) or solid (asphalt or mineral pitch).

Bityite. $CaLiAl_2(AlBeSi_2)O_{10}(OH)_2$. H = 5.5. White, yellow, or brownish-white transparent tabular, pseudohexagonal crystals, or micaceous. Associated with lithium minerals in granite pegmatite.

"Black diamond". A siliceous hematite that, when polished, takes a high, mirror-like lustre. Used as a gemstone.

Boehmite. AlO(OH). H = 3. White with pearly to silky lustre. Flaky, fibrous, granular, or powdery aggregates; also pisolitic. Associated with other aluminum minerals.

Bog iron ore. Loose porous iron ore formed by precipitation of water in bogs or swampy areas. Ore consists of limonite, goethite, and/or hematite.

Bohdanowiczite. $AgBiSe_2$. H = 3. Dark grey, metallic, microscopic grains associated with other selenides and with sulphides.

Boltwoodite. $(H_3O)K(UO_2)(SiO_4)$. H = 3.5–4. Light yellow acicular, fibrous aggregates. Silky, vitreous, to dull lustre. Fluoresces dull green in ultraviolet light. Secondary mineral formed from uranium minerals.

Boracite. $Mg_3B_7O_{13}Cl$. H = 7–7.5. Colourless, white, yellow, green, or grey cubic or dodecahedral crystals; fibrous or granular aggregates. Transparent with vitreous lustre. Occurs in gypsum, halite, and potash deposits. Soluble in HCl.

Bornite. Cu_5FeS_4. H = 3. Reddish-brown, metallic. Usually massive. Tarnishes to iridescent blue, purple, etc. Ore of copper. Also known as 'peacock ore', 'variegated copper', 'vitreous copper', and 'purple copper ore'.

Botallackite. $Cu_2Cl(OH)_3$. Light green to bluish-green columnar crystals forming crusts. Secondary mineral associated with other copper minerals.

Boulangerite. $Pb_5Sb_4S_{11}$. H = 2.5–3. 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 = 2.5–3. Grey to blackish-grey, metallic. Short prismatic or tabular crystals with striations; massive. Occurs in veins with sulphides and sulphosalts. Not readily identified in the hand specimen.

Brannerite. $(U,Ca,Y,Ce)(Ti,Fe)_2O_6$. H = 4.5. Black opaque grains, prismatic crystals, granular masses. Resinous to dull lustre. Brownish-yellow on weathered surfaces. Conchoidal fracture. Radioactive. Ore of uranium.

Bravoite. $(Ni,Fe)S_2$. Yellow to grey, metallic, with violet tinge. Pyrite group. Resembles pyrite except for colour.

Breccia. A rock composed of angular fragments; may be attractively patterned and coloured and used as an ornamental rock.

Breithauptite. NiSb. H = 5.5. Light copper-red with violet tint. Metallic lustre. Occurs as disseminated grains, massive, arborescent, and rarely as tabular or prismatic crystals. Reddish-brown streak. Associated with silver and nickel minerals in vein deposits.

Breunnerite. A variety of magnesite containing iron. White, yellowish- to brownish-white.

Britholite. $(Y,Ce,Ca)_5(SiO_4,PO_4)_3(OH,F)$. Tan to brown prisms, platy aggregates, and massive. Resinous lustre. Difficult to distinguish in the hand specimen.

Brochantite. $Cu_4(SO_4)(OH)_6$. H = 3.5–4. Green acicular crystal aggregates; massive, granular. Vitreous lustre. Secondary mineral formed by oxidation of copper minerals. Distinguished from malachite by lack of effervescence in HCl.

Brookite. TiO_2. H = 5.5–6. Dark brown to black tabular or pyramidal crystals with metallic, adamantine lustre. Not readily identifiable in the hand specimen.

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

Brugnatellite. $Mg_6Fe(CO_3)(OH)_{13}{\bullet}4H_2O$. H = 2. White silky, pearly, or waxy; flaky, aggregates, or foliated lamellar nodules; may be tinted reddish, yellowish, brownish. Associated with brucite and serpentine.

Burbankite. $(Na,Ca)_3(Sr,Ba,Ce)_3(CO_3)_5$. H = 3.5. Tiny yellow or greyish-yellow hexagonal crystals, massive; also colourless to reddish-pink fine hair-like aggregates in cavities with calcite. Associated with other rare-element minerals. Effervesces in HCl. Not readily identifiable in the hand specimen.

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

Cadmoselite. CdSe. H = 4. Black microscopic grains with resinous to adamantine lustre. Rare mineral associated with other selenium and cadmium minerals.

Cafarsite. $Ca_8(Ti,Fe,Mn)_{6-7}(AsO_3)_{12}{\bullet}4H_2O$. Dark brown cubic, octahedral, or dodecahedral crystals. Opaque. Conchoidal fracture. Yellowish-brown streak.

Calaverite. $AuTe_2$. H = 2.5–3. Brass-yellow to silver-white, metallic, bladed, lath-like, or striated short prismatic crystals. Fuses readily; on charcoal, gives bluish-green flame and gold globules. Ore of gold. Occurs in veins with pyrite, native gold.

Calcite. $CaCO_3$. H = 3. Colourless or white rhombohedral, scalenohedral crystals; cleavable, granular massive. May be variously coloured due to impurities. Transparent to opaque. Vitreous, pearly, or dull lustre. May fluoresce in ultraviolet light. Effervesces in dilute HCl. Distinguished from dolomite by its inferior hardness and superior solubility in HCl. Major constituent of chalk and limestone.

Cancrinite. $Na_6Ca_2Al_6O_{24}(CO_3)_2$. H = 6. Yellow, pink, or grey massive or prismatic crystals; vitreous to greasy lustre. Effervesces in warm HCl. Associated with nepheline and sodalite in nepheline syenite.

Carbonate-cyanotrichite. $Cu_4Al_2(CO_3,SO_4)(OH)_{12}{\bullet}2H_2O$. H = 2. Light blue to medium blue, finely granular encrustations with vitreous lustre; also silky fibrous. Secondary mineral formed from copper minerals and associated with other secondary copper minerals. Dissolves in HCl.

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

Carletonite. $KNa_4Ca_4Si_8O_{18}(CO_3)_4(F,OH){\bullet}H_2O$. H = 4–4.5. Colourless, pink, or light blue flakes. Transparent to translucent; vitreous to pearly. New species originally described from Mount Saint-Hilaire, Quebec, where it is associated with pectolite, albite, arfvedsonite, calcite, fluorite, and apophyllite. Named in honour of Carleton University where this and several other new species have been identified.

Carnallite. $KMgCl_3.{\bullet}6H_2O$. H = 2.5. Colourless to white tabular crystals, or granular massive. Greasy or dull lustre. Deliquescent and soluble in water. Bitter taste. Occurs with halite and sylvite.

Carnelian. Red to reddish-brown or reddish-yellow translucent variety of chalcedony. Used as a gemstone.

Carrollite. $Cu(Co,Ni)_2S_4$. H = 4.5–5.5. Grey, metallic; tarnishes to copper-red or violet-grey. Granular massive; octahedral crystals. Occurs with other sulphide minerals in vein deposits.

Cassiterite. SnO_2. H = 6–7. Yellow to brown prismatic crystals; twinning common. Also radiating fibrous, botryoidal, or concretionary masses; granular. Adamantine to splendent lustre. White to brownish or greyish streak. Distinguished from other light-coloured nonmetallic minerals by its high specific gravity (6.99), from wolframite by its superior hardness. Ore of tin. Concentrically banded variety is used as a gemstone. Occurs with gold in placers in Yukon Territory.

Catapleiite. $Na_2ZrSi_3O_9{\bullet}2H_2O$. H = 6. Light yellow, tan, yellowish-brown, or colourless hexagonal plates with vitreous to greasy lustre. Occurs in nepheline syenite where it can be distinguished by its platy habit.

Cattierite. CoS_2. H = 4. Pinkish metallic granular intergrowths with other sulphide minerals; cubic crystals to 1 cm across.

Caysichite. $Ca,GdY_4Si_8O_{20}(CO_3)_6(OH)\bullet 2H_2O$. Colourless, white, yellow, or green coatings or encrustations with divergent columnar structure. Associated with other yttrium minerals. Originally described from the Evans-Lou mine near Wakefield, Quebec. Named for the elements Ca, Y, Si, C, H.

Celadonite. $K(Mg,Fe)(Fe,Al)Si_4O_{10}(OH)_2$. H = 2. Bluish-green to greyish-green scaly, fibrous, or earthy compact masses. Occurs in basalt with zeolites and quartz. Mica group.

Celestine. $SrSO_4$. H = 3–3.5. Transparent, colourless, white, or light blue tabular crystals; also fibrous, massive. Vitreous lustre. Perfect cleavage. Flame test produces crimson colour. Resembles barite but not as heavy. Ore of strontium.

Cement rock. *See* waterlime.

Cenosite. *See* kainosite.

Cernyite. Cu_2CdSnS_4. H = 4. Steel-grey, metallic. Occurs as rare grains in pegmatite at the type locality, the Bernic Lake (Tanco) mine, in Manitoba. Named in honour of Professor Petr Cerny, University of Manitoba.

Cerussite. $PbCO_3$. H = 3–3.5. 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 yellow in ultraviolet light. Soluble in dilute HNO_3. Ore of lead.

Cervantite. Sb_2O_4. H = 4–5. Yellow to yellowish-white powdery or fibrous crust. Greasy, pearly, or earthy lustre. Secondary mineral formed by oxidation of antimony minerals.

Chabazite. $CaAl_2Si_4O_{12}\bullet 6H_2O$. H = 4. Square colourless, white, yellowish, or pinkish crystals. Vitreous lustre. Occurs in cavities in basalt. Distinguished from other zeolites by its almost cubic crystal form, from calcite by its superior hardness and its lack of effervescence in HCl.

Chalcanthite. $CuSO_4\bullet 5H_2O$. H = 2.5. Light to dark blue tabular or short prismatic crystals; massive, granular. Vitreous lustre. Metallic taste. Secondary mineral formed in copper sulphide deposits. Distinguished from azurite by lack of effervescence in HCl.

Chalcedony. SiO_2. H = 7. Translucent microcrystalline variety of quartz. Colourless, grey, bluish, yellowish, reddish, brown. Formed from aqueous solutions. Attractively coloured chalcedony is used for ornamental objects and jewellery. Varieties include agate, carnelian, jasper, etc.

Chalcoalumite. $CuAl_4(SO_4)(OH)_{12}\bullet 3H_2O$. H = 2.5. Light blue, bluish-green, or bluish-grey, transparent to translucent, platy, fibrous aggregates. Vitreous to dull lustre. Secondary mineral associated with copper minerals.

Chalcocite. Cu_2S. H = 3.5–4. Dark grey to black, metallic; massive. Tarnishes to iridescent blue, purple, etc. Also referred to as 'vitreous copper', 'sulphurette of copper', and 'copper glance'. Soluble in HNO_3. Black colour and slight sectility distinguish it from other copper sulphides. Ore of copper.

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

Chalcostibite. $CuSbS_2$. H = 3–4. Dark grey metallic blade-like crystals, or massive. Associated with copper and antimony minerals.

Chamosite. $(Fe,Mg)_5Al(Si_3Al)O_{10}(O,OH)_8$. H = 3. Yellowish to dull green or grey earthy or clay-like masses. Occurs in some sedimentary iron deposits. Chlorite group.

Chapmanite. $SbFe_2(SiO_4)_2(OH)$. H = 2. Yellowish-green lath-shaped crystals; powdery. Alteration product of silver-antimony minerals. Associated with native silver. Originally described from the Keeley mine, Cobalt district, Ontario. Named in honour of Edward J. Chapman, professor of mineralogy (1853–1895), University of Toronto.

Chert. SiO_2. H = 7. Massive opaque variety of chalcedony; generally drab colours: various tints of grey or brown.

Chloanthite. $(Ni,Co)As_3$. Member of the skutterudite series, high in nickel. Not distinguishable in hand specimen from other members of the series — smaltite and skutterudite in which the cobalt-nickel content is variable. Variety of nickel-skutterudite; not a valid mineral name.

Chlorite. $(Mg,Fe,Al)_6(Al,Si)_4O_{10}(OH)_8$. H = 2–2.5. Transparent green flaky aggregates. Distinguished from mica by its colour and by its flexible, but nonelastic, flakes. Occurs in metamorphic, igneous, and volcanic rocks. Alteration product of amphibole, pyroxene, biotite.

Chloritoid. $(Fe,Mg,Mn)_2Al_4Si_2O_{10}(OH)_4$. H = 6.5. Dark grey to black tabular crystals; also platy, scaly, foliated aggregates and massive. Translucent. Pearly lustre. Occurs in schist, lava.

Chlorophane. A variety of fluorite that phosphoresces bright green when heated. Not a valid mineral name.

Chondrodite. $(Mg,Fe)_5(SiO_4)_2(F,OH)_2$. H = 6–6.5. Orange-yellow grains and granular masses. Vitreous to slightly resinous lustre. Subconchoidal to uneven fracture. Occurs in crystalline limestone and in skarn deposits. Orange colour is distinguishing feature. Distinguished from tourmaline by its inferior hardness, from apatite by its superior hardness. Humite group.

Chrome-mica. Green chromium-bearing mica. Also known as "fuchsite".

Chromite. $FeCr_2O_4$. H = 5.5. Black metallic octahedral crystals (rare); generally massive. Distinguished from magnetite by its brown streak and weak magnetism. Commonly associated with serpentine. Ore of chromium.

Chrysoberyl. $BeAl_2O_4$. H = 8.5. Yellow, green, or brown tabular or short prismatic crystals commonly striated and twinned forming six broad radiating spokes. Vitreous; transparent to opaque. Transparent variety is used as a gemstone. Other gem varieties include alexandrite, which is green in natural light and red in artifical light, and cat's-eye, which exhibits a movable streak of light when cut in the cabochon style. Occurs in pegmatite and in mica schist.

Chrysocolla. $(Cu,Al)_2H_2(Si_2O_5)(OH)_4 \bullet nH_2O$. 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 intimately mixed with quartz or chalcedony, producing attractive patterns; being mixed with these minerals gives chrysocolla a superior hardness that renders it suitable for use in jewellery and ornamental objects. Minor ore of copper.

Chrysotile. Fibrous variety of serpentine (asbestos).

Cinnabar. HgS. H = 2–2.5. Orange-red to brownish-red, dark grey, rhombohedral, tabular, or prismatic crystals; also granular to earthy massive. Adamantine, metallic, or dull lustre. Opaque. Perfect cleavage. Occurs in veins formed at low temperatures. Commonly associated with pyrite, marcasite, and stibnite in silica-carbonate gangue. Ore of mercury.

Clausthalite. PbSe. H = 2.5–3. Dark grey metallic with bluish tint. Granular massive, foliated. Associated with other selenides in ore deposits.

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

Clinopyroxene. Monoclinic. Pyroxene group. Includes aegirine, augite, clinoenstatite, diopside.

Clinosafflorite. $(Co,Fe,Ni)As_2$. Monoclinic variety of safflorite. Associated with skutterudite in cobalt deposits.

Clinozoisite. $Ca_2Al_3(SiO_4)_3(OH)$. H = 7. Light green to greenish-grey prismatic crystals; also granular or fibrous masses. Vitreous lustre. Perfect cleavage. Epidote group. Occurs in metamorphic rocks.

Cobalt bloom. Term used by miners for erythrite.

Cobaltite. CoAsS. H = 5.5. Light grey metallic crystals (cubes, pyritohedrons), or massive. Perfect cleavage. Pinkish tinge distinguishes it from other grey metallic minerals. Crystals resemble pyrite, but differ in colour. Associated with cobalt and nickel sulphides or arsenides. Ore of cobalt.

Cobalt pentlandite. Co_9S_8. A rare mineral intimately associated with sulphides and arsenides in ore deposits at Cobalt, Ontario.

Coffinite. $U(SiO_4)_{1-x}(OH)_{4x}$. H = 5–6. Black with adamantine lustre; dull brown. Finely granular massive. Associated with uraninite from which it is indistinguishable in the hand specimen.

Colemanite. $Ca_2B_6O_{11}•5H_2O$. H = 4.5. Colourless to white prismatic crystals; cleavable or granular massive. Transparent to translucent with vitreous lustre. Flame test produces green colour. Occurs in borate and gypsum deposits.

Colerainite. $(Mg,Fe)_5Al(Si_3Al)O_{10}(OH)_8$. Thin, colourless to white, hexagonal plates forming rosettes and botryoidal aggregates. Pearly lustre. Associated with serpentine. Named for Coleraine Township, Quebec, where it was first found. Variety of clinochlore. Not a valid mineral name.

Coloradoite. HgTe. H = 2.5. Dark grey to black, metallic, granular masses. Soluble in HNO_3. Occurs with gold and silver tellurides.

Columbite. $(Fe,Mn)(Nb,Ta)_2O_6$. H = 6–7. Brownish-black to black prismatic or tabular crystals forming divergent or parallel groups; also massive. Submetallic lustre. Black to reddish-brown streak. Occurs in pegmatite. Ore of niobium used in high-temperature steel alloys.

Colusite. $Cu_{26}V_2(As,Sn,Sb)_6S_{32}$. H = 3–4. Bronze-yellow to bronze-brown granular massive or tetrahedral crystals. Associated with other copper minerals in ore deposits.

Concretion. Rounded mass formed in sedimentary rocks by accretion of some constituent (iron oxides, silica, etc.) around a nucleus (mineral impurity, fossil fragment, etc.).

Conglomerate. A sedimentary rock composed of rounded pebbles or gravel.

Connellite. $Cu_{19}Cl_4(SO_4)(OH)_{32}$•$3H_2O$. H = 3. Light azure-blue, translucent, acicular crystals. Vitreous lustre. Distinguished from azurite by lack of effervescence in HCl and by lighter colour.

Cookeite. $LiAl_4(Si_3Al)O_{10}(OH)_8$. H = 2.5–3.5. White, pink, greenish, yellowish, or brown pseudohexagonal plates; also scaly. Transparent to translucent with pearly or silky lustre. Occurs with lithium minerals in granite pegmatite. Chlorite group.

Copiapite. $Fe_5(SO_4)_6(OH)_2$•$20H_2O$. H = 2.5–3. Light yellow to orange-yellow and greenish-yellow granular to scaly aggregates; also tabular crystals. Transparent to translucent. Vitreous to pearly lustre. Secondary mineral formed by oxidation of sulphides, especially pyrite. Yellow colour is characteristic.

Copper. Cu. H = 2.5–3. Massive, filiform, or arborescent; crystals (cubic or dodecahedral) rare. Hackly fracture. Ductile and malleable. Occurs in lava.

Coquimbite. $Fe_2(SO_4)_3$•$9H_2O$. H = 2.5. White, yellowish, greenish, or violet, massive; also prismatic crystals. Vitreous lustre. Astringent taste. Secondary mineral formed from pyrite ore.

Cordierite. $Mg_2Al_4Si_5O_{18}$. H = 7. Blue to purplish-blue, bluish-grey, or colourless massive or irregular grains. Vitreous lustre. Subconchoidal fracture. Alters readily to muscovite or chlorite. Distinguished by its colour and by its alteration products. Occurs in metamorphic rocks (schist, gneiss). Gem variety is known as iolite.

Cordylite. $(Ce,La)_2Ba(CO_3)_3F_2$. H = 4.5. Short colourless or yellowish hexagonal prisms. Transparent; greasy to adamantine, pearly lustre. Occurs in nepheline syenite rocks.

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

Cosalite. $Pb_2Bi_2S_5$. H = 2.5–3. Dark grey, metallic, prismatic, needle-like, fibrous, or feathery aggregates; massive. Soluble in HNO_3. Associated with smaltite and cobaltite.

Covellite. CuS. H = 1.5–2. Inky blue, metallic; iridescent in shades of brass yellow, purple, coppery red. Massive; platy crystals (hexagonal) rare. Distinguished from chalcocite and bornite by its perfect cleavage and colour.

Crandallite. $CaAl_3(PO_4)_2(OH)_5$•H_2O. H = 5. Minute yellow to white or grey prisms; also fibrous, nodular, or finely granular massive. Transparent to translucent with vitreous or dull lustre. Occurs with other secondary phosphate minerals.

Criddleite. $TlAg_2Au_3Sb_{10}S_{10}$. Fine grey metallic grains (up to 50 μm) associated with aurostibite; recognized only by microscopic examination of polished sections. Occurs in the Hemlo gold deposit, the type locality. Named in honour of ore mineralogist Alan J. Criddle, British Museum, London.

Cristobalite. SiO_2. H = 6.5. White, grey, bluish octahedral (less than 1 mm) crystals; fibrous, massive, stalactitic, botryoidal. Translucent to opaque; vitreous to dull lustre. Occurs in volcanic rocks.

Crocidolite. Blue or bluish-grey asbestiform variety of riebeckite (amphibole). Known as 'blue asbestos'. Used as an insulator. Not a valid mineral name.

Crocoite. $PbCrO_4$. H = 2.5–3. Red-orange to yellow prismatic crystals; massive. Transparent to translucent; adamantine to vitreous lustre. Secondary mineral formed by oxidation of minerals containing lead and chromium.

Cryolite. Na_3AlF_6. H = 2.5. Colourless, yellow, reddish, or brownish, massive granular; crystals with cubo-octahedral aspect. Transparent; vitreous to greasy. Appears to disappear when immersed in water. Soluble in H_2SO_4.

Cryptomelane. KMn_8O_{16}. H = 6–6.5. Grey, greyish-black to black compact to loosely granular massive; also radiating fibres, botryoidal. Metallic to dull lustre. Brownish-black streak. Secondary mineral associated with manganese minerals.

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

Cubanite. $CuFe_2S_3$. H = 3.5. Brass-yellow to bronze-yellow tabular crystals, or massive. Distinguished from chalcopyrite by its strong magnetism. Associated with other copper-iron sulphides. Rare mineral.

Cuprite. Cu_2O. H = 3.5–4. Red to almost black octahedral, dodecahedral, or cubic crystals, massive, earthy. Adamantine, submetallic, or earthy lustre. Brownish-red streak. Distinguished from hematite by its inferior hardness, from cinnabar and proustite by its superior hardness. On charcoal, it is reduced to a metallic globule of copper. Soluble in concentrated HCl. Associated with native copper and other copper minerals. Ore of copper.

Curite. $Pb_2U_5O_{17}•4H_2O$. H = 4–5. Orange, yellow-brown, greenish yellow to greenish-brown, finely granular. Waxy to dull lustre. Strongly radioactive. Associated with uraninite.

Cyanotrichite. $Cu_4Al_2(SO_4)(OH)_{12}•2H_2O$. Minute sky-blue to azure-blue acicular crystals commonly radiating; also extremely fine, plush or wool-like aggregates. Silky lustre. Secondary mineral found sparingly in copper deposits.

Cyrtolite. A radioactive zircon containing uranium and rare elements. Not a valid mineral name.

Dachiardite. $(Ca,Na_2,K_2)_5Al_{10}Si_{38}O_{96}•25H_2O$. H = 4–4.5. Colourless to white prismatic crystals, or fibres forming parallel, divergent groups. Transparent; vitreous to silky lustre. Zeolite group.

Dacite. An igneous rock composed mainly of plagioclase with some quartz and pyroxene or hornblende.

Danaite. (Fe,Co)AsS. Variety of arsenopyrite containing up to 9% cobalt. Not a valid mineral name.

Danburite. $CaB_2(SiO_4)_2$. H = 7. Transparent colourless, light yellow prismatic crystals; white nodules. Clear, colourless danburite is used as a gemstone.

Datolite. $CaBSiO_4(OH)$. H = 6.5. Short, transparent, colourless, light yellow, green, or white prismatic crystals; also botryoidal porcelain-like masses, or granular. Vitreous lustre. Easily fusible. Distinguished by its colour, glassy appearance, crystal form, and ease of fusibility.

Dawsonite. $NaAl(CO_3)(OH)_2$. H = 3. Transparent, striated, square prismatic crystals; rosettes or encrustations of bladed or acicular crystals; tufts of colourless needles; also very fine micaceous aggregates. Lustre is vitreous or pearly in crystals, and silky in micaceous variety. Effervesces in HCl. Distinguished by its striated crystal form. Generally difficult to identify in the hand specimen because crystals are very small. Originally found in Montréal, Quebec, near the McGill University campus. Named for John William Dawson (1820–1899), geologist and principal of McGill University.

Devilline. $CaCu_4(SO_4)_2(OH)_6 \bullet 3H_2O$. H = 2.5. 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 secondary copper minerals in the hand specimen.

Diabase. Dark-coloured igneous rock composed mostly of lath-shaped crystals of plagioclase and pyroxene. Used as a building, ornamental, and monument stone.

Diaspore. AlO(OH). H = 6.5–7. White, grey, yellow, brown, light violet, pink, or colourless foliated, scaly, granular, or massive aggregates. Platy or acicular crystals. Pearly, vitreous, or brilliant lustre. Associated with aluminous minerals in igneous and metamorphic rocks.

Diatomite. Pulverulent material composed of the siliceous remains of tiny organisms (diatoms), which accumulated on the bottoms of lakes and swamps in Recent geological time. Lightweight and resembles chalk. Used for insulation, filtration, abrasives, absorbents, etc.

Digenite. Cu_9S_5. H = 2.5–3. Bluish-black to black with submetallic lustre. Occurs as pseudocubic crystals or as intergrowths with other copper sulphides.

Diopside. $CaMgSi_2O_6$. H = 6. Colourless, white, grey, green, blue. Transparent to opaque with vitreous lustre. Occurs as short prisms or granular masses in calcium-rich metamorphic rocks. Monoclinic variety of pyroxene.

Diorite. A dark-coloured igneous rock composed mainly of plagioclase and amphibole or pyroxene.

Djurleite. $Cu_{1.96}S$. Properties similar to those of chalcocite from which it is indistinguishable in the hand specimen. Occurs in some Cobalt, Ontario, ore deposits.

Dolomite. $CaMg(CO_3)_2$. H = 3.5–4. Colourless, white, pink, yellow, or grey rhombohedral or saddle-shaped crystals; also massive. Vitreous to pearly lustre. Slightly soluble in cold HCl. Common vein-filling mineral in ore deposits and essential constituent of dolomitic limestone and dolomitic marble. Ore of magnesium used in the manufacture of lightweight alloys.

Dolomitic limestone. Limestone containing 10% to 50% dolomite.

Domeykite. Cu_3As. H = 3–3.5. Light grey, metallic; massive, reniform, or botryoidal. Becomes yellowish to brown or iridescent when tarnished. Occurs with other copper minerals. Soluble in HNO_3 but not in HCl.

Donnayite. $NaCaSr_3Y(CO_3)_6{\bullet}3H_2O$. H = 3. Yellow, colourless, white, grey, brown, or reddish-brown platy, tabular, columnar, or granular aggregates. Vitreous lustre. Associated with microcline, analcime, calcite, natrolite, chlorite, aegirine, and arfvedsonite in nepheline syenite at the type locality, Mount Saint-Hilaire, Quebec. It was named in honour of Professors J.D.H. Donnay and Gabrielle Donnay, McGill University.

Doverite. *See* synchysite-Y.

Doyleite. $Al(OH)_3$. H = 2.5–3. White platy crystals forming rosettes; pulverulent to compact globules, crusts. Dull lustre. Originally described from Mount Saint-Hilaire, Quebec, where it occurs in albitite, and from Francon quarry, Montréal, where it occurs on weloganite, calcite, and quartz. Named in honour of its discoverer, mineral collector E.J. Doyle of Ottawa.

Dresserite. $Ba_2Al_4(CO_3)_4(OH)_8{\bullet}3H_2O$. H = 2.5–3. White to colourless spheres commonly 3 to 4 mm in diameter; blade-like crystals with oblique terminations forming tufts, spheres. Transparent to translucent, opaque; silky to vitreous lustre. Effervesces in HCl. Distinguished from dawsonite by its oblique termination. Associated with weloganite in quartz-albite-lined cavities in igneous sill rock at the Francon quarry, Montréal, Quebec, the type locality. Named in honour of geologist John A. Dresser (1866–1954) in recognition of his geological work in the Monteregian Hills, Quebec.

Dufrenoysite. $Pb_2As_2S_5$. H = 3. Long, grey, metallic, striated tabular crystals. Reddish-brown streak. Perfect cleavage. Associated with sphalerite and arsenic minerals.

Dumortierite. $Al_7(BO_3)(SiO_4)_3O_3$. H = 7. Blue, violet, or greenish-blue columnar or fibrous masses; also massive. Vitreous or dull lustre. Transparent to translucent. Difficult to distinguish from cordierite except by X-ray methods. Used in the manufacture of porcelain spark plugs and as a gemstone.

Dundasite. $PbAl_2(CO_3)_2(OH)_4{\bullet}H_2O$. H = 2. White silky to vitreous radiating crystals, spherical aggregates, matted encrustations. Effervesces in acids. Secondary mineral associated with lead minerals.

Dunite. Fine-grained, dull grey-black ultramafic igneous rock composed mainly of olivine.

Dyke. A long narrow body of igneous rock cutting across the structure of other rocks that it intrudes.

Dyscrasite. Ag_3Sb. H = 3.5–4. Light grey, metallic, tarnishing to dark grey. Granular massive, foliated; also pyramidal crystals. Sectile. Occurs in veins with silver minerals and sulphide minerals. Decomposed by HNO_3.

Ekanite. $ThCa_2Si_8O_{20}$. H = 5. Dark reddish-brown, yellow, or green tetragonal prisms, or massive. Vitreous lustre. Transparent variety is used as a gemstone. Originally found in gem gravel of Sri Lanka.

Electrum. (Au,Ag). H = 2.5–3. Yellow, metallic. Natural alloy of gold and silver with 20% gold content.

Ellsworthite. Amber yellow to dark brown, massive; adamantine lustre. Originally found in 1922 at the McDonald mine near Bancroft, Ontario, and named in honour of H.V. Ellsworth, mineralogist, Geological Survey of Canada. Subsequently found to be a uranpyrochlore. Not a valid mineral name.

Elpidite. $Na_2ZrSi_6O_{15}•3H_2O$. H = 7. White, light green, or grey fibrous, prismatic crystals or massive. Vitreous or silky lustre. Found in nepheline syenite. Not readily identifiable in the hand specimen.

Enargite. Cu_3AsS_4. H = 3. Greyish-black to iron-black, metallic (dull when tarnished), prismatic or tabular crystals; also massive or granular. When twinned, it forms star-shaped cyclic trillings. Perfect cleavage. Associated with pyrite, galena, sphalerite, and copper sulphides. Good cleavage is characteristic. Ore of copper.

Enstatite. $MgSiO_3$. H = 6. White, green, or brown with vitreous lustre. Occurs as coarse cleavable masses in pyroxenite, peridotite. Orthorhombic variety of pyroxene.

Epididymite. $NaBeSi_3O_7(OH)$. H = 5.5. White prismatic crystals, massive. Silky lustre. Occurs sparingly in nepheline syenite. Not readily identifiable in the hand specimen.

Epidote. $Ca_2(Al, Fe)_3(SiO_4)_3(OH)$. H = 6–7. Yellowish-green massive or fibrous aggregates. Vitreous lustre. Often associated with quartz and pink feldspar, producing attractive mottled or veined patterns (unakite). Forms during metamorphism of igneous rocks and limestone, and in veins. Takes a good polish and can be used for jewellery and other ornamental objects.

Epistilbite. $CaAl_2Si_6O_{16}•5H_2O$. H = 4. Colourless to reddish twinned prismatic crystals, spherical aggregates, or granular massive. Vitreous lustre. Occurs with stilbite and other zeolite minerals in cavities in basalt. Zeolite group.

Erythrite. $Co_3(AsO_4)_2•8H_2O$. H = 1.5–2.5. Rose-red to crimson globular, radial, or reniform aggregates; also earthy or pulverulent; prismatic to acicular crystals (rare). Dull to adamantine lustre. Soluble in HCl. Secondary mineral formed by the oxidation of cobalt arsenides. Referred to as 'cobalt bloom'.

Esker. A long stream-deposited ridge or mound formed by the accumulation of sand, gravel, and boulders left by retreating glaciers.

Eucairite. CuAgSe. H = 2.5. Light grey, metallic; tarnishes to a bronze colour. Granular massive. Associated with other selenides in copper deposits.

Eucryptite. $LiAlSiO_4$. H = 6.5. Short colourless or white hexagonal prisms; more commonly massive granular. Transparent with vitreous lustre. Fluoresces pink in ultraviolet light. Occurs with lithium minerals in granite pegmatite.

Eudialyte. $Na_4(Ca,Ce)_2(Fe,Mn,Y)ZrSi_8O_{22}(OH,Cl)_2$. H = 5–5.5. Pink, red, yellow, brown, massive; as grains, or tabular or rhombohedral crystals. Transparent with vitreous lustre. Occurs in nepheline syenite. Difficult to identify in the hand specimen.

Eulytite. $Bi_4(SiO_4)_3$. H = 4.5. Yellow, grey, light green, brown, or white tetrahedral crystal aggregates, also spherical forms. Associated with bismuth minerals.

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

Evaporite. Sedimentary rock formed by evaporation of minerals such as gypsum or halite from saline waters.

Ewaldite. $Ba(Ca,Y,Na,K)(CO_3)_2$. Bluish-green aggregates of microcrystals; tiny white tabular crystals. Associated with mckelveyite.

Facet cut. Polished gemstone featuring numerous flat surfaces, as in diamond.

Facies. A distinctive rock type corresponding to a certain environment or mode of origin.

Fairfieldite. $Ca_2(Mn,Fe)(PO_4)_2 \bullet 2H_2O$. H = 3.5. White, greenish-white, or yellow transparent prismatic crystals; also foliated, fibrous, lamellar, or radiating aggregates. Brilliant or pearly lustre. Soluble in acids. Occurs in granite pegmatite.

Faujasite. $(Na_2,Ca)Al_2Si_4O_{12} \bullet 8H_2O$. H = 5. Colourless or white octahedral crystals. Vitreous lustre. Distinguished from fluorite by its superior hardness.

Fault. Structural feature produced by the movement of one rock mass relative to another; the terms 'shear zone', 'brecciated zone', and 'fault zone' refer to the region affected by the movement.

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

Felsic. A term describing an igneous rock composed mostly of light-coloured minerals such as feldspar, feldspathoids, quartz, and muscovite.

Felsite. A dense, fine-grained, light-coloured (pink or grey) igneous rock composed mainly of feldspar with little or no quartz.

Ferberite. $FeWO_4$. H = 4–4.5. Black striated wedge-shaped prisms; also bladed or massive. Metallic lustre. Brownish-black to black streak. Weakly magnetic. Ore of tungsten.

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

Fersmite. $(Ca,Ce,Na)(Nb,Ta,Ti)_2(O,OH,F)_6$. H = 4–4.5. Dark brown to black striated prisms; also tabular. Subvitreous to resinous lustre. Greyish-brown streak. Occurs with niobium minerals in marble and in pegmatite.

Fibroferrite. $Fe(SO_4)(OH) \bullet 5H_2O$. H = 2.5. White, yellow, or greenish fibrous masses; also radiating fibres. Silky or pearly lustre. Formed by oxidation of pyrite and associated with other secondary iron minerals from which it is distinguished by X-ray methods.

Fischesserite. Ag_3AuSe_2. H = 2. Metallic grains associated with clausthalite, native gold, chalcopyrite, pyrite, and other selenides.

Flint. Yellowish-grey or brown, dark grey to black opaque variety of chalcedony. Used by primitive peoples for tools.

Fluoborite. $Mg_3(BO_3)(F,OH)_3$. H = 3.5. Colourless, white, or pink transparent to translucent hexagonal prisms, prismatic or granular aggregates; vitreous, silky, or pearly lustre. May fluoresce white in ultraviolet light. Resembles apatite, but has an inferior hardness. Occurs in crystalline limestone.

Fluorescence. Property of certain substances to glow when exposed to ultraviolet light, X-rays, or cathode rays. It is caused by impurities in the substance or by defects in its crystal structure. Two wavelengths are commonly used to produce ultraviolet fluorescence: long wave (320 to 400 nm), short wave (253.7 nm).

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

Fluor-richterite. $Na(Ca,Na)\ Mg_3Si_8O_{22}F_2$. H = 5–6. Dark grey to dark greenish-grey long prismatic crystals or aggregates of crystals. Fluorine-rich variety of richlerite; amphibole group. Not a valid mineral name.

Forsterite. Mg_2SiO_4. H = 6.5. White or light green square prismatic or tabular crystals; also massive. Vitreous lustre. Conchoidal fracture. Member of the olivine group; distinguished from other members of the group by X-ray methods. Used in the manufacture of refractory bricks.

Franconite. $Na_2Nb_4O_{11}•9H_2O$. White microscopic globules and globular aggregates (about 0.5 mm across) with vitreous to silky lustre. Dissolves in HCl. Occurs on weloganite, calcite, and quartz crystals at the Francon quarry, Montréal, the type locality. Named for the locality.

Freibergite. $(Ag,Cu,Fe)_{12}(Sb,As)_4S_{13}$. A silver-rich member of the tetrahedrite-tennantite series.

Freieslebenite. $AgPbSbS_3$. H = 2–2.5. Grey, metallic, striated prismatic crystals. Grey streak. Associated with silver and lead ores.

Frohbergite. $FeTe_2$. H=4. Pinkish white, metallic. Occurs as intergrowths with other telluride minerals, chalcopyrite, and native gold. Distinguishable from other metallic minerals only by microscopic examination of polished surfaces. Originally found in the Robb-Montbray mine, near Arntfield, Quebec. Named in honour of mining geologist Dr. M.H. Frohberg of Toronto, Ontario.

Froodite. $PdBi_2$. H = 2. Grey, metallic grains associated with arsenic-lead-copper ores. Originally described from the Frood mine, Sudbury district, Ontario, for which it is named.

Fuchsite. An emerald-green chromian muscovite. Not a valid mineral name. Also called chrome-mica.

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

Gadolinite. $(Ce,La,Nd,Y)_2FeBe_2Si_2O_{10}$. H = 6.5–7. Black prismatic crystals, or massive. Vitreous lustre. Occurs in pegmatite.

Gahnite. $ZnAl_2O_4$. H = 7.5–8. Dark blue-green, yellow, or brown octahedra, rounded grains, massive. Vitreous lustre. Occurs in granite pegmatite and in marble. Spinel group.

Gaidonnayite. $Na_2ZrSi_3O_9•2H_2O$. Colourless, white to light yellowish-brown striated bladed crystals. Transparent; vitreous. Occurs in nepheline syenite at Mount Saint-Hilaire, Quebec, as crystals on analcime, in cavities in natrolite; also occurs in pegmatite dykes with catapleiite, elpidite, hilairite, albite, microcline, chlorite, aegirine, epididymite, and goethite. Named in honour of Gabrielle Donnay, professor of crystallography, McGill University.

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

Galkhaite. $(Cs,Tl)(Hg,Cu,Zn)_6(As,Sb)_4S_{12}$. H = 3. Orange-red cubic crystals; granular aggregates. Vitreous to adamantine lustre. Occurs in arsenic-antimony-mercury deposits.

Garnet. Silicate of Al, Mg, Fe, Mn, Ca. H = 6.5–7.5. Transparent red dodecahedral crystals, or massive; also colourless, yellow, brown, orange, green, black. Used as an abrasive; transparent garnet is used as a gemstone. Distinguished by its crystal form. Mineral group consisting of several species including almandine, grossular, pyrope, spessartine.

Genthelvite. $Zn_4Be_3(SiO_4)_3S$. H = 6–6.5. Light yellow to brown, yellowish-green, or reddish-brown tetrahedral crystals, and massive. Vitreous lustre. Uneven to conchoidal fracture. Helvite group.

Genthite. Hydrous nickel silicate, also known by the general term 'garnierite'. Not a valid mineral species.

Gersdorffite. NiAsS. H = 5.5. Light to dark grey, metallic; octahedral, pyritohedral crystals or granular massive. Associated with other nickel minerals in vein deposits.

Getchellite. $AsSbS_3$. H = 1.5–2. Dark red, resinous, microscopic crystals; also granular or micaceous. May show violet or green iridescence. Associated with stibnite, realgar, orpiment.

Gibbsite. $Al(OH)_3$. H = 2.5–3.5. White, six-sided, tabular crystals; massive. Translucent, vitreous to pearly, or dull; earthy. Secondary mineral formed by alteration of aluminum minerals.

Gittinsite. $CaZrSi_2O_7$. H = 3.5–4. White fibrous radiating masses. Occurs as intergrowths with apophyllite in pegmatite. Originally described from the Kipawa area, Quebec, and named in honour of Professor John Gittens, University of Toronto.

Gladite. $PbCuBi_5S_9$. Dark grey, metallic, prismatic crystals. Associated with other lead-bismuth sulphide minerals.

Glaucodot. (Co,Fe)AsS. H = 5. Light grey to reddish-grey, metallic, striated prismatic crystals, or massive. May form cruciform twins. Decomposed by HNO_3 forming a pink solution. Associated with cobaltite from which it is distinguished by crystal form and colour.

Glauconite. $(K,Na)(Fe,Al,Mg)_2(Si,Al)_4O_{10}(OH)_2$. H = 2. Greyish, bluish, or yellowish-green fine platy aggregates. Commonly occurs in sedimentary rocks. Mica group.

Gmelinite. $(Na_2,Ca)Al_2Si_4O_{12}{\bullet}6H_2O$. H = 4.5. Colourless, white, light yellow, green, or pink striated tabular, pyramidal, or rhombohedral crystals. Transparent, vitreous. Occurs in basalt and other igneous rocks. Zeolite group.

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

Godlevskite. $(Ni,Fe)_7S_6$. Light yellow, metallic. Occurs as microscopic grains and aggregates associated with nickel and copper ores.

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

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

Gossan. Rusty oxidation product consisting of hydrated iron oxides derived from the weathering of pyrite and pyrrhotite. Commonly occurs as an outcrop of the upper zone of pyrite-bearing veins.

Götzenite. $Na_2Ca_5Ti(Si_2O_7)_2F_4$. Light yellowish-brown to colourless radiating acicular aggregates. Vitreous lustre. Rare mineral, difficult to identify in the hand specimen. Occurs with pectolite, natrolite, apophyllite at Mount Saint-Hilaire, Quebec.

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

Granite gneiss. Gneiss having the mineral composition of granite.

Granite pegmatite. Pegmatite having the mineral composition of granite.

Granodiorite. A coarse-grained igneous rock with composition intermediate between granite and diorite.

Graphic granite. A granitic rock composed of a regular intergrowth of quartz and K-feldspar producing a geometric pattern resembling hieroglyphic writing. An attractive ornamental stone.

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

Greenockite. CdS. H = 3–3.5. Yellow earthy coating; rarely as pyramidal crystals. Resinous to adamantine lustre. Associated with sphalerite. Dissolves in HCl giving strong H_2S odour.

Greenstone. A metamorphosed volcanic rock composed mainly of chlorite.

Greywacke. Sedimentary rock containing large amounts of amphibole or pyroxene and feldspar.

Grossular. $Ca_3Al_2(SiO_4)_3$. H = 6.5–7. Colourless, white, yellow, pink, orange, brown, red, black, or green, transparent to opaque, dodecahedral or trapezohedral crystals; massive granular. Vitreous lustre. Occurs in metamorphosed limestone and skarn zones with other calcium silicates. Transparent varieties are used as a gemstone. Garnet group.

Groutite. $MnO(OH)$. H = 5.5. Black, lustrous, acicular, prismatic, wedge-shaped crystals. Associated with other manganese minerals.

Gudmundite. FeSbS. H = 6. Light to dark grey, metallic, elongated, striated prismatic crystals; also massive, lamellar. Light bronze when tarnished. Not readily distinguishable from other grey metallic sulphides in the hand specimen.

Gunningite. $ZnSO_4 \bullet H_2O$. H = 2.5. White powder occurring as an efflorescence on sphalerite from which it has oxidized. First described from the Keno Hill, Yukon Territory, deposits, and named for Dr. H.C. Gunning, a former geologist with the Geological Survey of Canada and later head of the Geology Department, University of British Columbia.

Gustavite. $PbAgBi_3S_6$. Dark grey, metallic, tabular grains. Rare mineral associated with bismuth-lead-silver sulphosalt minerals.

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

Gyrolite. $NaCa_{16}(Si_{23}Al)O_{60}(OH)_5 \bullet 15H_2O$. H = 3–4. Colourless to white concretions with a radiating internal structure. Vitreous lustre. Associated with zeolite minerals in cavities in basalt. Zeolite group.

Hackmanite. $Na_8Al_6Si_6O_{24}Cl_2S$. H = 6. Light violet to bluish-violet, massive. Fades on exposure to sunlight. Vitreous to greasy lustre. Fluoresces yellow when exposed to ultraviolet rays. Variety of sodalite.

Halite. NaCl. H = 2.5. Colourless, white, grey, yellow, or blue, transparent to translucent vitreous crystals (cubes), or granular masses. May be fluorescent. Water soluble. Occurs in sedimentary rocks, in springs, seas, and salt lakes, and in dried inland lake basins. Used for the production of sodium, chlorine, hydrochloric acid, and in natural state as table salt.

Halotrichite. $FeAl_2(SO_4)_4 \bullet 22H_2O$. H = 1.5. White hair-like crystals; spherical aggregates. Vitreous lustre. Astringent taste. Secondary mineral formed by weathering of pyrite.

Harmotome. $(Ba,K)_{1-2}(Si,Al)_8O_{16} \bullet 6H_2O$. H = 4.5. Colourless, white, grey, yellow, pink, or brown cruciform penetration twins or radiating aggregates. Transparent to translucent, vitreous. Occurs in basalt and other igneous rocks. Zeolite group.

Hatchettolite. H = 4. Amber to black irregular masses. Occurs with radioactive zircon (cyrtolite) in pegmatite. Not a valid mineral name. Accepted name is 'uranpyrochlore'.

Hauchecornite. $Ni_9Bi(Sb,Bi)S_8$. H = 5. Light yellow, metallic, tarnishing to dark bronze; tabular, bipyramidal, prismatic crystals. Conchoidal fracture. Black streak. Occurs in nickel-bismuth ores.

Hausmannite. Mn_3O_4. H = 5.5. Brownish-black, greasy to submetallic, fine grained massive. Associated with other manganese minerals and difficult to distinguish from them in the hand specimen. Ore of manganese.

Hawleyite. CdS. Bright yellow powdery coating; earthy. Associated with sphalerite and siderite. First described from the lead-silver-zinc deposit at the Hector-Calumet mine, Elsa, Yukon Territory. Named for Professor J.E. Hawley, Queen's University, Kingston.

Heazlewoodite. Ni_3S_2. H = 4. Yellow, metallic; massive, granular, or platy aggregates. Distinguished from pyrite by its inferior hardness.

Hedenbergite. $CaFeSi_2O_6$. H = 6. Green to black short prismatic crystals or massive. Translucent to opaque; vitreous to dull. Monoclinic variety of pyroxene.

Hellandite. $(Ca,Y)_6(Al, Fe)Si_4B_4O_{20}(OH)_4$. H = 5.5. Red to brown tabular, prismatic crystals. Occurs with tourmaline and rare-earth minerals in granite pegmatite.

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

Hemimorphite (Calamine). $Zn_4Si_2O_7(OH)_2•H_2O$. H = 5. White, brownish, light 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.

Hemloite. $(As,Sb)_4(Ti,Fe,V,Al)_{24}(O,OH)_{48}$. Black, metallic to submetallic, with black streak. Occurs as grains associated with rutile, molybdenite, titanite, pyrite, sphalerite, arsenopyrite, vanadian muscovite, microcline, and quartz in the Hemlo gold deposit, the type locality. Named for the locality.

Hessite. Ag_2Te. H = 2–3. Grey, metallic, finely granular, massive. Sectile. Occurs with native gold and with other tellurides in vein deposits.

Heterogenite. CoO(OH). H = 3–4. Black to dark brown, reddish globular or reniform masses with conchoidal fracture. Alteration product of smaltite.

Heulandite. $(Na,Ca)_{2-3}Al_3(Al,Si)_2Si_{13}O_{36}•12H_2O$. H = 3–4. Colourless, white, pink, or orange tabular crystals. Vitreous or pearly lustre. Distinguished from other zeolites by its crystal form.

Hexahydrite. $MgSO_4•6H_2O$. Colourless, white, finely fibrous, columnar; also globular encrustations. Pearly to vitreous lustre. Bitter, saline taste. Occurs sparingly as an alteration product of epsomite. Originally found at a Bonaparte River locality in British Columbia. Associated with other sulphates from which it is not readily distinguished.

Hibschite. $Ca_3Al_2(SiO_4)_{3-x}(OH)_{4x}$. H = 6. Colourless, light yellow, or greenish-white octahedral crystals (minute), or massive. Vitreous to greasy lustre. Uncommon mineral, not readily identifiable in hand specimen. Garnet group.

Hilairite. $Na_2ZrSi_3O_9•3H_2O$. H = +4. Very small, trigonal, light brown, transparent crystals, and pink, porcelain-like, opaque crystals. Associated with analcime, natrolite, microcline, catapleiite, elpidite, aegirine, and chlorite in nepheline syenite at Mount Saint-Hilaire, Quebec, the type locality for which the mineral was named.

Hilgardite. $Ca_2B_5O_9Cl•H_2O$. H = 5. Colourless, transparent, tabular crystals. Vitreous lustre. Occurs in salt deposits and in gypsum or anhydrite deposits.

Hiortdahlite. $(Ca,Na)_3(Zr,Ti)Si_2O_7(O,F)_2$. H = 5.5. Yellow to brown tabular crystals. Translucent to transparent; vitreous. Occurs in alkalic igneous rocks.

Hisingerite. $Fe_2Si_2O_5(OH)_4•2H_2O$. H = 3. Black to brownish-black, compact, massive with conchoidal fracture. Greasy to dull lustre. Alteration product of iron-bearing minerals.

Hochelagaite. $(Ca,Na,Sr)Nb_4O_{11}•8H_2O$. H ~ 4. White microscopic globules composed of radiating blades. Vitreous lustre. Occurs on crystals of weloganite, calcite, and quartz at the Francon quarry, Montréal, the type locality. Indistinguishable from franconite in the hand specimen. Named for Hochelaga, the original name for Montréal.

Hollingworthite. (Rh,Pt,Pd)AsS. H = 6. Grey, metallic grains intergrown with platinum minerals such as sperrylite.

Holmquistite. $Li_2(Mg,Fe)_3Al_2Si_8O_{22}(OH)_2$. H = 5–6. Violet to light blue prismatic, acicular to fibrous aggregates; also massive. Transparent to translucent with vitreous lustre. Associated with lithium-rich pegmatite occurring in wall rock. Orthorhombic member of amphibole.

Hornblende. $Ca_2(Fe,Mg)_4Al(Si_7Al)O_{22}(OH,F)_2$. H = 6. Dark green, brown, or black prismatic crystals, or massive. Vitreous lustre. Common rock-forming mineral. Monoclinic variety of amphibole.

Howlite. $Ca_2B_5SiO_9(OH)_5$. H = 3.5. Colourless to white, vitreous, granular masses; transparent elongated tabular crystals; compact nodular masses. Crystals distinguished from selenite by superior hardness. Occurs in sedimentary rocks. Named after Henry How, Nova Scotia mineralogist who first described it in 1868.

Humite. $(Mg,Fe)_7(SiO_4)_3(F,OH)_2$. H = 6–6.5. Yellow to orange, granular or massive. Vitreous to resinous lustre. Difficult to distinguish from other members of the humite group (chondrodite, norbergite, clinohumite). Occurs in crystalline limestone.

Hydroboracite. $CaMgB_6O_8(OH)_6•3H_2O$. H = 2–3. Colourless, transparent, vitreous, prismatic crystals; white fibrous masses with silky lustre. Occurs in salt and borate deposits. Soluble in acids.

Hydrocarbon. Naturally occurring compounds of carbon and hydrogen such as paraffin, and compounds of carbon, hydrogen, and oxygen such as amber, petroleum, coal. Compounds are of organic origin and are not classified as minerals.

Hydrocerussite. $Pb_3(CO_3)_2(OH)_2$. H = 3.5. Tiny colourless to white or grey hexagonal scales and plates. Transparent to translucent with adamantine or pearly lustre. Associated with cerussite from which it is not readily distinguished. Alteration product of lead, galena.

Hydrodresserite. $BaAl_2(CO_3)_2(OH)_4•3H_2O$. H = 3–4. White spheres and hemispheres (2 to 4 mm across) composed of radiating blades. Translucent to opaque. Dehydrates to dresserite from which it cannot be distinguished in hand specimen. Effervesces in HCl. Occurs with quartz, dawsonite, and weloganite at the Francon quarry, Montréal, the type locality. Named for its chemical relationship to dresserite.

Hydromagnesite. $Mg_5(CO_3)_4(OH)_2•4H_2O$. H = 3.5. Colourless or white, transparent, flaky, acicular, or bladed crystals, aggregates forming tufs, rosettes, or encrustations; also massive. Vitreous, silky, or pearly lustre. Associated with serpentine, brucite, magnesite. Effervesces in acids. Distinguished from calcite by its habit.

Hydronepheline. Pink to orange-red nodular or irregular patches in nepheline syenite. Not a valid species. In the Bancroft, Ontario, area, what was referred to as 'hydronepheline' is natrolite.

Hydrotalcite. $Mg_6Al_2(CO_3)(OH)_{16}•4H_2O$. 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.

Hydroxylbastnaesite. (Ce,La)(CO_3)(OH,F). H = 4. Yellow to brown, pinkish-brown, or dark green, opaque, irregular to reniform masses. Waxy, greasy, or resinous lustre. Associated with other rare-earth minerals.

Hydrozincite. $Zn_5(CO_3)_2(OH)_6$. H = 2–2.5. White to grey, yellowish, brownish, or pinkish, fine- grained, compact to earthy or gel-like masses; also stalactitic, reniform, pisolitic, concentrically banded, or radially fibrous aggregates; flat, blade-like crystals. Dull, silky, or pearly lustre. Fluoresces light blue or light violet in ultraviolet light. Secondary mineral found in oxidized zones in zinc deposits.

Hypersthene. $(Mg,Fe)_2Si_2O_6$. H = 6. Brown to blackish-brown prismatic crystals or granular to cleavable masses. May have a bronze lustre (bronzite). Occurs in anorthosite, peridotite, and pyroxenite. Intermediate member of the orthorhombic enstatite-ferrosilite series, pyroxene group. Bronze variety used as a gemstone.

Igneous. Said of rocks that have crystallized from magma or from the melting of other rocks; usually composed of feldspar, quartz, and hornblende, pyroxene, or biotite.

Ilesite. (Mn,Zn,Fe)SO_4•$4H_2O$. Green to white, loose prismatic crystal aggregates. A secondary mineral formed by oxidation in sulphide veins.

Illite. $(K,H_3O)(Al,Mg,Fe)_2(Si,Al)_4O_{10}(OH)_2$•$H_2O$. H = 1-2. White, finely micaceous to clay-like. Dull lustre. Perfect cleavage. Mica-clay mineral.

Ilmenite. $FeTiO_3$. H = 5–6. Black, metallic to submetallic. Compact or granular massive; thick tabular crystals. Black streak distinguishes it from hematite. Ore of titanium.

Ilmenomagnetite. Titanium-bearing magnetite containing ilmenite in exsolution. Not a valid mineral name.

Ilmenorutile. $(Ti,Nb,Fe)_3O_6$. H = 6. Black to greenish-black plates, rosettes. Opaque; velvety to submetallic lustre. Occurs in dawsonite, calcite at the Francon Quarry, Montréal.

Insizwaite. $Pt(Bi,Sb)_2$. Metallic grains and massive. Associated with pentlandite, chalcopyrite, and nickel and platinum minerals.

Inyoite. $Ca_2B_6O_6(OH)_{10}$•$8H_2O$. H = 2. Colourless, transparent, prismatic to tabular crystals; granular massive. Vitreous lustre. Occurs in gypsum and borate deposits. Soluble in dilute acids and in hot water.

Irarsite. (Ir,Ru,Rh,Pt)AsS. Black, metallic, massive. Associated with platinum minerals.

Iridosmine. (Os,Ir). H = 6–7. Light grey, metallic, tabular, or rarely, short prismatic crystals; flakes, flattened grains. Perfect cleavage. Associated with gold and platinum in placer deposits.

Iron. Fe. H = 4. Dark grey to greyish-black metallic blebs, or massive. Malleable and magnetic. Soluble in dilute HCl and in acetic acid. Occurs in meteorites. Terrestrial native iron (uncommon) occurs in volcanic rocks.

Iron-formation. Metamorphosed sediment containing iron minerals and silica.

Ixiolite. $(Ta,Nb,Sn,Fe,Mn)_4O_8$. H = 6–6.5. Grey, metallic, prismatic crystals. Occurs in granite pegmatite.

Jade. Term used for two gemstones, nephrite and jadeite.

Jamesonite. $Pb_4FeSb_6S_{14}$. H = 2.5. Dark grey, metallic, acicular, fibrous, columnar, or plumose aggregates commonly striated. Iridescent tarnish. Decomposes in HNO_3. Occurs in veins with other lead sulphosalts and sulphides.

Jarosite. $KFe_3(SO_4)_2(OH)_6$. H = 2.5–3.5. Yellow to brownish pulverulent coating associated with iron-bearing rocks and with coal. Distinguished from iron oxides by giving off SO_2 when heated.

Jasper. An opaque, dark red to brown, yellow, green, or light violet variety of chalcedony. Used as an ornamental stone and as a gemstone.

Jaspilite. A rock consisting of alternating bands of red jasper and iron oxides. An attractive ornamental rock.

Joaquinite. $Ba_2NaCe_2Fe(Ti,Nb)_2Si_8O_{26}(OH,F)_2$. H = 5.5. Yellow to brown tabular or stubby pyramidal crystals. Transparent to translucent; vitreous. Occurs with aegirine and microcline in cavities in breccia at Mount Saint-Hilaire, Quebec. Rare mineral.

Junoite. $Pb_3Cu_2Bi_8(S,Se)_{16}$. Metallic grains (up to 0.5 mm across) associated with chalcopyrite, sphalerite, colbaltite, kesterite, and mawsonite in the Kidd Creek mine, Timmins, Ontario.

Kaersutite. $NaCa_2(Mg,Fe)_4Ti(Si_6Al_2)O_{22}(OH)_2$. H = 5–6. Dark brown to black short prismatic crystals, or massive. Translucent to opaque; vitreous to resinous. Occurs in volcanic rocks. Amphibole group.

Kainosite (cenosite). $Ca_2(Y,Ce)_2Si_4O_{12}(CO_3){\bullet}H_2O$. H = 5–6. Yellow to brown, colourless, or pink prismatic crystals. Transparent, vitreous. Occurs in igneous rocks.

Kaolinite. $Al_2Si_2O_5(OH)_4$. H = 2. White, greyish, yellowish, or brownish earthy masses. Dull lustre. Clay mineral formed chiefly by decomposition of feldspars. Becomes plastic when wet. Used as a filler (in paper) and in the manufacture of ceramics.

Karpinskyite. Mixture of leifite [$Na_2(Si,Al,Be)_7(O,OH,F)_{14}$] and zinc-bearing montmorillonite. Not a valid mineral name.

Kasolite. $Pb(UO_2)SiO_4{\bullet}H_2O$. H = 4–5. Yellow, greenish-yellow, or brown, finely granular; also minute prismatic crystals. Dull to resinous lustre. Radioactive. Soluble in acids. Associated with uraninite and secondary radioactive minerals from which it is not easily distinguished in the hand specimen.

Kermesite. Sb_2S_2O. H = 1–1.5. Red hair-like or tufted radiating aggregates of lath-shaped crystals. Translucent with adamantine to semimetallic lustre. Sectile. Alteration product of stibnite. Colour and habit are characteristic. Minor ore of antimony.

Kesterite. $Cu_2(Zn,Fe)SnS_4$. H = 4.5. Greenish black, opaque, massive. Associated with sulphide minerals. Related structurally to stannite.

K-feldspar. $KAlSi_3O_8$. H = 6. Potassium feldspar includes sanidine (colourless), orthoclase (white, pink), and microcline (white, pink, green).

Kiddcreekite. Cu_6SnWS_8. Microscopic metallic irregular grains. Originally found intimately associated with scheelite, clausthalite, tennantite, and tungstenite in a bornite zone in the Kidd Creek mine, Timmins, Ontario. Named for the locality. Identified by microscopic examination of polished surfaces.

Kieserite. $MgSO_4 \bullet H_2O$. H = 3.5. White, granular, massive. Occurs in salt deposits. Dissolves slowly in water.

Kimberlite. Porphyritic igneous rock composed mainly of serpentinized olivine and chloritized phlogopite forming phenocrysts and the fine-grained matrix enclosing them. Common host rock for diamond.

Klockmannite. CuSe. H = 2–3. Grey, metallic, tarnishing to bluish black. Granular aggregates; tabular. Associated with other selenides in ore deposits.

Kornerupine. $Mg_4(Al,Fe)_6(Si,B)_4O_{21}(OH)$. H = 6.5. Yellow, brown, red, blue, and green elongated prisms; also fibrous and columnar. Vitreous lustre. Transparent. Occurs in metamorphic rocks. Transparent variety used as a gemstone.

Kotulskite. Pd(Te,Bi). Metallic minute grains intergrown with chalcopyrite and platinum-group minerals. Identified by microscopic examination of polished surfaces.

Krennerite. $AuTe_2$. H = 2–3. Light grey to yellow, metallic, prismatic, striated crystals. Occurs with other gold tellurides and with native gold in vein deposits.

Kyanite. Al_2SiO_5. H = 4–5, 6–7. Blue, green, greyish-blue, long, bladed crystals and bladed masses. Vitreous to pearly lustre. Hardness is 4 to 5 along the length of the crystal and 6 to 7 across it. Occurs in schist and gneiss. Colour and varied hardness are distinguishing characteristics. Used in the manufacture of mullite refractories.

Labradorite. $(Ca,Na)(Al,Si)AlSi_2O_8$. H = 6. Grey, vitreous, transparent to translucent. Commonly exhibits blue, green, yellow, or bronze iridescence and is used as a gemstone. Chief constituent of anorthosite and gabbro. Named for Labrador. Variety of plagioclase feldspar.

Labuntsovite. $(K,Ba,Na)(Ti,Nb)(Si,Al)_2(O,OH)_7 \bullet H_2O$. H = 6. Pink, orange, red, or brownish-yellow prismatic, acicular crystals. Perfect cleavage. Occurs in nepheline syenite at Mount Saint-Hilaire, Quebec.

Laitakarite. $Bi_4(Se,S)_3$. H = soft. Grey, metallic, foliated plates and sheets to 2 mm across. Associated with junoite in the bornite zone at the Kidd Creek mine, Timmins, Ontario.

Lamprophyre. A dark porphyritic igneous rock with hornblende, pyroxene, and biotite forming phenocrysts in a fine-grained matrix composed of the same mafic minerals.

Langisite. (Co,Ni)As. Pinkish, light brown, metallic. Occurs as grains, lamellae in safflorite. Named for the Langis mine, Cobalt, Ontario, where it was orignally found.

Langite. $Cu_4(SO_4)(OH)_6 \bullet 2H_2O$. H = 2.5–3. Transparent tiny blue 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 the hand specimen.

Lapieite. $CuNiSbS_3$. H = 4–5. Grey, metallic, microscopic grains associated with pyrite, polydymite, gersdorffite, and millerite in a matrix consisting of quartz with altered spinel, magnesite, and bright green mica. Named for the Lapie River, Yukon Territory, which was named for an Indian guide to explorer Robert Campbell.

Larosite. $(Cu,Ag)_{21}(Pb,Bi)_2S_{13}$. Whitish, light brown, acicular crystals associated with chalcocite, stromeyerite in silver-copper ores. Originally found in the Foster mine, Cobalt, Ontario. Named for Mr. Fred LaRose, one of the discoverers of silver-cobalt ore in Cobalt.

Latite. A porphyritic igneous rock consisting of approximately equal amounts of plagioclase and K-feldspar phenocrysts, with little or no quartz, in a fine-grained to glassy matrix.

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.

Lava. Rock resulting from a volcanic eruption; also referred to as volcanic rock.

Lavenite. $(Na,Ca)_2(Mn,Fe)(Zr,Ti)Si_2O_7(O,OH, F)_2$. H = 6. Yellow to dark brown or brownish-red, prismatic, fibrous, acicular aggregates, or massive. Translucent; vitreous to greasy or dull lustre. Occurs in alkalic igneous rocks.

Lazulite. $MgAl_2(PO_4)_2(OH)_2$. H = 5.5–6. Blue pyramidal or tabular crystals; massive. Vitreous lustre. Soluble in hot acids. Transparent variety used as a gemstone.

Lead. Pb. H = 1.5. Grey, metallic, platy, dendritic, rounded masses; less commonly octahedral, dodecahedral, or cubic crystals. Malleable and ductile. Rare mineral occurring in various rock environments and in placer deposits. Decomposes readily in HNO_3.

Leadhillite. $Pb_4(SO_4)(CO_3)_2(OH)_2$. H = 2.5–3. Colourless, white, light blue to green tabular or prismatic crystals, or granular massive. Secondary lead mineral associated with galena and other lead minerals. Soluble in HNO_3. Exfoliates in hot water.

Lemoynite. $(Na,Ca)_3Zr_2Si_8O_{22}•8H_2O$. H = 4. White or yellowish-white, minute, prismatic crystals, spheres. Occurs in nepheline syenite associated with microcline at Mount Saint-Hilaire, Quebec, the type locality. Named for Charles Lemoyne and his sons, seventeenth century explorers of New France.

Leonhardtite. Not a valid mineral name. Renamed starkeyite.

Lepidocrocite. FeO(OH). H = 5. Reddish-brown, submetallic, scaly or fibrous masses. Characteristic orange streak. Associated with goethite as an oxidation product of iron minerals.

Lessingite. $(Ce,Ca)_5(SiO_4)_3F$. H = 4.5. Colourless, greenish, or reddish yellow. Vitreous lustre. Occurs with allanite, bastnaesite, cerite.

Leucophanite. $(Ca,Na)_2BeSi_2(O,F,OH)_7$. H = 4. Green to greenish-yellow tabular crystals with vitreous lustre. Occurs sparingly in nepheline syenite. Not readily distinguished in the hand specimen.

Leucosphenite. $BaNa_4Ti_2B_2Si_{10}O_{30}$. H = 6.5. Light blue, white prismatic crystals; also tabular. Vitreous lustre. Occurs sparingly in nepheline syenite. Not readily distinguished in the hand specimen.

Leucoxene. A general term for alteration products of ilmenite. Not a valid mineral species.

Levyne. $(Ca,Na_2,K_2)Al_2Si_4O_{12}•6H_2O$. H = 4–4.5. Colourless, transparent, tabular crystals or sheaf-like aggregates; also reddish or yellowish. Vitreous lustre. Occurs in cavities in basalt. Zeolite group.

Liebigite. $Ca_2(UO_2)(CO_3)_3•11H_2O$. H = 2.5–3. Light green, or yellowish-green short prismatic crystals; also scaly, granular, botryoidal aggregates. Transparent to translucent with vitreous to pearly lustre. Fluoresces green in ultraviolet light. Secondary mineral formed in uranium deposits.

Limestone. Soft, white, grey, or greyish-brown sedimentary rock formed by deposition of calcium carbonate. Dolomitic limestone contains varied proportions of dolomite and is distinguished from normal limestone by its weaker (or lack of) effervescence in HCl. Used as a building stone and as road metal. Shell limestone (coquina) is a porous rock composed mainly of shell fragments. Crystalline limestone (marble) is a metamorphosed limestone and is used as a building and ornamental stone, as a filler for paper and paints, for the production of magnesium metal, and as crushed stone.

Limonite. Field term referring to natural hydrous iron oxides. Yellow-brown to dark brown, earthy, porous, ochreous masses; also stalactitic or botryoidal. Secondary product of iron minerals. Not a valid mineral species.

Linnaeite. Co_3S_4. H = 4.5–5.5. Light to dark grey, metallic, tarnishing to copper-red. Octahedral crystals, massive. Decomposed by HNO_3. Uncommon mineral associated with cobalt ores.

Lithiophilite. $LiMnPO_4$. H = 4–5. Yellow, yellowish-brown, brown, pink, cleavable to compact massive; crystals (prismatic) are rare. Transparent to translucent with vitreous to subresinous lustre. Becomes brown, dark grey to black on weathered surfaces. Soluble in acids. Occurs with other lithium and phosphate minerals in granite pegmatite. Forms a series with triphylite.

Lithiophosphate. Li_3PO_4. H = 4. Colourless, white, or pink prismatic crystals, or massive. Vitreous lustre. Perfect cleavage. Occurs with other lithium minerals in granite pegmatite.

Loellingite. $FeAs_2$. H = 5–5.5. Light to dark grey, metallic, prismatic crystals; also pyramidal crystals or massive. Occurs with nickel and cobalt minerals in the Cobalt, Ontario, deposits.

Lokkaite. $CaY_4(CO_3)_7•9H_2O$. White radiating fibrous aggregates; massive. Alteration product of yttrium minerals.

Ludwigite. Mg_2FeBO_5. H = 5. Greenish-black, opaque, longitudinally striated prisms; dull to submetallic lustre. Also fibrous, acicular, or granular masses. Occurs with brucite, serpentine in contact metamorphic zones.

Lyndochite. Th-Ca-Euxenite. H = 6.5. Black, lustrous, flat, prismatic crystals. Conchoidal fracture. Vitreous lustre. Occurs in pegmatite. Named for Lyndoch Township, Ontario. Not a valid mineral species.

Mackinawite. $(Fe,Ni)_9S_8$. H = 2.5. Yellow, metallic; light grey metallic on freshly broken surfaces. Tetragonal, platy, or pyramidal crystals; also massive, finely lamellar aggregates. Associated with sulphide ore minerals.

Mafic. A term describing an igneous rock composed mostly of dark (ferromagnesian) minerals such as amphibole, pyroxene, biotite.

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 and by superior hardness. Used in the manufacture of refractory bricks, cements, flooring, and magnesium metal.

Magnetite. Fe_3O_4. H = 5.5–6.5. Black metallic octahedral, dodecahedral, or cubic crystals; massive granular. Occurs in vein deposits, in igneous and metamorphic rocks, and in pegmatite. Strongly magnetic. Ore of iron.

Malachite. $Cu_2CO_3(OH)_2$. H = 3.5–4. Green granular, botryoidal, earthy masses; usually forms coatings with other secondary copper minerals on copper-bearing rocks. Distinguished from other green copper minerals by effervescence in HCl. Ore of copper.

Manganite. MnO(OH). H = 4. Steel-grey to iron-black, metallic, prismatic striated crystal aggregates; also columnar, fibrous, stalactitic, finely granular. Not readily distinguishable from other black manganese minerals in the hand specimen. Ore of manganese.

Manganocolumbite. $(Mn,Fe)(Nb,Ta)_2O_6$. H = 6. Black, brownish-black tabular crystals. Occurs in granite pegmatite. Forms series with manganotantalite and ferrocolumbite.

Manganotantalite. $MnTa_2O_6$. H = 6–6.5. Brownish-black, tabular, short prismatic crystals, or massive. Dark red streak. Vitreous to resinous lustre. Iridescent on tarnished surfaces. Occurs in granite pegmatite. Columbite group.

Manganous manganite. $Na_4Mn_{14}O_{27}{\bullet}9H_2O$. H = 1.5. Occurs as black to bluish-black, submetallic to dull, fine-grained powdery coating associated with other manganese minerals and hematite. Synonym for birnessite.

Marble. *See* limestone.

Marcasite. FeS_2. H = 6–6.5. Light bronze to grey, metallic, radiating, stalactitic, globular, or fibrous; twinning produces cockscomb and spear shapes. Yellowish to dark brown tarnish. Massive variety is difficult to distinguish from pyrite in the hand specimen.

Mariposite. Bright green. Chrome variety of muscovite. Not a valid mineral name.

Martite. Fe_2O_3. H = 5.5–6.5. Black octahedral crystals. Dull to splendent lustre. Hematite pseudomorphous after magnetite.

Matildite. $AgBiS_2$. H = 2.5. Black to grey, metallic, granular massive; striated indistinct prismatic crystals (rare). Uneven fracture. Occurs intergrown with galena from which it alters. Associated with sulphide minerals in deposits formed at moderate to high temperatures.

Mattagamite. $CoTe_2$. Grey, metallic, with violet to pink tinge. Occurs as microscopic grains and bladed aggregates with altaite, pyrrhotite, and chalcopyrite. Named for Mattagami Lake, Quebec, which is near the mine where it was originally found.

Maucherite. $Ni_{11}As_8$. H = 5. Grey, metallic, with reddish tinge tarnishing to copper-red. Tabular or pyramidal crystals; also massive, granular, or radiating fibrous. Decomposed by acids. Associated with cobalt-nickel ores.

Mawsonite. $Cu_6Fe_2SnS_8$. H = 3.5–4. Metallic microscopic irregular to rounded grains associated with bornite and other copper sulphide minerals.

Mckelveyite. $Ba_3Na(Ca,U)Y(CO_3)_6{\bullet}3H_2O$. Green, yellowish-green, or yellow crystal aggregates or platy crystals. Occurs with donnayite, natrolite, microcline in carbonate cavities at Mount Saint-Hilaire, Quebec.

Mckinstryite. $(Ag,Cu)_2S$. Steel grey, metallic, becoming black on exposure to air. Associated with silver ore minerals. Originally found in the Foster mine, Cobalt, Ontario.

Melaconite. CuO. Dull powdery coatings or masses; lustrous, resembling coal; reniform or colloform masses. Soluble in HCl or HNO_3. Known as 'copper pitch ore'. Name changed to tenorite.

Melanterite. $FeSO_4•7H_2O$. H = 2. Greenish-white to green or 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.

Melilite. $(Ca,Na)_2(Mg,Fe,Al)(Al,Si)O_7$. H = 5. White, light yellow, greenish; square or octagonal prisms. Vitreous to resinous lustre. Conchoidal to uneven fracture. Difficult to identify in the hand specimen.

Melonite. $NiTe_2$. H = 1–1.5. Reddish-white, metallic, tarnishing to brown. Tiny hexagonal plates or lamellae. Dark grey streak. Perfect cleavage. Occurs with sulphides and other tellurides in nickel-copper deposits.

Meneghinite. $Pb_{13}Sb_7S_{24}$. H = 2.5. Blackish-grey, metallic. Slender, striated prismatic crystals, fibrous, massive. Oxidized by HNO_3. Associated with sulphides and sulphosalts.

Merenskyite. $(Pd,Pt)(Te,Bi)_2$. Minute metallic grains intergrown with platinum minerals. Distinguished from associated minerals by microscopic examination of polished surfaces.

Mertieite. $Pd_{11}(Sb,As)_4$. Yellow metallic grains, massive. Sparingly associated with platinum minerals.

Mesolite. $Na_2Ca_2Al_6Si_9O_{30}•8H_2O$. H = 5. Colourless or white acicular crystals and radiating aggregates; as tufts. Vitreous lustre. Generally associated with other zeolites in amygdaloidal basalt and distinguished from them by X-ray methods.

Metagabbro. A metamorphosed gabbro.

Metamict mineral. Mineral rendered amorphous by the destruction of its crystal structure by radiation from radioactive elements it contains. Zircon and allanite may be metamict.

Metasedimentary rock. Metamorphosed sedimentary rock.

Metavolcanic rock. Metamorphosed volcanic rock.

Miargyrite. $AgSbS_2$. H = 2.5. Black to dark grey, metallic, striated tabular crystals; massive. Red streak. Occurs with other silver sulphosalts and with sulphide minerals in low-temperature hydrothermal veins.

Mica. A mineral group of hydrous aluminum silicates characterized by sheet-like platy structure producing perfect basal cleavage. Muscovite, biotite, and phlogopite are common members of this group.

Michenerite. (Pd,Pt)BiTe. H = 2.5. Greyish-white, metallic, minute grains; massive. Black streak. Associated with gold, platinum, and bismuth minerals. Originally described from the Frood mine, Sudbury, Ontario, and named in honour of geologist C.E. Michener who discovered the mineral.

Microcline. $KAlSi_3O_8$. H = 6. White, pink to red, or green (amazonite) crystals or cleavable masses. Distinguished from other feldspars by X-ray diffraction and chemical analysis. Triclinic member of K-feldspar.

Microlite. $(Ca,Na)_2Ta_2O_6(O,OH,F)$. H = 5–5.5. Yellow to brown, reddish octahedral crystals, grains, or massive. Translucent to opaque with vitreous lustre. Occurs with lithium minerals in granite pegmatite.

Micropegmatite. A granitic rock composed of an irregular microscopic intergrowth of quartz and K-feldspar. Synonym of granophyre.

Millerite. NiS. H = 3–3.5. Light brass-yellow, slender, elongated, striated crystals; acicular radiating or hair-like aggregates. Grey iridescent tarnish. Distinguished from pyrite by its crystal form and its inferior hardness. Ore of nickel.

Minium. Pb_3O_4. H = 2.5. Bright red to brownish-red, earthy, pulverulent masses with greasy to dull lustre. Orange-yellow streak. Affected by HCl and HNO_3. Secondary mineral formed by alteration of galena, cerussite.

Miserite. $K(Ca,Ce)_6Si_8O_{22}(OH,F)_2$. H = 5.5–6. Pink to light violet fibrous, scaly, or cleavable masses. Vitreous or pearly lustre. Associated with wollastonite, eudialyte, scapolite.

Mixite. $BiCu_6(AsO_4)_3(OH)_6 \bullet 3H_2O$. H = 3–4. Green acicular crystals with brilliant lustre; hair-like tufts; compact spherical masses. Occurs in copper and bismuth deposits.

Molybdenite. MoS_2. H = 1–1.5. Dark bluish-grey, metallic, tabular, foliated, scaly aggregates or hexagonal crystals; also massive. Sectile with greasy feel. Distinguished from graphite by its bluish-lead-grey colour and by its streak (greenish on porcelain, bluish grey on paper). Ore of molybdenum.

Molybdite. MoO_3. Very soft, yellow, fibrous or earthy crusts or coatings. Secondary mineral formed by alteration of molybdenite.

Molybdomenite. $PbSeO_3$. H = 3.5. Colourless to white, yellowish-white scaly aggregates. Pearly to greasy lustre. Occurs with clausthalite from which it forms.

Monadnock. A residual hill or mountain rising conspicuously above a peneplain having resisted the long erosion that produced the plain.

Monazite. $(Ce,La,Nd,Th)PO_4$. H = 5–5.5. Yellow, reddish-brown, or brown equant or flattened crystals and grains. Resinous to vitreous lustre. Radioactive. Resembles zircon, but it is not as hard. Distinguished from titanite by its superior hardness and radioactivity. Occurs in granitic rocks. Ore of thorium.

Montbrayite. $(Au,Sb)_2Te_3$. H = 2.5. Greyish-white to yellowish-white, metallic. Occurs as intergrowths with other telluride minerals, chalcopyrite, and native gold. Distinguishable from other metallic minerals only by microscopic examination of polished surfaces. Originally found in the Robb-Montbray mine, Montbray Township, near Arntfield, Quebec. Named for the type locality.

Monteregianite. $(Na,K)_6(Y,Ca)_2Si_{16}O_{38} \bullet 10H_2O$. H = 3.5. Colourless, white, grey, rarely light violet or light green. Transparent; vitreous to silky lustre. Acicular radiating or tabular crystals. Occurs in cavities in nepheline syenite at Mount Saint-Hilaire, Quebec, the type locality, where it is associated with calcite, pectolite, microcline, albite, aegirine, arfvedsonite. Named for the Monteregian Hills, Quebec, igneous monadnocks protruding from Ordovician limestone; Mount Saint-Hilaire is one of the Monteregian Hills.

Monticellite. $CaMgSiO_4$. H = 5. Colourless, grey, small prismatic crystals or grains. Vitreous lustre. Occurs in calcite and crystalline limestone. Related to the olivine group. Not readily identifiable in the hand specimen.

Montmorillonite. $(Na,Ca)_{0.3}(Al,Mg)_2Si_4O_{10}(OH)_2$•$nH_2O$. H = 1–2. White, grey, greenish, yellowish, flaky or finely granular massive. Waxy to dull lustre; opaque. Expands with absorption of water, becoming viscose, gelatinous.

Montroyalite. $Sr_4Al_8(CO_3)_3[(OH),F]_{26}$•10–11$H_2O$. H = 3.5. White, translucent, distorted spheres (1 mm across) with bumpy to botryoidal surface. Dull lustre. Soluble in HCl. Fluoresces white in ultraviolet light. Occurs on platy albite and quartz lining of cavities in silicocarbonatite sill at the Francon quarry, Montréal, the type locality. Named after Mont Royal, the name given by Jacques Cartier to Mount Royal from which the name Montréal is derived.

Moorhouseite. $(Co,Ni,Mn)SO_4$•$6H_2O$. H = 2.5. Pink, powdery, with vitreous lustre and white streak. Occurs as coatings on barite-siderite-sulphide specimens. Soluble in water. Originally described from the Magnet Cove barite mine, Walton, Nova Scotia, and named in honour of W. Wilson Moorhouse, professor of geology, University of Toronto.

Mordenite. $(Ca,Na_2,K_2)Al_2Si_{10}O_{24}$•$7H_2O$. H = 3–4. White, pink, or reddish tabular crystals; also as spheres or nodules with compact fibrous structure. Crystal form is not easily distinguished from other zeolites; compact fibrous structure is characteristic. Named for Morden, Nova Scotia, where it was first found.

Morenosite. $NiSO_4$•$7H_2O$. H = 2–2.5. Light green to greenish-white fibrous encrustations; stalactitic. Generally translucent to opaque. Vitreous to dull lustre. Astringent metallic taste. Soluble in water. Secondary mineral formed by oxidation of nickel sulphide minerals.

Mosandrite. Alteration product of rinkite. Not a valid mineral name.

Mudstone. Hardened mud-like sediment composed chiefly of clay minerals.

Muscovite. $KAl_2(Si_3Al)O_{10}(OH,F)_2$. H = 2–2.5. Colourless or light green, grey, brown; transparent with splendent or pearly lustre. Tabular hexagonal crystals, sheet-like, platy, or flaky aggregates. Occurs in pegmatite. Constituent of granitic and metamorphic rocks. Sericite is a white, silky, fine, scaly aggregate of muscovite that occurs as an alteration of minerals such as topaz, kyanite, feldspar, spodumene, and andalusite. Used as electrical and heat insulator; in cosmetics, paints, and wallpaper to produce a pearly lustre; in the manufacture of simulated pearls; as a filler for plastics.

Mylonite. Chert-like rock with streaky, banded, or flow structure.

Nacrite. $Al_2Si_2O_5(OH)_4$. H = 2–2.5. White thin tabular crystals; scaly or granular massive. Silky to earthy lustre. Kaolinite group.

Nahcolite. $NaHCO_3$. H = 2.5. Colourless, white prismatic crystals; fibrous, concretionary; fibrous, porous masses. Transparent to translucent; vitreous to resinous. Associated with sodium chloride, carbonate, borate, and sulphate minerals.

Narsarsukite. $Na_2(Ti,Fe)Si_4(O,F)_{11}$. H = 7. Yellow tabular or short prismatic crystals. Vitreous lustre. Weathers to brownish grey or brownish yellow. Rare mineral occurring in nepheline syenite and pegmatite.

Natrojarosite. $NaFe_3(SO_4)_2(OH)_6$. H = 3. Yellow to brownish-yellow, earthy, minute tabular crystals. Dull lustre. Secondary mineral formed from alteration of iron minerals such as pyrite, marcasite.

Natrolite. $Na_2Al_2Si_3O_{10}$•$2H_2O$. H = 5. Colourless, white, reddish needle-like crystals often forming radiating or nest-like aggregates; also nodular or slender prisms. Vitreous to pearly lustre. May be distinguished from other zeolites by its acicular habit. Occurs with other zeolite minerals in amygdaloidal basalt and in some igneous rocks.

Naumannite. Ag_2Se. H = 2.5. Dark grey to black, metallic, tarnishing to iridescent brown. Granular massive, platy; cubic crystals. Associated with copper minerals and gold in vein deposits.

Nemalite. A fibrous variety of brucite.

Nenadkevichite. (Na,Ca)(Nb,Ti)Si_2O_7•$2H_2O$. H = 5. Dark brown to pink foliated masses. Opaque; dull lustre. Occurs in alkalic igneous rocks.

Nepheline. (Na,K)$AlSiO_4$. H = 6. White to grey irregular masses, less commonly as hexagonal prisms. Greasy to vitreous lustre. Distinguished from feldspar and scapolite by its greasy lustre and by its gelatinizing in HCl. Used in the manufacture of glass and ceramics.

Nephrite. $Ca_2(Fe,Mg)_5Si_8O_{22}(OH)_2$. H = 6. Dense, compact, fibrous variety of tremolite-actinolite group. Green to black, grey, white. Occurs in metamorphic rocks, peridotite, or serpentinite. Very tough. Nephrite is one variety of jade used as a gemstone and as an ornamental stone; another variety is jadeite.

Neptunite. $KNa_2Li(Fe,Mn)_2Ti_2Si_8O_{24}$. H = 5–6. Black, dark red, prismatic crystals. Vitreous lustre. Occurs in nepheline syenite. Rare mineral.

New mineral. A mineral approved by the Commission on New Minerals and New Mineral Names of the International Mineralogical Association upon determining that the mineral's physical, structural, optical, and chemical properties are distinct from those of any known mineral. The proposed name of the new mineral must also be approved.

Niccolite. *See* nickeline.

Nickel bloom. Term used by miners for annabergite.

Nickeline. NiAs. H = 5–5.5. Copper-coloured to pinkish coppery, metallic, massive, reniform with columnar structure; crystals (tabular, pyramidal) rare. Exposed surfaces alter readily to annabergite. Occurs in veins with cobalt arsenides and native silver. Colour is distinctive. Formerly known as 'niccolite'.

Niggliite. PtSn. H = 3. Silver-white, metallic, minute grains. Associated with platinum and palladium minerals.

Niocalite. $Ca_{14}Nb_2(Si_2O_7)_4O_6F_2$. H = 6. Yellow prismatic crystals with vitreous lustre; also massive granular. Occurs commonly as twinned crystals. Associated with other niobium minerals. Granular variety resembles apatite, but is harder. Originally found in the niobium deposit at Oka, Quebec; named for the elements niobium and calcium.

Norbergite. $Mg_3(SiO_4)(F,OH)_2$. H = 6–6.5. Yellow to orange, transparent to translucent squat crystals, grains. Vitreous to resinous lustre. Occurs in crystalline limestone. Humite group; distinguished from other members of the group by X-ray diffraction and chemical analysis.

Nordmarkite. A quartz-bearing syenite. Used as a building stone and an ornamental stone.

Nordstrandite. $Al(OH)_3$. H = 3. Colourless to white, yellowish, or greyish-white transparent, tabular, blade-like crystals or fine crystal aggregates. Vitreous, pearly to greasy lustre. Occurs in limestone and altered igneous rocks.

Norite. A gabbro with orthopyroxene (hypersthene) as the dominant ferromagnesian component.

Ochre. Impure iron oxides composed of limonite or goethite (yellow ochre), or of hematite (red ochre). Pulverulent, yellow, brownish red, massive. Used as a pigment.

Okenite. $Ca_{10}Si_{18}O_{46}•18H_2O$. H = 4.5–5. White, vitreous to pearly, blade-like crystals; compact fibrous massive. Occurs in amygdaloidal basalt.

Oligoclase. $(Na,Ca)(Al,Si)Si_2O_8$. H = 6–6.5. Colourless, white, pink, grey, greenish, yellowish, or brown transparent to translucent cleavable masses; tabular crystals (less common). Vitreous to pearly lustre. Occurs in pegmatite, granitic rocks. Plagioclase feldspar group.

Olivine. $(Mg,Fe)_2SiO_4$. H = 6.5. Yellowish- to brownish-green, vitreous, granular masses or rounded grains; also colourless, yellowish to brownish, black. Distinguished from quartz by its cleavage, from other silicates by its yellowish-green colour. Used in the manufacture of refractory bricks; transparent variety (peridot) used as a gemstone. Mineral group that includes the fayalite-forsterite series.

Opal. $SiO_2•nH_2O$. H = 5.5–6.5. Colourless, green, grey to black with waxy lustre, and iridescence (play of colour) in gem varieties. Common or nongem variety lacks iridescence, is translucent to opaque, colourless to white, red, brown, grey, green, yellow, etc. Massive, botryoidal, mammillary, or pisolitic forms. Distinguished from chalcedony by its inferior hardness, lower specific gravity. Formed at low temperatures by silica-bearing waters seeping into fissures and cavities in sedimentary and volcanic rocks; silica is in the form of cristobalite.

Orpiment. As_2S_3. H = 1.5–2. Yellow foliated, columnar, fibrous, reniform, botryoidal, granular to powdery aggregates; short prismatic crystals (rare). Transparent to translucent with pearly or resinous lustre. Alteration product of arsenic minerals, notably realgar. Associated with arsenic and antimony minerals.

Orthoclase. $KAlSi_3O_8$. H = 6. Colourless, white, pink, green, grey, yellow transparent to translucent squat prismatic or tabular crystals; cleavable massive. Vitreous to pearly lustre. Perfect cleavage. Occurs as a constitutent of pegmatite and granitic rocks. Distinguished from plagioclase feldspar by the absence of twinning striations. Monoclinic variety of K-feldspar.

Orthogneiss. A gneiss derived from the metamorphism of an igneous rock.

Orthopyroxene. Orthorhombic variety of pyroxene, including enstatite and hypersthene.

Ottrelite. $(Mn,Fe,Mg)_2Al_4Si_2O_{10}(OH)_4$. H = 6.5. Green, grey to black tabular crystals; also scaly, platy, or foliated. Lamellar varieties resemble mica or chlorite, but are distinguished by their brittleness and hardness. Occurs in metamorphosed sedimentary rocks.

Overite. $CaMgAl(PO_4)_2(OH)•4H_2O$. H = 3.5–4. Light green to colourless platy crystals and aggregates; massive. Vitreous lustre. Soluble in hot HNO_3. Associated with other phosphate minerals.

Paragneiss. A gneiss derived from a sedimentary rock.

Parapierrotite. $Tl(Sb,As)_5S_8$. Black, semimetallic, small prismatic crystals. Occurs in cavities in realgar.

Pararammelsbergite. $NiAs_2$. H = 5. Light grey, metallic, rectangular tablets, or massive. Exposed surfaces alter readily to erythrite. Associated with nickel and cobalt minerals in the Cobalt district, Ontario.

Pararealgar. AsS. H = 1–1.5. Yellow, orange-yellow to orange-brown powdery to granular aggregates. Vitreous to resinous lustre. Associated with realgar, stibnite.

Paratacamite. $Cu_2(OH)_3Cl$. H = 3. Green, dark green to greenish-black vitreous, translucent, to semi-opaque rhombohedral crystals; also granular massive, powdery encrustations, or fibrous or spherulitic aggregates. Easily soluble in acids. Secondary mineral formed by alteration of copper minerals.

Pargasite. $NaCa_2(Mg,Fe)_4Al(Si_6Al_2))_{22}(OH)_2$. H = 5–6. Bluish-green, light brown to brown, grey prismatic crystals, or massive. Occurs in igneous and metamorphic rocks. Monoclinic member of the amphibole group.

Parisite. $Ca(Ce,La)_2(CO_3)_3F_2$. H = 4.5. Yellow, brownish, or greyish-yellow hexagonal pyramids or rhombohedral crystals. Striated. Transparent to translucent; vitreous, resinous, or pearly lustre. Soluble in hot acids.

Parkerite. $Ni_3(Bi,Pb)_2S_2$. H = 2. Bronze, metallic. Exhibits lamellar twinning. Occurs as microscopic grains intimately associated with bismuthinite, native bismuth, cobalt pentlandite, siegenite, and bravoite at the Langis mine, Cobalt, Ontario. Effervesces in dilute HNO_3.

Pavonite. $AgBi_3S_5$. Grey, metallic, lath-like or elongated grains. Occurs in bismuthinite-matildite-native bismuth intergrowths in the Keeley mine, Cobalt, Ontario.

Pearceite. $Ag_{16}As_2S_{11}$. H = 3. Black, metallic, hexagonal tabular prisms with bevelled edges and triangular striations on the basal face. Decomposed by HNO_3. Associated with silver minerals such as argentite, native silver.

Pectolite. $NaCa_2Si_3O_8(OH)$. H = 5. White needle-like crystals forming radiating and globular masses. Silky to vitreous lustre. Decomposed by warm dilute HCl. Associated with zeolites in basalt. Blue gem variety known as 'larimar stone'.

Pegmatite. A very coarse-grained igneous rock occurring as dykes, lenses, and veins at the margins of batholiths.

Pekoite. *PbCuBi*$_{11}$(S,Se)$_{18}$. Grey, metallic, thin-bladed crystals associated with lead-bismuth minerals.

Pentlandite. $(Fe,Ni)_9S_8$. H = 3.5–4. Light bronze-yellow, massive, granular aggregates. Octahedral parting distinguishes it from pyrrhotite with which it is commonly associated. Non-magnetic. Ore of nickel.

Periclase. MgO. H = 5.5. Colourless to grey and, less commonly, yellow, green, or black octahedrons or grains. Transparent with vitreous lustre. Soluble in dilute HCl. Distinguished from spinel by its inferior hardness; spinel is not soluble in HCl.

Peridotite. An igneous rock consisting almost entirely of olivine and pyroxene with little or no plagioclase feldspar.

Peristerite. White or reddish albite having a blue schiller (iridescence). Intergrowth of K-feldspar and albite. Also called moonstone. Used as a gemstone.

Perovskite. $CaTiO_3$. H = 5.5. Reddish-brown to black cubic or octahedral crystals; also granular massive. Adamantine to metallic lustre. Uneven fracture. White to grey streak. Distinguished from titanite by its crystal form, from pyrochlore by its lustre and streak.

Perrierite. $(Ca,Ce,Th)_4(Mg,Fe)_2(Ti,Fe)_3Si_4O_{22}$. H = 5.5. Dark reddish-brown to black, opaque, striated tabular plates, or flat prismatic crystals; resinous to greasy lustre. Occurs in crystalline limestone, in weathered tuff. Resembles titanite; striations, platy habit, and lustre distinguish it from titanite.

Perthite. A subparallel intergrowth of pink microcline or orthoclase and colourless albite. Exhibits silky sheen with golden aventurescence. Named for Perth, Ontario, where it was originally found. Used as a gemstone. Not a valid mineral species.

Petalite. $LiAlSi_4O_{10}$. H = 6–6.5. Colourless, white, grey, or yellow, cleavable, massive. Vitreous to pearly lustre. Transparent to translucent. Associated with lepidolite in granite pegmatite.

Petarasite. $Na_5Zr_2Si_6O_{18}(Cl,OH)•2H_2O$. H = 5–5.5. Amber yellow, greenish yellow, massive. Transparent to translucent; vitreous. Associated with biotite, microcline, catapleiite, apatite, zircon, aegirine in nepheline syenite at Mount Saint-Hilaire, Quebec, the type locality. Named in honour of Dr. Peter Tarassoff, collector and amateur mineralogist from Dollard-des-Ormeaux, Quebec.

Petzite. Ag_3AuTe_2. H = 2.5–3. Light to dark grey, metallic; massive granular. Associated with other tellurides in vein deposits. Decomposed by HNO_3.

Phenocryst. Distinct crystal in a fine-grained igneous rock referred to as porphyry.

Phillipsite. $(K,Na,Ca)_{1–2}$ $(Si,Al)_8O_{16}•6H_2O$. H = 4–4.5. White radiating aggregates of prismatic crystals with pyramidal terminations. Translucent to opaque, vitreous. Associated with other zeolites in basalt.

Phlogopite. $KMg_3Si_3AlO_{10}(F,OH)_2$. H = 2.5. Amber to light brown variety of mica. Used in the electrical industry.

Phosphorescence. Property of certain substances to continue to glow after heating or exposure to ultraviolet rays.

Phyllite. A lustrous metamorphic rock with a texture between that of schist and slate.

Picrolite. A nonflexible fibrous variety of antigorite (serpentine).

Piemontite. $Ca_2(Al,Mn,Fe)_3(SiO_4)_3(OH)$. Violet-red, reddish-brown to reddish-black prismatic or acicular crystals; also fibrous, massive. Occurs in igneous rocks and in schists. Epidote group. Also known as piedmontite.

Pitchblende. Massive uraninite containing trace amounts of thorium and rare earths. Not a valid mineral name.

Placer. Sand or gravel deposit containing gold and/or other heavy minerals; generally refers to deposits in paying quantities.

Plagioclase. $(Na,Ca)Al(Al,Si)Si_2O_8$. H = 6. White or grey tabular crystals and cleavable masses having twinning striations on cleavage surfaces. Vitreous to pearly lustre. Distinguished from other feldspars by its twinning striations. Feldspar group.

Platinum. Pt. H = 4–4.5. Grey, metallic grains, scales, nuggets, cubic crystals (rare). Hackly fracture. Malleable and ductile. Occurs in mafic and ultramafic igneous rocks and in placers.

Plumbojarosite. $PbFe_6(SO_4)_4(OH)_{12}$. Yellowish-brown to dark brown, dull to silky, powdery, earthy, or compact encrustations; microscopic hexagonal plates. Soft, and feels like talc. Dissolves slowly in acids. Oxidation product of lead ores. Not readily identified in the hand specimen.

Pollucite. $(Cs,Na)_2Al_2Si_4O_{12}•H_2O$. H = 6.5–7. Colourless, white, grey, massive; crystals (cubic) are rare. Transparent to translucent with vitreous to pearly lustre. Conchoidal to uneven fracture. Associated with spodumene, amblygonite in granite pegmatite. Resembles quartz, but has a slightly greasy lustre. Zeolite group. Ore of cesium.

Polybasite. $(Ag,Cu)_{16}Sb_2S_{11}$. H = 2–3. Black, metallic, tabular crystals, or massive. Thin splinters are dark red. Decomposed by HNO_3. Occurs with silver-bearing minerals in veins.

Polycrase. $(Y,Ca,Ce,U,Th)(Ti,Nb,Ta)_2O_6$. H = 5.5–6.5. Black prismatic crystals; parallel to radial aggregates of crystals, or massive. Submetallic to greasy lustre. Yellowish, greyish, or reddish-brown streak. Radioactive. Conchoidal fracture. Occurs in granite pegmatite.

Polydymite. Ni_3S_4. H = 4.5–5.5. Grey, metallic, octahedral crystals, massive. Associated with other sulphide minerals in hydrothermal vein deposits.

Polylithionite. $KLi_2AlSi_4O_{10}(F,OH)_2$. H = 2.5–4. White, pink, micaceous; tabular crystals. Pearly lustre. Variety of lepidolite.

Polymorph. Mineral having the same chemical composition as another mineral, but a different crystal structure.

Porphyroblast. A large crystal formed in a metamorphic rock by recrystallization, e.g. garnet in schist. Also referred to as metacryst.

Porphyry. A dyke rock consisting of distinct crystals (phenocrysts) in a fine-grained matrix. The matrix may be diorite, diabase, rhyolite, etc.; these terms are then used to describe the rock.

Posnjakite. $Cu_4(SO_4)(OH)_6•H_2O$. H = 2–3. Minute, blue, flaky, radiating, sheaf-like aggregates on copper-bearing rocks. Associated with other secondary copper minerals; not readily distinguished from them in the hand specimen.

Prehnite. $Ca_2Al_2Si_3O_{10}(OH)_2$. H = 6.5. Light green, globular, stalactitic masses with fibrous or columnar structure; tabular crystals. Vitreous lustre. Colour and habit are distinguishing features. Associated with zeolite minerals in basalt, and as an alteration of plagioclase.

Priceite. $Ca_4B_{10}O_{19}•7H_2O$. H = 3–3.5. White, earthy, nodular or irregular masses. Occurs in gypsum and borate deposits. Soluble in acids.

Pringleite. $Ca_9B_{26}O_{34}(OH)_{24}Cl_4•13H_2O$. H = 3–4. Colourless or orange prismatic crystals and platy aggregates. Transparent to translucent with vitreous lustre. Occurs with hilgardite, halite, and sylvite. Originally described from the Penobsquis potash mine, Sussex, New Brunswick, and named in honour of Gordon J. Pringle, Geological Survey of Canada.

Probertite. $NaCaB_5O_7(OH)_4 \bullet 3H_2O$. H = 3.5. Colourless, transparent acicular crystals; radiating crystal aggregates; massive. Occurs with other borate minerals. Soluble in dilute acids.

Proustite. Ag_3AsS_3. H = 2–2.5. Red with adamantine lustre. Prismatic crystals or massive. Associated with other silver minerals. Known as ruby silver. Ore of silver.

Pseudoixiolite. A disordered columbite-tantalite. Not a valid mineral name.

Pseudorutile. Renamed 'arizonite'.

Psilomelane. $(Ba,H_2O)Mn_5O_{10}$. 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. Not a valid mineral name. Renamed romanechite.

Pumpellyite. $Ca_2(Mg,Fe)Al_2(SiO_4)(Si_2O_7)(OH)_2 \bullet H_2O$. H = 5.5. Bluish-green to green or white tiny fibrous aggregates; also platy, massive. Silky to vitreous lustre. Occurs in amygdaloidal basalt and in metamorphic rocks.

Pyrargyrite. Ag_3SbS_3. H = 2.5. Dark red prismatic crystals, or massive. Adamantine lustre. Dark red streak. Occurs in veins carrying other silver minerals. Known as ruby silver. Ore of silver. Colour is identifying characteristic.

Pyrite. FeS_2. H = 6–6.5. Light brass-yellow (iridescent when tarnished) metallic crystals (cube, pyritohedron, octahedron), or massive granular. Distinguished from other sulphides by colour, crystal form, and superior hardness. Source of sulphur.

Pyroaurite. $Mg_6Fe_2(CO_3)(OH)_{16} \bullet 4H_2O$. H = 2.5. Colourless, yellowish, blue, green, or white, flaky, nodular or fibrous. Pearly or waxy lustre. Crushes to talc-like powder. Effervesces in HCl. Becomes golden yellow and magnetic when heated. Occurs with brucite in serpentine and in crystalline limestone.

Pyrochlore. $(Na,Ca)_2Nb_2O_6(OH,F)$. H = 5–5.5. Dark brown, reddish-brown to black octahedral crystals, or irregular masses. Vitreous or resinous lustre. Light brown to yellowish-brown streak. Distinguished from perovskite by its lustre and streak, from titanite by its crystal form. Ore of niobium.

Pyrochroite. $Mn(OH)_2$. Colourless, yellow, light green, or blue, altering to dark brown and black on exposure to air. Associated with manganese minerals.

Pyroclastic rock. A rock composed of fragments of volcanic rocks.

Pyrolusite. MnO_2. H = 6–6.5 (crystals), 2–6 (massive). Light to dark grey, metallic, with bluish tint. Columnar, fibrous, or divergent masses; reniform, concretionary, granular to powdery and dendritic. Soils fingers easily and marks paper. Ore of manganese.

Pyromorphite. $Pb_5(PO_4)_3Cl$. H = 3.5–4. 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.

Pyrope. $Mg_3Al_2(SiO_4)_3$. H = 7–7.5. Red transparent dodecahedral or trapezohedral crystals; grains. Vitreous lustre. Occurs in serpentinite, peridotite, and kimberlite. Used as a gemstone. Garnet group.

Pyrophanite. $MnTiO_3$. H = 5. Dark red or reddish-brown thin tabular crystals or fine flakes. Metallic to adamantine lustre. Conchoidal fracture. Ilmenite group.

Pyrophyllite. $Al_2Si_4O_{10}(OH)_2$. H = 1–2. White, grey, green, or yellow foliated, lamellar, fibrous, or granular compact masses. Pearly, greasy, or dull lustre. Resembles talc, but has slightly superior hardness. Used for carved ornamental objects, in the manufacture of ceramics and insecticides, and for refractories.

Pyroxene. A mineral group consisting of Mg, Fe, Ca, and Na silicates related structurally. Diopside, augite, aegirine, jadeite, spodumene, enstatite, and hyperstene are members of the group. Common rock-forming mineral.

Pyroxenite. An igneous rock composed mainly of pyroxene with little or no feldspar.

Pyrrhotite. $Fe_{1-x}S$. H = 4. Brownish bronze, massive granular. Black streak. Magnetic; this property distinguishes it from pyrite and other bronze sulphides.

Quartz. SiO_2. H = 7. Colourless, yellow, violet, pink, brown, or black six-sided prisms with transverse striations, or massive. Transparent to translucent with vitreous lustre. Lack of cleavage distinguishes it from other colourless and white minerals. Rock-forming mineral. Occurs in veins in ore deposits. Used in glass and electronic industries. Transparent varieties used as gemstones.

Quartzite. A quartz-rich rock formed by metamorphism of sandstone. Used as a building stone, a monument stone, and an ornamental stone; high-purity quartzite is used in the manufacture of glass.

Radioactive minerals. Minerals that give off radiation due to spontaneous disintegration of uranium or thorium atoms. Detected by Geiger counter.

Raite. $Na_4Mn_3Si_8(O,OH)_{24}\bullet 9H_2O$ (?). H = 3. Gold to brown acicular crystals. Occurs in alkalic igneous rocks.

Rammelsbergite. $NiAs_2$. H = 5.5–6. Light grey, metallic, tinged with red; massive with granular texture or prismatic, radial fibrous structure. Occurs in vein deposits with nickel and cobalt minerals such as smaltite, nickeline.

Ramsayite. $Na_2Ti_2Si_2O_9$. H = 6. Colourless fine acicular crystals. Vitreous lustre. Occurs in nepheline syenite. Rare mineral. Not readily identifiable in the hand specimen. Not a valid mineral name; renamed lorenzenite.

Ramsdellite. MnO_2. H = 3. Black massive or platy crystal aggregates. Metallic lustre and black streak. Associated with other manganese minerals in manganese deposits.

Rancieite. $(Ca,Mn)Mn_4O_9\bullet 3H_2O$. Black, dark brown, grey metallic, massive; also lamellar. Associated with manganese minerals.

Rare-earth elements. A series of elements from atomic number 57 (lanthanum) to 71 (lutetium) and yttrium that were originally believed to be of rare occurrence.

Realgar. AsS. H = 1.5–2. Orange-red to orange-yellow, granular to compact massive; also striated, short, prismatic crystals. Resinous to greasy lustre. Transparent on freshly broken surface. Alters to light yellow to reddish-yellow powder (consisting of orpiment and arsenolite) on exposure to light. Occurs with orpiment and other arsenic minerals and with ores of antimony, lead, silver, and gold. Decomposed by HNO_3 and aqua regia.

Retgersite. $NiSO_4 \bullet 6H_2O$. H = 2. Dark green to blue-green fibrous encrustations and veinlets; crystals (prismatic) rare. Vitreous lustre. Greenish-white streak. Alteration product of nickeline.

Rhabdophane. $(Ce,La)PO_4 \bullet H_2O$. H = 3.5. Pinkish, yellowish-white, or brown stalactitic or botryoidal encrustations with radial structure. Translucent; waxy lustre. Occurs in pegmatite.

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 lustre, transparent. Soluble in warm HCl. Distinguished from rhodonite by its inferior hardness. Ore of manganese.

Rhodonite. $MnSiO_3$. H = 6. Pink to rose red, massive, commonly veined with black manganese minerals. Conchoidal fracture, very tough. Resembles rhodochrosite from which it is distinguished by its superior hardness and lack of effervescence in HCl. Associated with manganese ores. Used as a gemstone and an ornamental stone.

Rhyolite. A fine-grained volcanic rock with composition similar to granite.

Richterite. $Na_2Ca(Mg,Fe)_5Si_8O_{22}(OH)_2$. H = 5–6. Green, brown to brownish-red, yellow, rose-red long prismatic crystals. Transparent to translucent; vitreous. Monoclinic member of amphibole.

Rickardite. Cu_7Te_5. H = 3.5. Purplish-red, metallic; massive. Soluble in HNO_3. Associated with other tellurides from which it is distinguished by its colour resembling tarnished bornite.

Rinkite. $(Na,Ca,Ce)_3Ti(Si_2O_7)_2OF_3$. H = 5. Yellow, yellowish-green to brown tabular or prismatic crystals, and massive. Vitreous to greasy lustre. Rare mineral occurring in nepheline syenite. Not easily identified in the hand specimen.

Rock wool. Felted or matted fibres produced by blowing or spinning molten self-fluxing siliceous and argillaceous dolomitic limestone. Used as insulating material and for acoustic tiles. Now replaced by fibreglass for insulation.

Roemerite. $Fe_3(SO_4)_4 \bullet 14H_2O$. H = 3–3.5. 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 the hand specimen from other iron sulphates.

Romeite. $(Ca,Fe,Mn,Na)_2(Sb,Ti)_2O_6(O,OH,F)$. H = 5.5–6.5. Yellow to brown small octahedral crystals; massive. Vitreous, greasy, or subadamantine lustre. White to light yellow streak. Occurs with rhodonite and other manganese minerals.

Roquesite. $CuInS_2$. H = 3.5–4. Grey, metallic, with bluish tint. Microscopic grains associated with copper ore minerals.

Roscoelite. $K(V,Al,Mg)_2(AlSi_3)O_{10}(OH)_2$. H = 2.5. Reddish-brown to greenish-brown scaly aggregates. Pearly lustre. Occurs in gold and vanadium deposits. Mica group.

Rose quartz. Pink to rose variety of quartz; used as an ornamental stone.

Routhierite. $TlHgAsS_3$. Reddish-black metallic grains and veinlets associated with stibnite, sphalerite, pyrite, realgar, and orpiment.

Roxbyite. Cu_9S_5. H = 2–3. Bluish-black metallic grains; bronze flakes. Occurs with other copper sulphides.

Rozenite. $FeSO_4•4H_2O$. White or greenish-white, finely granular, botryoidal, or globular encrustations. Metallic astringent taste. Difficult to distinguish in the hand specimen from other iron sulphates with which it is associated.

Ruby silver. The silver minerals, pyrargyrite and proustite, are known as ruby silver because of their colour.

Ruitenbergite. $Ca_9B_{26}O_{34}(OH)_{24}Cl_4•13H_2O$. Monoclinic polymorph of pringleite with which it is associated and identical in appearance. Originally described from the Penobsquis potash mine, Sussex, New Brunswick, and named in honour of Arie A. Ruitenberg of the New Brunswick Geological Survey.

Rutile. TiO_2. H = 6–6.5. 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.

Sabinaite. $Na_4Zr_2TiO_4(CO_3)_4$. White powdery coatings, compact, finely flaky aggregates. Silky to pearly lustre. Effervesces in warm HCl. Commonly coated with white powdery gibbsite-like mineral that fluoresces strongly in ultraviolet light. Associated with weloganite, dawsonite, quartz, calcite, and dresserite in igneous sills at the Francon quarry, Montréal, the type locality. Named in honour of Ann P. Sabina, Geological Survey of Canada.

Safflorite. $(Co,Fe)As_2$. H = 4.5–5. Light grey, metallic, massive, with radiating fibrous structure; prismatic crystals resembling arsenopyrite. May form cruciform or six-ray star twins. Occurs with cobalt and nickel minerals and with native silver in vein deposits.

Samarskite. $(Y,Er,Ce,U,Ca,Fe,Pb,Th)(Nb,Ta,Ti,Sn)_2O_6$. H = 5–6. Black, brownish-black prismatic or tabular crystals, massive. Vitreous, resinous, or splendent lustre. Radioactive. Exposed surfaces alter to brown or yellowish-brown. Conchoidal fracture. Dark brown to reddish or yellowish-brown streak. Occurs in granite pegmatite.

Samsonite. $Ag_4MnSb_2S_6$. H = 2.5. Dark grey to black metallic striated prisms. Associated with silver and manganese minerals.

Sanidine. Colourless glassy monoclinic variety of potash feldspar.

Sandstone. A sedimentary rock composed of sand-sized particles, mostly quartz.

Sapphirine. $Mg_{15}Al_{12}Si_2O_{27}$. H = 7.5. Light to dark blue, greenish-blue grains; also tabular crystals. Vitreous lustre. Uncommon mineral. Difficult to identify except by X-ray methods.

Scapolite. $Na_4Al_3Si_9O_{24}Cl - Ca_4Al_6Si_6O_{24}(CO_3,SO_4)$. H = 6. White, grey, or less commonly pink, yellow, blue, or green prismatic and pyramidal crystals; also massive granular with splintery, woody appearance. Vitreous, pearly to resinous lustre. Distinguished from feldspar by its square prismatic form, its prismatic cleavage, its splintery appearance on cleavage surfaces. May fluoresce under ultraviolet rays. Clear varieties may exhibit chatoyancy (cat's-eye effect) when cut in the cabochon style. Mineral group including marialite, meionite.

Schapbachite. High-temperature form of matildite, $AgBiS_2$. Not a valid mineral name.

Scheelite. $CaWO_4$. H = 4.5–5. White, yellow, brownish, transparent to translucent; massive. Also dipyramidal crystals. High specific gravity (about 6). Generally fluoresces bright bluish white under short ultraviolet rays; this property is used in prospecting for this tungsten ore mineral.

Schiller. Internal near-surface reflection of light, producing a display of spectral colours, or iridescence, as in feldspar (peristerite).

Schist. A metamorphic rock composed mainly of flaky minerals such as mica and chlorite.

Scolecite. $CaAl_2Si_3O_{10}•3H_2O$. H = 5. Colourless to white prismatic crystals (generally twinned); also radiating acicular to fibrous aggregates. Vitreous lustre. Occurs in cavities in basalt. Zeolite group.

Scorodite. $FeAsO_4•2H_2O$. H = 3.5–4. Green, greyish-green to brown crusts composed of tabular or prismatic crystals; also massive, earthy, porous, or sinter-like. Vitreous to subresinous or subadamantine lustre. Soluble in acids. Secondary mineral formed by oxidation of arsenopyrite.

Selenite. Colourless, transparent variety of gypsum.

Selenium. Se. H = 2. Grey, metallic, acicular, tube-like crystals; aggregates of crystals forming sheets. Red streak. Associated with pyrite deposits.

Seligmannite. $PbCuAsS_3$. H = 3. Dark grey to black, metallic; short prismatic to tabular crystals. Brown to purplish-black streak. Associated with sulphide and sulphosalt minerals.

Senarmontite. Sb_2O_3. H = 2–2.5. Colourless to greyish white, transparent; octahedral crystals or granular, massive. Forms crusts. Resinous to subadamantine lustre. Soluble in HCl. Secondary mineral formed by oxidation of antimony minerals. Minor ore of antimony.

Sepiolite. $Mg_4Si_6O_{15}(OH)_2•6H_2O$. H = 2–2.5. White, greyish, yellowish, fibrous, scaly, earthy, clay-like, or compact nodular; silky, waxy, or dull lustre. Secondary mineral formed from serpentine, magnesite. Massive variety is referred to as meerschaum and was used for making tobacco pipes.

Serandite. $Na_6(Ca,Mn)_{15}Si_{20}O_{58}•2H_2O$. Pink to reddish prismatic crystal aggregates. Vitreous lustre. Occurs with analcime, aegirine in nepheline syenite. Distinguished by its colour and crystal form.

Sericite. Fine scaly or fibrous muscovite; an important constituent of some schist and gneiss.

Serpentine. $(Mg,Fe)_3Si_2O_5(OH)_4$. H = 2–5. White, yellow, green, blue, red, brown, black massive; may be mottled, banded, or veined. Waxy lustre. Translucent to opaque. Asbestos (chrysotile) and picrolite are fibrous varieties. Formed by alteration of olivine, pyroxene, amphibole, or other magnesium silicates. Found in metamorphic and igneous rocks. Used as an ornamental building stone (verde antique) and for ornamental objects.

Serpentinite. A metamorphic rock consisting almost entirely of serpentine.

Serpierite. $Ca(Cu,Zn)_4(SO_4)_2(OH)_6•3H_2O$. Light blue, minute, elongated, lath-like crystals; also tufts, crusts of flattened fibres. Transparent with vitreous to pearly lustre. Secondary mineral associated with other sulphate minerals in copper deposits.

Shale. A fine-grained sedimentary rock composed of clay minerals and having a laminated structure.

Shear zone. A region in which lateral movement along rock planes has produced crushed or brecciated rocks.

Siderite. $FeCO_3$. H = 3.5–4. Brown rhombohedral crystals, cleavable masses, earthy, botryoidal. Soluble in HCl. 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, light green to bluish fibrous crusts, needle-like crystals, or finely granular encrustations. Vitreous lustre. Metallic, astringent taste. Not distinguishable in the hand specimen from other iron sulphates.

Siegenite. $(Ni,Co)_3S_4$. H = 4.5–5.5. Grey, metallic, tarnishing to copper-red. Octahedral crystals or massive granular. Uncommon mineral occurring with copper, nickel, or iron sulphides in vein deposits.

Silex. An obsolete term for flint. Used in the Gaspé region, Quebec, for grey to brown chalcedony pebbles found in the area.

Siliceous sinter. H = 7. White porous quartz. Occurs in cavities in basalt.

Sill. A long narrow body of igneous rock that parallels the structure of the rock it intrudes.

Sillimanite. Al_2SiO_5. H = 7. White, colourless, fibrous, or prismatic masses. Vitreous or silky lustre. Distinguished from wollastonite and tremolite by its superior hardness. Occurs in schist and gneiss.

Siltstone. A very fine-grained sedimentary rock with composition between sandstone and shale, lacking the fissility of shale.

Silver. Ag. H = 2.5–3. Grey, metallic, arborescent, wiry, leaf, platy, or scaly forms; crystals (cubic, octahedral, dodecahedral) rare. Tarnishes to dark grey or black. Hackly fracture. Ductile, malleable. Colour, form, and sectility are identifying characteristics.

Sinhalite. $MgAl(BO_4)$. H = 6.5–7. Colourless, yellow, pink, greenish to pinkish-brown, or dark brown transparent vitreous grains, or massive. Occurs in skarn zones, in marble, and in crystalline limestone. Transparent varieties used as a gemstone.

Sjogrenite. $Mg_6Fe_2(CO_3)(OH)_{16}•4H_2O$. H = 2.5. Transparent tiny thin flexible hexagonal plates; colourless to yellowish- or brownish-white. Glistening, vitreous, or pearly lustre. Rare mineral associated with pyroaurite.

Skarn. An altered rock zone in limestone and dolomite in which calcium silicates (garnet, pyroxene, epidote, etc.) have formed.

Sklodowskite. $(H_3O)_2Mg(UO_2)_2(SiO_4)•2H_2O$. H = 2–3. Light yellow to greenish-yellow small acicular crystals or fibres forming rosettes, radial tufts; also powdery to earthy. Silky, vitreous to dull lustre. Secondary mineral formed from uranium minerals.

Skutterudite. $CoAs_{2-3}$. H = 5.5–6. Grey, metallic, cubic, cubo-octahedral, or pyritohedral crystals; massive, colloform. Resembles arsenopyrite, but is distinguished by its crystal form. Associated with other cobalt and nickel minerals in vein deposits.

Slate. A fine-grained compact metamorphic rock characterized by a susceptibility to split into thin sheets.

Smaltite. $(Co,Ni)As_{3-x}$. An arsenic-deficient variety of skutterudite. Not a valid mineral name.

Smithsonite. $ZnCO_3$. H = 4–4.5. Greyish-white to grey, greenish or bluish; also yellow to brown. Generally botryoidal, reniform, stalactitic, 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.

Smythite. Fe_3S_4. Bronze to brownish-black metallic plates or flakes. Magnetic. Resembles pyrrhotite from which it is distinguished by X-ray diffraction. Occurs with other sulphides such as pyrrhotite, pyrite, chalcopyrite, marcasite.

Soapstone. A metamorphic rock composed chiefly of talc; massive fibrous texture and unctuous feel. Used as a carving medium, for refractory bricks, as marking crayons for metalworkers, and as heat-resistant pads and plates.

Sodalite. $Na_8Al_6Si_6O_{24}Cl_2$. H = 6. Royal blue to purplish-blue granular masses, dodecahedral crystals. Vitreous lustre. Resembles lazurite, but is harder; also distinguished by its association: sodalite in nepheline rocks, lazurite in crystalline limestone.

Soddyite. $(UO_2)_2SiO_4•2H_2O$. H = 3.5. Yellow, amber-yellow to yellowish-green small bipyramidal or tabular crystals or radial fibrous aggregates; powdery to earthy masses and crusts. Vitreous, resinous to dull lustre. Secondary mineral formed from uraninite.

Spangolite. $Cu_6Al(SO_4)(OH)_{12}Cl•3H_2O$. H = 3. Green tabular or prismatic crystals. Transparent with vitreous lustre. Secondary mineral occurring in copper deposits.

Specularite. Black variety of hematite having a brilliant lustre.

Sperrylite. $PtAs_2$. H = 6–7. Light grey, metallic, cubic or cubo-octahedral crystals. Associated with pyrrhotite-pentlandite-chalcopyrite ores.

Spertiniite. $Cu(OH)_2$. Blue to blue-green transparent vitreous lath-like crystals forming microscopic botryoidal aggregates. Soluble in acids and decomposes in hot water. Associated with native copper, chalcocite, atacamite. Named in honour of Dr. Francis Spertini, geologist at the Jeffrey mine, Asbestos, Quebec, the type locality.

Spessartine. $Mn_3Al_2(SiO_4)_3$. H = 7–7.5. Orange to orange-red and brown transparent dodecahedral or trapezohedral crystals; grains. Vitreous lustre. Occurs in granite pegmatite. Used as a gemstone. Garnet group.

Sphalerite. ZnS. H = 3.5–4. Yellow, brown, or black, granular to cleavable massive; also botryoidal. Resinous to submetallic. Light yellow streak. Soluble in HCl, giving off H_2S. Ore of zinc.

Sphene. Synonym for titanite.

Spinel. $MgAl_2O_4$. H = 7.5–8. Dark green, brown, black, dark blue, pink, or red grains or octahedral crystals; also massive. Conchoidal fracture. Vitreous lustre. Distinguished from magnetite and chromite by its superior hardness and lack of magnetic property. Transparent varieties used as gemstones.

Spionkopite. $Cu_{39}S_{28}$. Grey to black, metallic, with green, violet iridescence; microscopic flakes forming aggregates. Generally intergrown with other copper sulphides. Originally described from sandstone and quartzite copper deposits in the Yarrow Creek and Spionkop Creek areas, southwestern Alberta; named for the locality.

Spodumene. $LiAlSi_2O_6$. H = 6.5. White, grey, pink, violet, green long prismatic crystals or platy masses. Perfect cleavage. Vitreous lustre. Distinguished by its form and cleavage. Occurs in granite pegmatite. Ore of lithium. Used in ceramics. Transparent pink (kunzite), green (hiddenite), and yellow varieties are used as gemstone.

Stannite. Cu_2FeSnS_4. H = 4. Grey to greyish-black, metallic; granular massive or disseminated grains. Bluish tarnish. Black streak. Occurs in tin-bearing veins associated with chalcopyrite, sphalerite, tetrahedrite, pyrite, and cassiterite.

Starkeyite. $MgSO_4•4H_2O$. Dull white encrustations. Bitter, metallic taste. Difficult to distinguish visually from other sulphates. Formerly known as leonhardtite.

Staurolite. $(Fe,Mg,Zn)_2Al_9(Si,Al)_4O_{22}(OH)_2$. H = 7. Brownish-yellow to brown prismatic crystals commonly twinned forming cruciform shapes. Vitreous to resinous lustre. Colour and habit are diagnostic. Occurs in schist and gneiss.

Steenstrupine. $(Ce,La,Na,Mn)_6(Si,P)_6O_{18}(OH)$. H = 5. Reddish-brown to black rhombohedral crystals or massive. Opaque. Occurs in nepheline syenite.

Stephanite. Ag_3SbS_4. H = 2–2.5. Black, metallic, striated prismatic or tabular crystals, or massive. Decomposed by HNO_3. Occurs in veins in silver deposits.

Stibarsen. SbAs. H = 3–4. Tin-white, reddish-grey, metallic; fibrous, lamellar, reniform, mammillary, or finely granular masses. Tarnishes to grey or brownish black. Perfect cleavage in one direction. Fuses to a metallic globule. Occurs in veins with other arsenic and antimony minerals, and in pegmatite containing lithium minerals.

Stibiconite. $Sb_3O_6(OH)$. H = 4.5–5. Yellow, vitreous, granular to powdery encrustations; also radiating fibrous aggregates (pseudomorphs after stibnite), botryoidal, or concentric. 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 or bladed masses, and granular. Soluble in HCl. Most important ore of antimony.

Stichtite. $Mg_6Cr_2(CO_3)(OH)_{16}•4H_2O$. Light violet scaly micaceous masses associated with serpentine. Also occurs as blebs and veinlets in serpentine.

Stilbite. $NaCa_2Al_5Si_{13}O_{36}\bullet 14H_2O$. H = 4. Colourless, pink, or white platy crystals commonly forming sheaf-like aggregates. Vitreous, pearly lustre. Transparent. Sheaf-like form distinguishes it from other zeolites with which it is associated in volcanic rocks. Also occurs in metamorphic and granitic rocks.

Stillwellite. (Ce,La,Ca)$BSiO_5$. Grey, pink, brownish-yellow, brownish-red to brown translucent to opaque, hexagonal tabular or rhombohedral crystals; also massive, compact, porcelain-like. Waxy to resinous lustre. Occurs with other rare-element minerals in marble.

Stilpnomelane. $K(Fe,Al)_{10}Si_{12}O_{30}(OH)_{12}$. H = 4. Black, dark green, golden to reddish-brown foliated plates, fibrous aggregates. Associated with magnetite, hematite, goethite in iron deposits, and with chlorite and epidote in schist.

Stromeyerite. CuAgS. H = 2.5–3. Dark grey, metallic, with blue tarnish. Prismatic crystals or massive. Soluble in HNO_3. Distinguished from arsenopyrite by its darker colour and inferior hardness.

Strontiodresserite. $(Sr,Ca)(Al_2CO_3)_2(OH)_4\bullet H_2O$. White silky flakes forming coatings; white spheres (1 mm in diameter). Effervesces in HCl. Associated with weloganite, strontianite, quartz in igneous sill rock, Francon quarry, Montréal, the type locality. Named for its chemical relationship to dresserite.

Strüverite. Black. Tantalum-rich variety of rutile.

Sudburyite. (Pd,Ni)Sb. Microscopic metallic grains occurring in cobaltite and maucherite. Identified by microscopic examination of polished section of ore minerals. Originally described from the Copper Cliff South and Frood mines, Sudbury, Ontario, and named for the locality.

Sulphur. S. H = 1.5–2.5. Yellow, reddish, greenish tabular, bipyramidal crystals; massive. Transparent; greasy to resinous lustre. Black when admixed with pyrite from which it alters.

Sunstone. A feldspar (orthoclase or oligoclase) containing flaky inclusions of goethite or hematite that cause bright copper-coloured reflections. Used as a gemstone.

Syenite. An igneous rock composed mainly of feldspar with little or no quartz. Used as a building stone.

Sylvanite. $(Au,Ag)Te_2$. H = 1.5–2. Light grey to dark grey, metallic; prismatic or tabular crystals, bladed aggregates, granular. Associated with native gold and tellurides in vein deposits. Distinguished from other gold tellurides by its inferior hardness.

Sylvite. KCl. H = 2.5. Colourless, white, orange-red cubic crystals, or granular massive. Vitreous lustre. Sectile. Bitter taste. Soluble in water. Occurs with halite and gypsum. Used in fertilizers.

Synchisite. $(Ce,La)Ca(CO_3)_2F$. H = 4.5. Yellow to brown tabular or platy aggregates. Greasy, vitreous, or subadamantine lustre. Translucent. Soluble in acids. Associated with other rare-element minerals in pegmatite. Not easily distinguished in the hand specimen.

Synchisite-Y. $(Y,Ce)Ca(CO_3)_2F$. H = 6–7. Small pink to reddish-brown prisms; massive granular. Associated with yttrium minerals. Also known as doverite.

Szaibelyite. (Mg,Mn)(BO_2)(OH). H = 3–3.5. White, fine, fibrous or platy matted or hair-like aggregates. Silky lustre. Soluble in acids. Uncommon mineral not readily identified in the hand specimen.

Szmikite. $MnSO_4H_2O$. H = 1.5. White to pink, reddish stalactitic, botryoidal masses. Earthy. Secondary mineral found with manganese minerals.

Szomolnokite. $FeSO_4$•H_2O. H = 2.5. White to pinkish-white, fine, hair-like aggregates or finely granular encrustations; also botryoidal, globular crusts. Vitreous lustre. Metallic taste. Associated with pyrite and other iron sulphates from which it is not readily distinguishable in the hand specimen.

Talc. $Mg_3Si_4O_{10}(OH)_2$. H = 1. Grey, white, green, finely granular or foliated. Translucent with greasy feel. Massive impure varieties are known as steatite and soapstone, and because of their suitability for carving are used for ornamental purposes. Formed by alteration of magnesium silicates (olivine, pyroxene, amphibole, etc.) in igneous and metamorphic rocks. Used in cosmetics, ceramics, paint, plastic, rubber, chemical, roofing, and paper industries.

Tancoite. $HNa_2LiAl(PO_4)_2(OH)$. H = 4–4.5. Colourless to pink equant or tabular crystals, often elongated and commonly in parallel multiple growth. Transparent with vitreous lustre. Conchoidal fracture and two cleavages. Associated with lithiophosphate and apatite in spodumene-bearing pegmatite. Soluble in dilute HNO_3 and in HCl. Originally described from the Bernic Lake (Tanco) mine, Bernic Lake, Manitoba, for which it is named.

Tapiolite. $Fe(Ta,Nb)_2O_6$. H = 6–6.5. Black, short, prismatic or equant crystals with submetallic to subadamantine lustre. Rusty or greyish-brown to brownish-black streak. Occurs in granite pegmatite.

Tellurantimony. Sb_2Te_3. Pink, metallic, lath-like microscopic grains associated with altaite. Originally found in the Mattagami Lake mine, Mattagami, Quebec. Named for its composition.

Tellurobismuthite. Bi_2Te_3. H = 1.5–2. Dark grey, metallic, platy, foliated aggregates. Laminae flexible; sectile. Triangular striations on cleavage surfaces. Occurs in auriferous quartz veins. Accepted name is tellurobismuthite.

Temiskamite. Name was given to a bronze-coloured material with radiating structure occurring in the Elk Lake-Gowganda (Ontario) silver-cobalt deposits. Synonym for maucherite. Not a valid mineral name.

Tengerite. $CaY_3(CO_3)_4(OH)_3$•$3H_2O$. Dull white, powdery, fibrous coating, or encrustations; associated with yttrium minerals from which it alters.

Tennantite. $(Cu,Fe)_{12}As_4S_{13}$. H = 3–4.5. Dark grey to greyish-black, metallic, tetrahedral crystals; compact to granular massive. Black, brown to red streak. Occurs in hydrothermal veins with copper, lead, zinc, and silver minerals. Forms a series with tetrahedrite, but is much less abundant.

Tenorite. CuO. H = 3.5. Steel-grey to black, metallic, platy, lath-like, scaly aggregates; also black, submetallic, earthy, or compact masses with conchoidal fracture. Associated with other copper minerals; melaconite occurs in the oxidized portion of copper deposits. Ore of copper.

Tetradymite. Bi_2Te_2S. H = 1.5–2. Light grey, metallic, indistinct pyramidal crystals; also bladed, foliated, or granular aggregates. Blades are flexible, inelastic. Tarnishes to dull or iridescent surfaces. Soils paper as does graphite. Occurs with telluride and sulphide minerals in gold-quartz veins formed at moderate to high temperatures, and in contact metamorphic deposits.

Tetrahedrite. $(Cu,Fe)_{12}Sb_4S_{13}$. H = 3–4.5. Dark grey to greyish-black, metallic, tetrahedral crystals; granular to compact massive. Black to brown streak. Ore of copper; silver-rich variety may be important ore of silver. Occurs with chalcopyrite, galena, pyrite, sphalerite, bornite, and argentite in hydrothermal veins. Forms a series with tennantite.

Tetranatrolite. $Na_2Al_2Si_3O_{10}$•$2H_2O$. White prismatic crystals and fibrous aggregates; earthy. Translucent to opaque; vitreous to dull lustre. Transparent in specimens freshly broken from the rock, becoming white, opaque, friable on exposure to air. Associated with natrolite, analcime, microcline in nepheline syenite at Mount Saint-Hilaire, Quebec. Named for its structure, tetragonal natrolite. Zeolite group.

Thaumasite. $Ca_3Si(OH)_6(CO_3)(SO_4)$•$12H_2O$. H = 3.5. Colourless to white, acicular or massive. Transparent to translucent; vitreous, silky lustre to greasy. Occurs with calcium silicate and sulphate minerals.

Thenardite. Na_2SO_4. H = 2.5–3. Colourless, white, greyish, reddish, yellowish, brownish, powdery; tabular, dipyramidal crystals. Dull to vitreous lustre. Formed from evaporation of salt lakes.

Thomsonite. $NaCa_2Al_5Si_5O_{20}$•$6H_2O$. H = 5–5.5. White, pinkish-white to reddish, light green radiating columnar or fibrous masses; also compact. Vitreous to pearly lustre. Transparent to translucent. Associated with other zeolites. Massive variety used as a gemstone.

Thorbastnaesite. $Th(Ca,Ce)(CO_3)_2F_2$•H_2O. White silky fibres forming spheres less than 1 mm in diameter; coatings. Associated with baddeleyite, zircon (cyrtolite) at the Francon quarry, Montréal.

Thorianite. ThO_2. H = 6.5. Dark grey to black cubic crystals or rounded grains. Dull to submetallic lustre. Grey streak. Radioactive. Soluble in HNO_3 and H_2SO_4. Occurs in pegmatite, crystalline limestone, stream gravels.

Thorite. $ThSiO_4$. H = 5. Black to reddish-brown tetragonal prisms with pyramidal terminations; also massive. Resinous to submetallic lustre. Conchoidal fracture. Radioactive. Distinguished by its crystal form, radioactivity. Source of thorium. Occurs in pegmatite, crystalline limestone, and hydrothermal veins.

Thorogummite. $Th(SiO_4)_{1-x}(OH)_{4x}$. Grey, light brown, yellowish brown to dark brown, earthy, nodular, massive; encrustation or replacement of thorite or thorium minerals. Secondary mineral formed from thorium minerals.

Thucholite. Hydrocarbon containing U, Th, rare earth elements, and silica. H = 3.5–4. Jet black with brilliant lustre and conchoidal fracture. Occurs in pegmatite. Not a valid mineral species.

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.

Tochilinite. $6Fe_{0.9}S{\bullet}5(Mg,Fe)(OH)_2$. Black, finely fibrous, acicular, flaky, or platy aggregates; bronze lustre. Occurs in serpentine and in serpentine-bearing marble. Distinguished from graphite by its bronze lustre. Alteration product of pyrrhotite.

Tomichite. $(V,Fe)_4Ti_3AsO_{13}(OH)$. Minute, black, opaque, tabular crystals. Black streak. Associated with vanadian muscovite and quartz.

Tonalite. A quartz-rich diorite containing hornblende and biotite as the chief dark minerals.

Topaz. $Al_2SiO_4(F,OH)_2$. Colourless, white, light blue, yellow, brown, grey, or green prismatic crystals with perfect basal cleavage; also massive granular. Vitreous lustre, transparent. Distinguished by its crystal habit, cleavage, and hardness. Used as a gemstone.

Tourmaline. $Na(Mg, Fe)_3Al_6(BO_3)_3Si_6O_{18}(O,OH,F)_4$. H = 7.5. Black, dark green, blue, pink, brown, or yellow prismatic crystals; also columnar, granular. Prism faces are vertically striated. Vitreous lustre. Conchoidal fracture. Distinguished by its triangular cross-section in prisms and by its striations. Used in the manufacture of pressure gauges; transparent varieties are used as gemstones. Mineral group consisting of several species including dravite, schorl, elbaite, and uvite.

Trachyte. A light-coloured lava composed essentially of orthoclase with minor biotite, amphibole, and/or pyroxene.

Trap rock. Dark-coloured, fine-grained dyke rock.

Trembathite. $(Mg,Fe)_3B_7O_{13}Cl$. H = 6–8. Colourless to light blue transparent rhombohedral crystals. Vitreous lustre. Occurs with hilgardite and halite. Originally described from the Salt Springs potash deposit, Sussex, New Brunswick, and named in honour of Professor Lowell T. Trembath, University of New Brunswick.

Tremolite. $Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$. H = 5–6. White, grey, striated prismatic crystals, bladed crystal aggregates, or fibrous; perfect cleavage. Usually occurs in metamorphic rocks. Fibrous variety is used for asbestos. Monoclinic member of amphibole.

Triphylite. $LiFePO_4$. H = 4–5. Greenish to bluish grey, cleavable to compact massive; prismatic crystals rare. Transparent to translucent with vitreous to subresinous lustre. Occurs with lithium and phosphate minerals in granite pegmatite.

Troctolite. A gabbro with olivine as the dominant ferromagnesian component.

Trondhjemite. A light-coloured igneous rock composed mainly of Na-plagioclase with quartz and biotite.

Tuff. A rock formed from volcanic ash.

Tundrite. $Na_2Ce_2(Ti,Nb)SiO_8{\bullet}4H_2O$. H = 3. Brownish or greenish-yellow acicular crystals occurring individually or forming spheres. Occurs in nepheline syenite.

Tungstenite. WS_2. H = 2.5. Dark grey, metallic, massive, or fine scaly aggregates. Associated with scheelite, wolframite, and sulphide minerals.

Tungstite. $WO_3{\bullet}H_2O$. H = 2.5. Yellow to yellowish-green aggregates of microscopic plates, or powdery to earthy masses. Resinous or pearly lustre. Oxidation product of tungsten minerals.

Tungusite. $Ca_4Fe_2Si_6O_{15}(OH)_6$. H ~ 2. Green to yellow-green platy aggregates resembling chlorite. Pearly lustre. Associated with analcime and other zeolites in lava.

Tvalchrelidzeite. $Hg_{12}(Sb,As)_8S_{15}$. Dark grey, metallic, granular aggregates with dark reddish tint. Adamantine lustre. Associated with cinnabar and realgar.

Twinnite. $Pb(Sb,As)_2S_4$. Black, metallic, minute grains. Streak is black with brownish tint. Rare mineral associated with other sulphosalts. Originally described from a prospect pit near Madoc, Ontario.

Type locality. Locality from which a mineral species was originally described.

Ulexite. $NaCaB_5O_6(OH)_6{\bullet}5H_2O$. H = 1. White with silky lustre. Occurs as nodules composed of fine fibres and as compact fibrous veins. Source of borax. Occurs in gypsum deposits in Nova Scotia and New Brunswick.

Ullmannite. NiSbS. H = 5–5.5. Silver-white to grey, metallic, cubic, octahedral, or pyritohedral crystals with striations on cube faces. Greyish-black streak. Perfect cleavage. Occurs with nickeline and other nickel minerals in vein deposits. Distinguished from pyrite by its colour.

Umangite. Cu_3Se_2. H = 3. Bluish-black grains or massive granular. Metallic lustre. Associated with copper sulphide and selenide minerals such as chalcocite, chalcomenite, and chalcopyrite.

Unakite. A rock consisting of pink to orange-red feldspar, epidote, and some quartz. Used as an ornamental stone.

Uraconite. Probably a uranium sulphate. Yellow to green, earthy, nodular, scaly, or botryoidal crust. Not a valid mineral species.

Uraninite. UO_2. H = 5–6. Black, brownish-black cubic or octahedral crystals; also massive, botryoidal. Submetallic, pitchy to dull lustre. Uneven to conchoidal fracture. Radioactive. Distinguished by its high specific gravity (10.3 to 10.9), crystal form, and radioactivity.

Uranophane. $(H_3O)_2Ca(UO_2)_2(SiO_4)_2{\bullet}3H_2O$. H = 2–3. Yellow fibrous, radiating aggregates; massive. Occurs with uraninite from which it alters.

Uranothorite. $(Th,U)SiO_4$. H = 4.5–5. Black prismatic crystals, grains. Pitchy lustre. May have orange-coloured sunburst effect on enclosing rock. Radioactive. Occurs in granitic and pegmatitic rocks. Granular variety distinguished from thorite and uraninite by X-ray methods. Variety of thorite containing uranium. Not a valid mineral name.

Uranpyrochlore.$(U,Ca,Ce)_2(Nb,Ta)_2O_6(OH,F)$. H = 4.5. Yellowish-brown to black octahedral crystals, or massive. Resinous to adamantine lustre. Occurs in granite pegmatite. Pyrochlore group.

Valentinite. Sb_2O_3. H = 2.5–3. Colourless, 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 secondary antimony oxides resulting from oxidation of metallic antimony minerals.

Valleriite. $4(Fe,Cu)S{\bullet}3(Mg,Al)(OH)_2$. Very soft, sooty. Bronze-black, platy, massive with perfect cleavage. Occurs in high-temperature copper deposits.

Veatchite. $Sr_2B_{11}O_{15}(OH)_5 \bullet H_2O$. H = 2. Colourless, transparent, platy or prismatic crystals; white fibrous masses with silky lustre. Occurs with howlite, colemanite, and other borate minerals.

Vermiculite. $Mg_3Si_4O_{10}(OH)_2 \bullet xH_2O$. H = 1.5. Silvery-amber or light brown, flaky, sheet-like aggregates. Pearly lustre. Expands or exfoliates on heating, which distinguishes it from mica. Formed by alteration of phlogopite and biotite. Used as an insulator in the construction industry, for concrete and plaster, as a lubricant, and as a soil conditioner.

Vesuvianite. $Ca_{10}Mg_2Al_4(SiO_4)_5(Si_2O_7)_2(OH)_4$. H = 7. Yellow, brown, green, violet 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 is distinguished by its ready fusibility and intumescence in a blowpipe flame. Also known as idocrase. Transparent varieties are used as a gemstone.

Villiaumite. NaF. H = 2–2.5. Dark red, pink, orange, finely crystalline or massive. Transparent; vitreous. Occurs in nepheline syenite.

Vinogradovite. $(Na,Ca,K)_4Ti_4AlSi_6O_{23} \bullet 2H_2O$. H = 4. Colourless to white fibrous and spherical aggregates; prismatic crystals less common. Transparent; vitreous. Occurs in nepheline syenite.

Violarite. $FeNi_2S_4$. H = 4.5–5.5. Light grey, brilliant metallic; tarnishes to violet-grey. Massive. Distinguished by its violet tarnish. Associated with copper, nickel, and iron sulphides in vein deposits. Rare mineral.

Vivianite. $Fe_3(PO_4)_2 \bullet 8H_2O$. H = 1.5–2. Colourless transparent on fresh surfaces, becoming blue, greenish-blue to dark blue translucent due to oxidation. Vitreous to dull lustre. Prismatic crystals; bladed, globular, fibrous, powdery to earthy aggregates. Streak is colourless to bluish white, quickly altering to dark blue or brown. Soluble in acids. Darkens in H_2O_2. Occurs as a secondary mineral in metallic ore deposits and as a weathering product of iron-manganese phosphates in pegmatite.

Vlasovite. $Na_2ZrSi_4O_{11}$. Colourless to light brown crystals and grains. Vitreous, pearly, or greasy lustre. Excellent cleavage. Occurs in alkalic rocks.

Voggite. $Na_2Zr(PO_4)(CO_3)(OH) \bullet 2H_2O$. Colourless, transparent, acicular, microscopic crystals; white matted fibres. Occurs in centimetric cavities in an amygdaloidal basalt dyke cutting a weloganite-bearing sill at the Francon quarry, Montréal, the type locality. Resembles dawsonite. Name in honour of its discoverer, mineral collector Adolf Vogg of Arnprior, Ontario.

Volkovskite. $KCa_4[B_9O_8(OH)_4]_4[B(OH)_3]_2Cl \bullet 4H_2O$. H = 2.5. Colourless to pink thin platy crystals. Transparent with vitreous lustre. Occurs with other borate minerals in potash deposits.

Voltaite. $K_2Fe_9(SO_4)_{12} \bullet 18H_2O$. H = 3. Greenish-black to black, dark green cubic or octahedral crystals; also massive granular. Resinous lustre. Greyish-green streak and conchoidal fracture. Decomposed by water, leaving a yellow precipitate. Soluble in acids. Associated with other iron sulphate minerals.

Wacke. A sandstone consisting of generally unsorted angular mineral and rock fragments in a clay-silt matrix.

Wad. A field term used for substances consisting mainly of manganese oxides.

Wakefieldite. YVO_4. H = 5. Amber, yellow, brownish, white, grey, pulverulent; coatings. Dull lustre. Occurs in pegmatite with rare-element minerals. Named for Wakefield Lake, Quebec, which is near the Evans-Lou mine, the type locality.

Wallrock. Rock forming the walls of a vein, dyke, or other ore deposit.

Warwickite. $(Mg,Ti,Fe,Al)_2(BO_3)O$. H = 3.5–4. Black opaque prismatic crystals without terminations, rounded grains, granular aggregates. Adamantine to submetallic, dull, or pearly lustre. May have coppery-red tarnish on the surface. Occurs with spinel, chondrodite, serpentine in crystalline limestone.

Waterlime. A clayey limestone containing alumina, silica, and lime in the proper proportions to produce cement by the addition of water. Also known as 'cement rock'.

Wehrlite. Mixture of hessite (Ag_2Te) and pilsenite (Bi_4Te). Not a valid mineral species.

Weloganite. $Sr_3Na_2Zr(CO_3)_6{\bullet}3H_2O$. H = 3.5. Transparent yellow to orange-yellow, colourless prismatic crystals terminated by pyramids; also massive. Conchoidal fracture. Vitreous lustre. Effervesces in HCl. Originally found at the Francon quarry, Montréal, and named for Sir William E. Logan, first director of the Geological Survey of Canada.

Whitlockite. $Ca_9(Mg,Fe)H(PO_4)_7$. H = 5. Colourless to white, grey, or yellowish rhombohedral crystals; granular to earthy massive. Transparent to translucent with vitreous to subresinous lustre. Soluble in dilute acids. Occurs in phosphate rock deposits and in pegmatite.

Willemite. Zn_2SiO_4. H = 5.5. Colourless, yellow, green, white, reddish brown, massive or granular; also prismatic crystals. Vitreous lustre. Soluble in HCl. May fluoresce green. Nonfluorescent variety difficult to identify in hand specimen. Minor ore of zinc.

Wilsonite. An altered scapolite (to muscovite). Pink, rose-red, mauve to violet. Translucent variety used as a gemstone. Named for Dr. James Wilson of Perth, Ontario, where it was originally found. Not a valid mineral name. Pinite is the preferred term for muscovite alteration from scapolite, feldspar, or spodumene.

Witherite. $BaCO_3$. H = 3–3.5. Colourless to white, greyish, yellowish, greenish, or brownish six-sided dipyramids and prisms; also tabular, globular, botryoidal, fibrous, or granular massive. Transparent to translucent with vitreous to resinous lustre. Effervesces in dilute HCl. Occurs with barite and galena in low-temperature hydrothermal veins.

Wittichenite. Cu_3BiS_3. H = 2–3. Grey, metallic, tabular crystals, or columnar, acicular aggregates; massive. Fuses easily. Soluble in HCl and gives off H_2S; decomposed by HNO_3. Alters readily to yellowish-brown, red, blue, and eventually forms covellite.

Wodginite. $(Ta,Nb,Sn,Mn,Fe)_{16}O_{32}$. H ~ 6. Reddish-brown to dark brown and black irregular grains. Submetallic lustre. Occurs in granitic rocks. Ore of tantalum with uses in electrolytic, nuclear reactor, and aircraft industries.

Wöhlerite. $NaCa_2(Zr,Nb)Si_2O_8(O,OH,F)$. H = 5.5–6. Yellow, brown, orange tabular or prismatic crystals. Vitreous lustre. Occurs in nepheline syenite. Rare mineral.

Wolframite. $(Fe,Mn)WO_4$. H = 4–4.5. Dark brown to black, short, prismatic striated crystals; lamellar or granular. Submetallic to adamantine lustre. Perfect cleavage in one direction. Distinguishing features are colour, cleavage, and high specific gravity (7.1–7.5). Ore 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 in ultraviolet light. Distinguished from tremolite (H = 6) and sillimanite (H = 7) by its inferior hardness and by its solubility in HCl. Occurs in crystalline limestone and skarn zones. Used in ceramics and paints.

Woodhouseite. $CaAl_3(PO_4)(SO_4)(OH)_6$. H = 4.5. Violet, pink, white, or colourless tiny, pseudocubic striated crystals. Vitreous, transparent. Secondary mineral associated with topaz, lazulite, pyrophyllite.

Wurtzite. (Zn,Fe)S. H = 3.5–4. Brownish-black resinous crystals (pyramidal, prismatic, tabular) or fibrous, columnar, concentrically banded crusts. Like sphalerite, but has darker colour and brown streak. Occurs with sulphide minerals.

Wulfenite. $PbMoO_4$. H = 3.5-4. Orange to yellow, orange-brown, tan, brown transparent to translucent square to thin tabular, octahedral, or prismatic crystals; massive, granular. Resinous. Secondary mineral in oxidation zone associated with vanadinite, mimetite, pyromorphite, galena, cerussite.

Xanthoconite. Ag_3AsS_3. H = 2–3. Dark red to orange or brown tabular or lath-shaped crystals. Adamantine lustre. Orange-yellow streak. Fuses readily. Associated with ruby silver; at LaRose mine and at Keeley mine, Cobalt, Ontario.

Xenotime. YPO_4. H = 4.5. Reddish or yellowish-brown, grey prismatic crystals similar to zircon. Vitreous to resinous lustre. Distinguished from zircon by its inferior hardness. Occurs in pegmatite and alkalic igneous rocks.

Xonotlite. $Ca_6Si_6O_{17}(OH)_2$. H = 6.5. Pink to white, microscopic to fine, compact fibrous masses. Vitreous to waxy lustre. Very tough. Weathered surface is chalk white. Pink variety is used as a gemstone.

Yarrowite. Cu_9S_8. Dark grey to black, metallic, flaky or platy (microscopic) aggregates with green-violet iridescence. Associated with chalcopyrite, bornite, and other copper minerals from which it alters. Indistinguishable in the hand specimen from spionkopite. Originally described from the sandstone and quartzite copper deposits in the Yarrow and Spionkop Creeks area, southwestern Alberta; named for the locality.

Yofortierite. $Mn_5Si_8O_{20}(OH)_2(OH_2)_4{\bullet}8\text{–}9H_2O$. H = 2.5. Pink to violet radiating fibres. Associated with analcime, serandite, eudialyte, polylithionite, aegirine, microcline, and albite in pegmatite veins cutting nepheline syenite at Mount Saint-Hilaire, Quebec, the type locality. Named in honour of Dr. Y.O. Fortier, Arctic geologist and director (1964–1973) of the Geological Survey of Canada.

Yttrofluorite. Yttrian fluorite with yttrium substituting for Ca. Yellow, brown, violet, or blue, granular massive. Density and hardness are somewhat greater than in fluorite. Not a valid mineral name.

Yttrotantalite. (Y,U,Fe)(Ta,Nb)O_4. H = 5–5.5. Black to dark brown prismatic or tabular crystals; irregular grains, massive. Submetallic, vitreous to greasy lustre and conchoidal fracture. Grey streak. Occurs in pegmatite.

"Yukon diamond". A term used in the North for concentrically banded black, dark brown, or tan cassiterite pebbles found in placers in the Yukon Territory. Also known as 'wood tin'. Used as a gemstone.

Yukonite. $Ca_3Fe_3(AsO_4)_4OH \bullet 12H_2O$. H = 2–3. Black to dark brown irregular masses. Decrepitates at low heat and when immersed in water. Easily fusible. Found originally at Tagish Lake, Yukon Territory. Named for the locality.

Zavaritskite. BiOF. Yellow to grey, granular to powdery, with greasy to submetallic lustre. Associated with bismutite, bismuthinite, bismuth.

Zeolites. A group of hydrous silicates of related composition, but differing crystallization; water is given off continuously when heated, but can be taken up again. Heulandite, chabazite, stilbite, natrolite, analcime belong to this group. Formed from magmatic or hydrothermal solutions, or by alteration of feldspar minerals. Used as water softeners, as gas and impurity absorbents, and in heat reservoirs.

Zinc. Zn. H = 2. Light grey, metallic crystals, grains, scales. Brittle. Perfect cleavage. Formed from oxidation of sphalerite.

Zinkenite. $Pb_9Sb_{22}S_{42}$. H = 3–3.5. Grey, metallic, columnar to radial fibrous aggregates, massive; indistinct slender striated prisms. Tarnishes to iridescent surfaces. Occurs with stibnite, jamesonite, and other sulphosalts, and galena, pyrite, and sphalerite in veins formed at low to moderate temperatures.

Zircon. $ZrSiO_4$. H = 7.5. Pink, reddish to greyish-brown tetragonal prisms terminated by pyramids; also colourless, green, violet, or grey. May form knee-shaped twins. Adamantine lustre. May be radioactive. Distinguished by its crystal form, hardness. Ore of zirconium and hafnium. Used in moulding sand, ceramics, and refractory industries; transparent varieties are used as gemstones.

Zoisite. $Ca_2Al_3(SiO_4)_3(OH)$. H = 6.5. Grey to brownish-grey, yellowish-brown, violet-pink, green aggregates of long prismatic crystals (striated); also compact fibrous to columnar masses. Vitreous to pearly lustre. Transparent to translucent. Massive variety distinguished from amphibole by its perfect cleavage. Transparent varieties used as gemstones; pink variety known as 'thulite', transparent blue variety, as 'tanzanite'.

References: 29; 59; 77; 78; 100; 105; 156; 157; 167; 172; 173; 180; 222; 233; 234; 235; 290.

CHEMICAL SYMBOLS FOR SELECTED ELEMENTS

Ag - silver
Al - aluminum
As - arsenic
Au -gold
B - boron
Ba - barium
Be - beryllium
Bi - bismuth
Br - bromine
C - carbon
Ca - calcium
Cd - cadmium
Ce - cerium
Cl - chlorine
Co - cobalt
Cr - chromium
Cs - cesium
Cu - copper
Dy - dysprosium
Er - erbium
F - fluorine
Fe - iron
Ga - gallium
Gd - gadolinium
Ge - germanium
H - hydrogen
Hf - hafnium
Hg - mercury
I - iodine
In - indium
Ir - iridium
K - potassium
La - lanthanum
Li - lithium
Mg - magnesium
Mn - manganese
Mo - molybdenum
N - nitrogen
Na - sodium
Nb - niobium
Nd - neodymium
Ni - nickel
O - oxygen
P - phosphorus
Pb - lead
Pd - palladium
Pt - platinum
Rb - rubidium
Re - rhenium
Rh - rhodium
Ru - ruthenium
S - sulphur
Sb - antimony
Sc - scandium
Se - selenium
Si - silicon
Sm - samarium
Sn - tin
Sr - strontium
Ta - tantalum
Te - tellurium
Th - thorium
Ti - titanium
Tl - thallium
U - uranium
V - vanadium
W - tungsten
Y - yttrium
Yb - ytterbium
Zn - zinc
Zr - zirconium

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