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LOUVICOURT TOWNSHIP, ABITIBI-EAST COUNTY

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QUEBEC DEPARTMENT OF NATURAL RESOURCES

Honorable Paul-E. Allard, Minister

MINES BRANCH

GEOLOGICAL REPORT 135

LOUVICOURT TOWNSHIP

ABITIBI-EAST COUNTY

By
John I. Sharpe

QUEBEC
1968

MINERAL DEPOSITS SERVICE

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Abitibi-East County

by

John I. Sharpe

INTRODUCTION

Louvicourt township is located at the eastern extremity of the extensive zone of Precambrian gold deposits known as the "gold belt" which extends across northwestern Quebec. This favorable geologic setting, and the presence of numerous small deposits of gold and copper, have encouraged much prospecting, development work, and some mining, at various times since 1929. The present work was undertaken to integrate the considerable data from previous surveys* and records of mining companies into a detailed geologic map.

Louvicourt township covers 100 square miles and is centered near latitude 48°06' and longitude 77°28'. Provincial highways 58 and 59, and a branch of the Canadian National Railways cross the area, connecting with the town of Val-d'Or, which is 10 miles to the east. Numerous old roads and trails provide easy access to most parts of the area except to the south part, which may be reached via Louvicourt river.

The field work done in 1964 consisted of the mapping of outcrops, trenches and drill-hole collars at scales from 1 inch equals 100 feet to 1 inch equals 1,000 feet, according to the complexity of the geology. As the locations of most outcrops are indicated on previous geologic maps, systematic traverses were done only where air photos indicated the possibility of unmapped exposures. However, all outcrop areas were remapped. Drill-hole records and some cores from approximately 1,000 surface holes were examined, along with information from underground workings. Data from detailed ground magnetometer surveys were used to locate certain of the contacts of magnetite-bearing rocks.

Township range lines provided the prime survey controls. Picket lines, air photos at 1,000 feet to the inch and pace and compass traverses served to tie in most outcrops. Survey lines, drill-hole collars, etc. from much of previous exploration work are difficult to locate and may not always be depicted accurately on the present maps.

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*References at end of report.

A few areas have abundant outcrops. Elsewhere, only low exposures protrude through the thick glacial deposits. The numerous drill-holes thus provide essential geologic information as they commonly penetrate zones of structural disturbance and altered rock-types particularly susceptible to denudation.

C. Ritter and L.A. Dorr ably assisted the field work and Mr. Ritter, senior assistant, mapped in detail much of the eastern part of the area.

Acknowledgements

The writer is indebted to the many individuals who provided access to their records on past exploration. Particular thanks are due to Jean Lavallée, formerly chief geologist for East Sullivan Mines Ltd.; J.P. Bonneville, manager of Sullivan Consolidated Mines Ltd.; and Neil MacIsaac, geologist at Bevcon Mines Ltd.

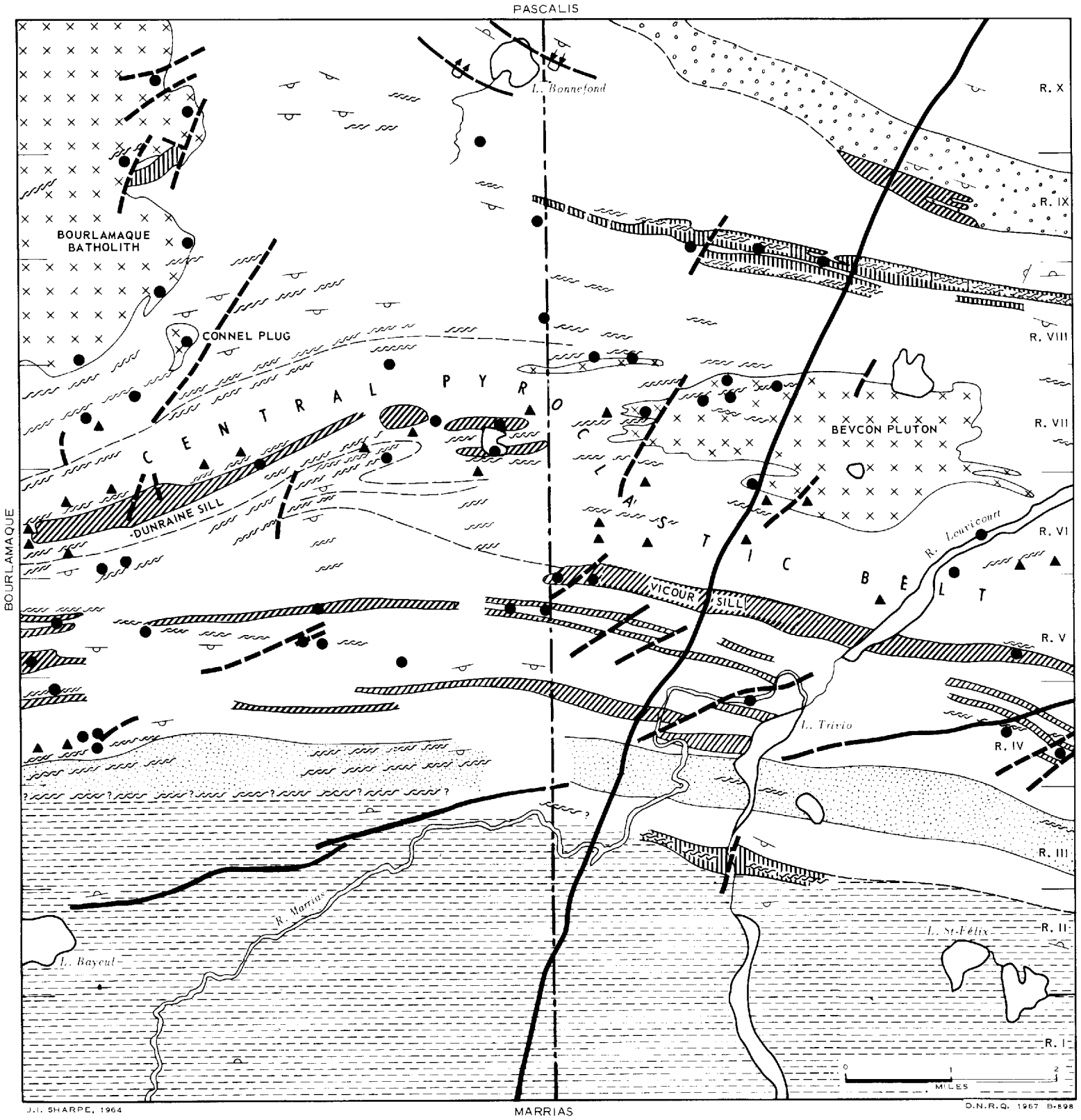
Previous Work

Robert Bell's (1900) reconnoitre of the Bell river was the earliest geological observation in the region. During the first part of the 20th century, reconnaissance surveys by the Geological Survey of Canada extended to the north and west of the map-area. That of James and Mawdsley (1928) covered the northwest corner of the township. In 1932, studies by Hawley (1931), L.V. Bell and A.M. Bell (1932) for the Quebec Bureau of Mines indicated the salient geological features of the area. Denis (1937) mapped in detail the area of metallized rocks in the central part of the township. Comprehensive preliminary maps for each quarter of the township at 1 inch equals 1,000 feet were made by Norman (1945). Since Norman's work, a number of property examinations have been made by officers of the Quebec Department of Mines. They also collected a large amount of useful data from prospectors through the years. Despite the large amount of field work, comprehensive geological descriptions remain to be published.

DESCRIPTION OF AREA

The main settlement is the village of Louvicourt situated on Highway No. 58 in the east part of range VI. A few houses are found along highways and mine sites and there are summer cottages around Bayeul lake.

The area is approximately 1,050 feet above sealevel and is flat except for two esker-ridges, local kame mounds, and small uplands in the areas of outcrop. These protrude through glacial outwash and the lacustrine deposits of glacial lake Barlow-Ojibway which blanket extensive muskeg swamps. Small paludified kettle lakes dot the eskers.



LATE PRECAMBRIAN

- Diabase dike

EARLY PRECAMBRIAN

- Granodiorite and allied rocks
- Diorite gabbro
- Serpentinized ultrabasic rocks
- Mainly volcanic rocks

PONTIAC GROUP

- Metasedimentary schists

TRIVIO GROUP

- Sedimentary rocks

GARDEN ISLAND LAKE GROUP

- Sedimentary rocks

SYMBOLS

- Copper, zinc
- Gold
- Top determination
- Longitudinal shear zone
- Assumed transverse fault
- Fold axis: (a) anticline, (b) syncline

Fig. 1

GENERAL STRUCTURE AND STRATIGRAPHY

LOUVICOURT TOWNSHIP

Louvicourt lake, and contiguous Trivio lake and Sleepy lake are wide parts of the Louvicourt river which flows across the southeast part of the township. Marrias, Louvicourt and Tiblemont rivers drain the area northward to James bay via Bell and Nottaway rivers. The waters of Colombière river reach James bay via the Harricana river.

Approximately 60% of the land has been cut over for timber or burned, leaving a scrubby intergrowth and small stands of stunted black spruce, poplars, birch and a few tamarack. Large areas mantled by glacio-fluvial sands and gravels are overgrown with jack pine. Several marketable spruce stands occur east of Bayeul lake, along Marrias river in the southwest corner of the area, and in the southeast quarter of the township.

GENERAL GEOLOGY

Thick piles of Early Precambrian lavas and pyroclastic rocks trend eastward across the area, dip steeply north, and generally face southward. Graywacke, arkosic graywacke and other sedimentary rocks are intercalated with the volcanic units, and an extensive area of sedimentary rocks, metamorphosed to quartz-biotite schists, occurs south of the volcanic assemblage.

Numerous intrusions, which range in composition from pyroxenite to granitic rocks, invade the volcanic rocks. The most extensive of these are swarms of dioritic sills and large plutons of granodiorite.

The volcanic and sedimentary rocks exhibit variable states of dynamic, thermal and metasomatic metamorphism; the most prevalent is the development of moderately schistose fabrics and chlorite, epidote and sericite. Higher degrees of metamorphism are found near the larger plutons and in biotitic and amphibolitic rocks in the south part of the area.

The prime deformation structures are extensive longitudinal schist zones and sets of transverse faults. Although some interformational folds are recognized, the main part of the volcanic units appear to face south and occupy an overturned homocline with a gross stratigraphic thickness exceeding 5 miles.

TABLE OF FORMATIONS

QUATERNARY	Recent Pleistocene	Palustrine deposits, minor fluvial silts, till, morainal deposits, glacio-fluvial and glacio-lacustrine sand, gravel, silt and clay
Unconformity		
LATE PRECAMBRIAN		Diabase, quartz diabase dikes
?		? Intrusive Contact
EARLY PRECAMBRIAN	Intrusive Rocks	Quartz veins, mafic dikes, quartz-feldspar porphyry, quartz-feldspar-amphibole porphyry - Bourlamaque batholith, Cornell plug, Bevcon pluton; sodic granodiorite and affiliated rocks - Diorite, quartz diorite, gabbro (include sub-volcanic intrusions), talc-serpentine, serpentinized pyroxenite and peridotite
	Intrusive Contact	
	Pontiac Group - - - ? - - Trivio Group	Quartz-biotite schist, metamorphosed sedimentary rocks (structural and chronological relations to Trivio Group not established) - - - - - - - - - - - ? - - - - - - - - - - - Graywacke, conglomerate, argillite, graphitic phyllite, tuff, chert, minor lava members
	Main volcanic assemblage (Malartic Group)	Rhyolite, rhyodacite, dacite, trachyte, spherulitic lava, andesite-basalt lava, breccia, agglomerate, tuff, minor members of chert, graphitic siltstone, arkosic graywacke and volcanic conglomerate
	Garden Island Lake Group	Graywacke, phyllite, tuff
	Pre-Garden Island Lake volcanic rocks	Pillowed intermediate lavas and pyroclastic rocks (incompletely exposed)

Volcanic Rocks
(Malartic Group and Pre-Garden Island)

Lavas, various types of pyroclastic rocks, tuffaceous sedimentary rocks and intrusive rocks affiliated with the lavas underlie most of the northern two-thirds of the township. Some assemblages, with distinctive lithology or marker horizons, are persistent, steep-dipping, stratiform units which trend east across the area. However stratigraphic relations commonly appear incoherent due to facies changes and interfingering of lithologic types. Longitudinal faults and interformation folds may further complicate stratigraphic relations, particularly across the medial part of the area.

The volcanic rocks are everywhere altered and usually converted to the mineral assemblages of low-grade metamorphism. Near intrusions they may be amphibolitized and albitized and, elsewhere, converted to schists. However, the primary characteristics of texture, structure and composition are sufficiently well preserved in parts of all major units to allow classification.

Top determinations on pillowed lavas and graded beds, combined with strike continuity, indicate that the main parts of the volcanic assemblage face southward and are usually slightly overturned.

Lava Units

The lavas range from quartz porphyritic rhyolite to greenish black basalt. The main varieties which were distinguished in the field are: rhyolite, dacite, trachyte, rhyodacite, and andesite-basalt. There are also some units which are markedly porphyritic, spherulitic or variolitic. The designations on the maps: "unclassified volcanic rock", "intermediate volcanic rock" are used in areas which need additional specific information.

The rhyolitic rocks usually have hard, brittle, aphanitic or spherulitic matrices and phenocrysts of quartz and feldspar. Individual units tend to be small, lenticular masses such as those along the west end of range-line VI/VII. A larger mass of porphyritic rhyolite, aplitic rhyolite and coarse breccia crops out in lot 40, range VI. This may be a domical protrusion into the enclosing pyroclastic unit. A similar complex mass of rhyolitic composition underlies the central part of the Akasaba property at the west end of range IV.

Relatively fresh rhyolite is seen under the microscope to consist of polysynthetically-twinned albite phenocrysts (10%) and quartz phenocrysts (15%), set in a microlitic matrix with accessory muscovite, chlorite and tiny grains of iron oxide. Staining tests with sodium-cobaltinitrite indicate that the rhyolites contain little potassic feldspar and should be termed sodic rhyolite or quartz keratophyre.

The dacitic lavas are light green to gray, moderately hard rocks which usually are characterized by bun-type pillows. Transitional types grade to gray-colored, softer, more feldspathic and less siliceous sodic trachyte (or leuco-andesite) or to harder, more vitreous, rhyodacite. The three prominent rocks – rhyodacite, trachyte and dacite – may be referred to collectively as feldspathic lavas since distinctions are difficult to make in the field and the divisions may be somewhat arbitrary.

These feldspathic lavas are particularly abundant within a thick unit of pyroclastic rocks which underlies much of ranges VI and VII. Spherulitic facies and pillowed varieties are well exposed near the southeast corner of the Beacon Mines property in the west part of range VIII. An unusually thick flow of porphyritic trachyte with phenocrysts of altered plagioclase crops out in the northwest corner of range VI.

A zone of distinctive spherulitic lavas, more than 2,000 feet thick, extends eastward along range V and then swings southward to crop out at the east end of range IV. This is an important marker unit as its southern contact (with pillowed mafic lava) was determined to be the top of the unit and was traced across the area.

The spherulitic rocks are characterized by myriad ellipsoidal aggregates of cherty quartz and feldspar which may be distributed in streams through a lithoidal base or become concentrated as an aggregate of spheroids with narrow selvages of chlorite. The spheroids range from indistinguishable to 20 mm. in diameter. In places, a faint radial or concentric structure may be discerned but usually the spherules (or varioles) appear to have been replaced by cherty silica. Where these rocks become schistose, such as at the west end of range V, the ellipsoids are smeared out and fragmented, and the rocks resemble a coarse tuff.

An assemblage of mafic lavas composed of andesite or basalt overlies the above-mentioned spherulitic unit. In the western part of the township the assemblage is approximately 3,000 feet thick, and is gradually diminished to 1,000 feet in thickness at the east boundary of the area. Similar rocks, in what appear to be lens-shaped piles, are intercalated with feldspathic lavas and pyroclastic materials in the north part of the area.

The mafic lavas are rich in chlorite, epidote and amphibole and range in color from medium green to greenish black. Some contain minor amounts of quartz; others are extremely mafic. In general they may be termed andesite-basalt. Most occurrences exhibit large elongate pillows with lithoidal textures. Some pillows are marked by a variolitic rim or encased in coarse tuff or agglomerate.

The pillowed flows may grade along strike or across strike to massive lavas with diabasic or granular textures. Individual massive

PLATE I

a) Epidotized flow breccia impregnated with chert (white) in outcrop 700 feet north of Akasaba Mines shaft, range IV.

b) Laminated chert with pyrite, possibly a thermal spring deposit, 1,700 feet north of Akasaba Mines shaft, range IV.

flow units may be recognized where their margins are marked by flow breccia or narrow tuff beds but, where these features are not exposed, they are indistinguishable from narrow, fine-grained sills of similar composition.

Probably, many of the dioritic sills outlined in ranges IV and V are sub-volcanic intrusions, particularly those at the west end of range V where irregular apophyses may be feeders to the overlying mafic lavas. It is noteworthy that dioritic intrusions are not found in the sedimentary rocks overlying the volcanic assemblage. Their absence suggests that the diorite intrusions were emplaced during the volcanism.

The mafic and feldspathic lavas, whether foliated or essentially undeformed, are considerably altered. The mafic rocks are commonly metasomatized to epidote-rich material and, in some places, are impregnated with silica (Plate I). The andesite-basalt in the north-central part of the township is carbonatized over large areas. Around the Bourlamaque batholith the rocks are speckled with metacrysts of albite, and the rocks in contact with the west end of the granodiorite pluton in the eastern part of range VII are converted to maculose hornfels.

Where sheared, the andesite-basalt units are generally converted to chlorite-epidote-albite schists and the feldspathic lavas and rhyolitic rocks to quartz-sericite schists, with or without chlorite.

Pyroclastic Deposits

Lenses and layers of pyroclastic rocks are interstratified with the lavas throughout the area. Particularly thick and extensive accumulations are found along a zone which trends eastward across the area. This zone, referred to as the "central pyroclastic belt" (Figure 1), is bounded on the north (in a transitional fashion) by a thick assemblage of mafic and feldspathic pillow-lavas. In its west part, at the end of range VI, the belt has an outcrop width of 4,000 feet and is intruded by a large diorite sill. The central and eastern parts are much wider and bounded on the south by a long mafic sill at the edge of the spherulitic unit. Another thick pyroclastic unit extends southeastward from Bonnefond lake across the northeast corner of the township. Less extensive deposits occur along the southeast flank of the Bourlamaque batholith and within the stratiform units of spherulitic lavas and mafic lavas in the south part of the volcanic sequence.

The pyroclastic units include tuff and agglomerate; welded pyroclastic rocks; volcanic conglomerates; tuffites and some sedimentary rocks of tuffaceous appearance. The term volcanic conglomerate refers to a rock consisting of fragments of volcanic origin which have been rounded or which show evidence of transport by a fluvial agency. In general, the lithologic varieties of pyroclastic origin intergrade or are intimately

interbedded. Because the pyroclastic materials are inherently incompetent and susceptible to deformation and alteration, precise distinctions or delimitations of some types are usually difficult to make.

The most extensive pyroclastic units, such as those in the central belt, are a mélange of angular blocks, bombs and fragments composed of feldspathic and siliceous lava, scoria and chert. Usually these materials are not markedly bedded or sorted but may contain thin interbeds of tuff. These agglomerates may merge with underlying flow breccias in which the fragments are more homogeneous, less distinct, and set in lavoid matrices. Agglomerates also grade to lapilli tuffs wherein larger fragments become scarce and distributed through a predominantly medium-grained tuff matrix.

Beds of fine tuff, colored gray, green or rusty brown, occur as narrow layers between flows, as local interbeds in coarser debris and as relatively thick and extensive members. The tuffs vary extremely in appearance but, where they are medium grained, and not highly schistose, they usually can be best identified by close examination of clean weathered surfaces. Examples of interbedded tuffs and coarse agglomerates are well exposed near the road in lot 35, range VI.

A distinctive and unusually thick unit of welded breccia encompasses the southeast contact of the Bourlamaque batholith at the west end of range VII. Much of this unit appears to be welded lapilli tuff and agglomerate. Hand specimens are characterized by abundant large shards and fragments of chert and felsic material with blurred or melted edges, set in a variegated, siliceous, granulose matrix with splotches (amygdules ?) of epidote and quartz. Parts of this unit are not agglomeratic but appear to be brecciated and altered rhyodacite lava in which the occasional fragmented pillow can be identified.

In general, the coarser pyroclastic debris do not appear to be water-worked. Some volcanic conglomerates occur in the northeastern exposure of the Bonnefond Lake belt where well-rounded lava pebbles and cobbles are found in stratified feldspathic tuff or arkosic graywacke. The few exposures along the south margin of this belt such as in lot 42, range IX, are unusually well laminated and sorted and may be waterlain.

Extensive deposits of well-sorted graphitic tuff or siltstone and laminated tuffaceous materials or tuffite with interbeds of chert occur along the northern part of the central pyroclastic belt. Chert deposits (Plate 1), intercalated with agglomerate and pillowed lava, are well exposed at a point 700 feet north of the Akasaba shaft at the west end of range IV. These cherty layers may be thermal spring deposits and they usually are associated with sulfide minerals and carbonatized and silicified zones.

Sedimentary Rocks

Sedimentary rocks occur as intervolcanic groups which are within and generally conformable to the stratiform volcanic rocks, and as a metamorphosed sequence in the southern part of the area. The latter rocks are contiguous to the Pontiac Group (as defined by Wilson,1948, p. 677, Figure 4). The intervolcanic types are the Garden Island Lake Group, which traverses the northeast corner of the area, and the Trivio Group,which lies along the top (south) edge of the volcanic assemblage.

Garden Island Lake Group

The Garden Island Lake Group, within the area, consists of well-bedded, interstratified graywacke, phyllitic silty slate and tuffaceous beds. These are the western extension of the "Garden Island Lake Sediments" of Bell and Bell (1932, p. 75) in Vauquelin and Pershing townships.*

The group is more than 1,000 feet thick near the east end of range IX where outcrops show well-developed graded bedding which indicates that the unit faces southward and strikes northwest. The next outcrops are found north of the map-area, on strike, in Pascalis township and here again exhibit south-facing beds (McDougall, 1951).

The main members which may be observed are medium-grained, slightly schistose, greenish-gray beds of subgraywacke separated by narrow argillaceous beds or partings. The graywackes consist mainly of rounded quartz grains and scarce feldspar fragments in a chloritic micaceous matrix.

Trivio Group

The second unit, here named provisionally the Trivio Group, consists of heterogeneous beds of volcanic and sedimentary material which lie along the top of the volcanic pile. The rocks are not well exposed but the main members appear to be discontinuous beds of tuffaceous sedimentary rock, graywacke, arkose, graphitic phyllite, conglomerate, tuff, chert and lava. The eastern facies of the group, which outcrops near the highway in range III, is predominantly sedimentary: chloritic graywacke, arkosic graywacke, conglomerate, and the occasional narrow bed of phyllitic slate and argillite. The conglomerate members (in lot 55) contain elongated cobbles and pebbles of leached granitoid rock and felsite, set in a gritty arkosic base. Small beds of massive, coarse (0.5 to 1 mm. grain diameters) arkose are interbedded.

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* These rocks (and other groups to be discussed) are designated as "Kewagama group ?" on Norman's map (1945). Because the rocks appear to be discrete or different stratigraphic units, and cannot be correlated with certitude to the Kewagama Group of the Cadillac area, the older terminology seems preferable.

In this locality the group has an outcrop breadth of approximately 3,000 feet and is overlain by a thick lenticle of volcanic rocks which separate the Trivio Group* from the biotitic rocks of the Pontiac Group to the south.

The facies of the group in the central-western part of the area is at least 3,000 feet thick and contains more interstratified volcanic material. Drill-holes in this area intersect complex lithologies. One important member, approximately 500 feet thick, of fine-grained, well-stratified clastic materials, which resemble the interlava tuffs, contains disseminated magnetite and cherty beds. A magnetometer anomaly indicates that this unit trends N.85°E. and extends at least 2 1/2 miles. Beds of arkose probably are present also as a boulder of massive arkose (Plate II) was found at the west end of range IV.

Drill-holes along the northern edge of the group transect beds of graphitic argillite and tuffaceous rocks which appear to be disrupted by a mass of rhyolitic breccia at the west end of range IV. Outcrops of the group in the latter area are extremely schistose layered rocks of indeterminable origin.

The south contact of the Trivio Group in the west part of the area is not exposed. There is a possibility that a regional fault zone extends along the south edge of the group, separating it from the Pontiac rocks to the south.

Pontiac Group

The third major unit of sedimentary rocks, the Pontiac Group, is composed of rusty-weathering biotitic quartz-feldspar schists. Although these may have been graywacke, they are much more metamorphosed than the intervolcanic sedimentary rocks, and their primary textures are obscured by recrystallization and the imprint of a regional foliation.

Outcrops usually exhibit layering parallel to a secondary foliation marked by aligned biotite flakes. The regular and clearly defined layering is due to variations in the textures and relative proportions of felsic and biotitic grains. It is certainly a reflection of stratification. Cyclic bedding (Plate II) and graded beds may be recognized on clean exposures. Reliable top determinations could be made, in places, where the amount of biotite (which is assumed to have been argillaceous material) increases toward the top of the bed, coincident with a decrease in the grain size of the felsic constituents.

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* The lenticle is not included in the Trivio Group at this time as further mapping to the east may clarify its stratigraphic or structural relations.

PLATE II

a) Coarse Trivio Group arkose with poorly developed crossbedding and graded bedding. A glaciated boulder embedded in esker northeast of Bayeul lake.

b) Cyclic bedding in biotitic quartz-feldspar metasediment of Pontiac Group. Dark beds are laminated, biotitized argillite. Outcrop 2,500 feet northeast of Bayeul lake.

Microscopically, the schists are granulose aggregates of quartz and 5 to 35% clear sodic plagioclase. Biotite occurs as parallel shreds. Tiny skeletal porphyroblasts of spessartite (?) were observed in one thin section. The lack of chlorite is noteworthy.

The predominant foliation and layering trends eastward and dips steeply. Multiple S-planes, and consequent steep-plunging lineations and crenulations, are common in some sectors but appear to be erratic in both orientation and distinctiveness.

The stratigraphic and structural relations of the Pontiac Group to the volcanic rocks and intervolcanic sedimentary rocks pose major problems throughout the region. The general relations have led most field workers to consider that the thick sedimentary units, south of the volcanic complexes, are younger than the lavas but that the later stages of volcanism were synchronous with sedimentation (cf. Norman 1948, p. 822). Precise regional correlation between the intervolcanic sedimentary units is difficult. It would require interpretation of the influence of large-scale fault and fold structures.

No outcrops occur along the critical contacts in Louvicourt township but the following relations should be noted: both the lithology and state of metamorphism of the Pontiac and Trivio groups are markedly different. The Trivio clearly was deposited during volcanism as it has volcanic members and exhibits (with local exceptions) the same state of alteration (chlorite and sericite) as the volcanic assemblage. The north part of the Pontiac Group can be seen only in a few drill cores and in outcrops located approximately 3,000 feet south of the Trivio rocks. South of this interval the Pontiac rocks lack chlorite but are rich in biotite. A second feature is that the Pontiac rocks bear the imprint of relatively homogeneous regional foliation. The Trivio Group, though intensely schistose in places, usually does not have a marked deformation fabric. However, multiple S-planes are pronounced locally in both groups. A third feature is that determinations on graded beds indicate that substantial parts of the Pontiac Group have been folded to face northward, even in places that are adjacent to the south-facing volcanic complex. As the regional relations indicate that the volcanic rocks are older than the southern sedimentary rocks, the apparent superposition is anomalous. Though each of the relations mentioned above may be accounted for in several ways, together they constitute evidence that some major tectonic or stratigraphic discontinuity occurs along the north edge of the Pontiac Group.

Intrusive Rocks

A wide variety of plutons intrude the volcanic rocks and, to a lesser extent, the sedimentary units. Five main divisions from generally oldest to youngest are: 1) serpentinized peridotite and pyroxenite, diorite, quartz diorite and gabbro, 2) sodic granodiorite and affiliated rocks, 3) feldspar porphyry dikes, 4) "younger" basic dikes, 5) Late Precambrian diabase. The age relations and associations of many small intrusions have not been sufficiently established but, where evidence is available, the larger plutons of similar composition are of similar relative age.

Serpentinized Pyroxenite and Peridotite

Serpentinized ultrabasic rocks occur as an elliptical mass near the west end of range IX; as a series of long sills near range-line VIII and IX; and as a lenticular mass at the south end of Trivio lake.

The first-mentioned occurrence is a lobate re-entrant which appears to have been faulted down into the margin of the Bourlamaque batholith. Drill-holes indicate that much of the serpentine is underlain by granodiorite.

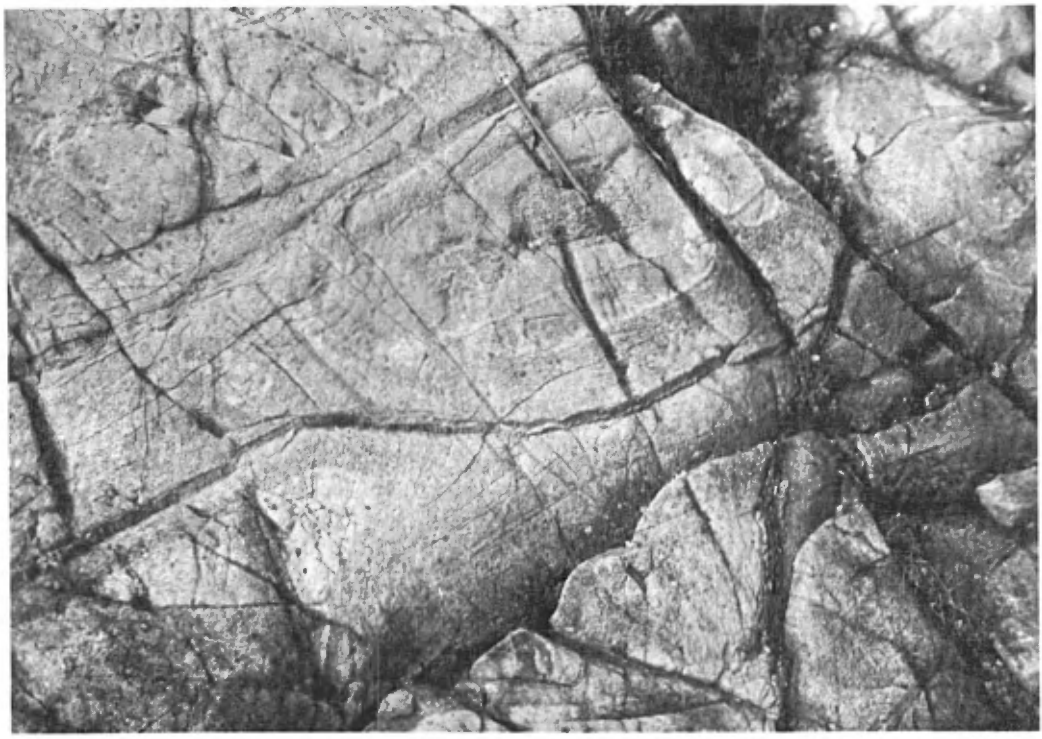
The ultrabasic rock is converted to blackish-green serpentine traversed by reticulating joints whose walls are lined in places with chrysotile. Much of the rock has a granular aspect which suggests a relic texture from peridotite. However, in the area located east of the road, patches of the serpentine have escaped complete textural destruction and exhibit a massive crystalline appearance suggestive of pyroxenite. The areas in which chrysotile is plentiful have a zonal serpentinization (Plate III) around the cores of blocks which are encompassed by the chrysotile-filled joints. The phenomenon is accentuated on weathered surfaces as a ferriferous envelope weathers brown.

Sills of serpentinized peridotite and talc-serpentine (-chlorite) schist extend for several miles along range-line VIII/IX. These intrusions and their wall rocks are highly schistose and probably lie along a zone of longitudinal faulting.

The occurrence at Trivio lake consists of massive and schistose talc and serpentine of uncertain parentage but, as the wall rocks have well defined contacts, the mass is probably an intrusion rather than a zone of magnesian metasomatism.

The ultrabasic intrusions are considered to be older than the granodiorite as dikes of this rock cut the serpentine at the edge of the batholith. Also, small dikes and sills of quartz diorite and aplite cut the other bodies; thus, the ultrabasic rocks are among the oldest intrusions in the area.

PLATE III



Serpentinized rock with veins of high-quality cross fiber chrysotile (pencil tip) enveloping a core of granular pyroxenite or peridotite. The fine-textured material is rusty-weathering serpentine. Outcrop located at west end of range IV.

Diorite, Quartz Diorite, Gabbro

Swarms of altered mafic intrusions invade the volcanic units and are particularly extensive in ranges IV, V and VI. The largest of these, such as the Dunraine sill at the west end of range VI and the Vicour sill complex which extends east from the center of the township, are between 1,000 and 1,500 feet thick and several miles in length. As the diorite plutons contain disseminated magnetite, their contacts may be defined by detailed ground magnetometer surveys.

These rocks invariably are altered to aggregates of secondary minerals: saussurite, epidote, amphibole, chlorite, carbonate, quartz and albite. Thus a petrographic classification is usually based on the amounts of the different secondary minerals and their pseudomorphic textural arrangement. Rocks composed of more than 50% mafic minerals were designated gabbro; those composed predominantly of feldspathic alteration products, or of indeterminate composition, were considered to be diorite.

Some mafic intrusions or parts of intrusions contain dispersed quartz grains. Where these were obvious macroscopically the rock is indicated as quartz diorite. However, under the microscope, some of this quartz is embedded in alteration and might not be a primary rock constituent.

Another variety of diorite, particularly common in the northwestern quarter of the area, contains sparse to abundant subhedral phenocrysts of altered calcic plagioclase.

Generally, the rocks grouped in the diorite-gabbro clan are schistose and, from evidence available, predate the more siliceous intrusions. As noted previously, at least some of the diorites appear to be allied to the mafic lavas. However, some small quartz diorite masses intruding peridotite in eastern range IX resemble the dioritic facies of the granodiorite plutons. Thus, all members of the clan may not be synchronous.

Granodiorite and Affiliated Rocks

The largest plutons are those of sodic granodiorite and include the eastern extremity of the Bourlamaque batholith and its small satellite, the Connell plug, in the northwest quarter of the township. The Bevcon pluton in eastern range VII is of similar composition and its individual outcrops have a pattern surprisingly similar to the shape of the batholith. This may denote a gross western plunge of the pluton. Its eastern margin cuts across the regional structural trend and its western nose approaches concordancy. Small dikes and sills of granodiorite composition occur between the larger plutons.

The granodiorite in the interior of the plutons is a medium- to coarse-grained granitoid rock which consists mainly of feldspar. It seems that one type of feldspar is completely converted to secondary white micas; the other type is a plagioclase partially altered to saussurite, sericite or paragonite. The remaining essential minerals are 15% to 25% quartz and 5% to 15% chloritized mafic minerals. The most altered forms of the granodiorite are characterized by small "eyes" of bluish quartz. In some thin sections and immersion liquids, slightly altered plagioclase (Ab_{80} to Ab_{90}) can be identified. The main mafic minerals are amphibole and its alteration product, chlorite. Potassic feldspar appears to have been scarce but much of the feldspar is too modified for identification.*

*Gussow (1937) studied the batholith in detail and in the western part of the pluton he identified less altered rocks of gabbroic composition. He concluded that the whole "granodiorite" pluton is silicified and albitized quartz gabbro. The rocks observed by this writer (the eastern part of the pluton), whatever their original composition, appear to be derived from a leucocratic parent; contain some primary oligoclase; and, according to Gussow, up to 0.9% K_2O. The term "granodiorite", which appears in numerous maps and reports according to Gussow's work, may be retained in a qualified form as "sodic granodiorite".

The marginal zone of this end of the Bourlamaque batholith, and the southern flank of the Bevcon pluton, and much of the Connell plug differ from the interiors of the larger plutons in that they contain more mafic minerals, and,in place of the granitoid texture, have more euhedral feldspar crystals. In the one thin section examined (from the marginal part of the batholith) the altered feldspar is set in a matrix of myrmekitic quartz and clear albite with interstitial hornblende. This mafic granodiorite or quartz diorite forms a shell from 1,000 to 2,500 feet wide around the east margin of the batholith. The transition to the interior rock is gradational.

As pronounced foliate fabrics and schist zones traverse the granodiorite, it may be considered synorogenic. The time of intrusion is placed after that of most of the diorite-gabbro clan, as dikes and masses of dioritic rocks appear to be truncated by the granodiorite. Some diorite intrusions, and particularly the coarser-grained varieties of quartz diorite, resemble the mafic facies at the margins of the granodiorite. These also are sodic rocks and may be allied to the granodiorite plutons.

Feldspar Porphyry Dikes

Feldspar porphyry dikes intrude the plutons mentioned above. The main varieties are relatively fresh rocks characterized by abundant, subhedral to euhedral, pinkish or gray feldspar phenocrysts, between 3 and 15 mm. long, which are set in a fine-grained, light-gray, felsic matrix. Some dikes contain very little quartz and resemble syenite; others are rich in hornblende phenocrysts. The main varieties crop out in the area south of the shaft, at the west end of range V, on the property of Louvicourt Goldfields Ltd.

The dikes may be long tabular bodies, such as those in the north flank of the Bevcon pluton, or complex anastomizing or branching intrusions such as those at the west end of range V. In general, the porphyry dikes tend to follow transverse fractures or fault planes. Though some are faulted or schistose rocks, most are less deformed than their wall rocks.

Individual dikes, if extensive, may vary in composition and appearance, particularly those containing black hornblende and quartz. The hornblendic variety, under the microscope, consists of phenocrysts of strongly zoned, polysynthetically-twinned, altered oligoclase and smaller prisms of hornblende set in a fine-grained quartz-feldspar matrix. Other varieties, without substantial hornblende, have similar feldspar phenocrysts along with quartz phenocrysts. Some samples have dark black matrices due to a predominance of hornblende. Cursory observations suggest that there may be a serial variation between hornblende-feldspar porphyry and quartz-feldspar porphyry.

It is perhaps significant that the porphyry dikes are most abundant in certain zones of structural dislocation; that they may mark the last important intrusive activity (except for the intrusion of the Late Precambrian diabase dikes); and that the dikes are often co-extensive in space with auriferous quartz-tourmaline veins.

Lamprophyres, Diorite

Basic dikes transect some of the porphyry dikes and the granodiorite. They include fine-grained diorite, chloritic dikes and very mafic porphyritic lamprophyre.

The diorite dikes are fine- to medium-grained, dark green rocks and, except for their field relations, are not readily distinguished from the older dioritic intrusions. At Bevcon Mine, the chloritic dikes appear to transect feldspar porphyry.

Late Precambrian Diabase

Two diabasic gabbro dikes extend across all other intrusions and orogenic structures; one is oriented N.15°E. and the other strikes, with an en échelon pattern, N.80°E. Their relative age has not been established but, in accord with similar dikes in the region, both are considered to be Late Precambrian.

A thin-section from the outcrop located 2,000 feet northeast of Bayeul lake consists of labradorite with interstitial pyroxene (incipiently altered to uralite and chlorite), 1% quartz and 3% magnetite.

Structure

Most of the volcanic rocks, and the intercalated sedimentary formations, dip steeply north and face south. Marker units and top determinations (Figure 1) are sufficiently widespread to indicate that there are few folds of even moderate magnitude in the volcanic and intervolcanic sedimentary units and that the gross assemblage of volcanic rocks approximates a slightly overturned homocline which faces southwards. However the Pontiac rocks appear to be tightly folded.

The main deformation structures within the volcanic rocks are longitudinal schist zones and sets of transverse faults.

All major rock units have secondary foliated fabrics which range in magnitude from one set of incipient S-planes to multiple directions of foliation and consequent steep-plunging lineations and

crenulations. The degree of fissility is largely conditioned by the incompetency of affected volcanic rocks, and zones of deformation are localized in the incompetent belts of pyroclastic rocks.

Only one marked S-plane is apparent where the volcanic rocks are slightly foliated but, within or near longitudinal schist zones (such as in the vicinity of the south end of Trivio lake) the rocks may have pronounced crenulations or intersecting foliation planes which cause the rock to shatter into flat prisms.

The Pontiac rocks everywhere exhibit a prominent bedding foliation, due to aligned biotite flakes; in places where mica is abundant, the schists may be crenulated and up to 3 S-planes discernible.

In general, the Pontiac rocks have a relatively "homogeneous" schistosity or sub-gneissic texture which reflects the regional deformation. The volcanic rocks, and the Trivio and Garden Island Lake groups, are marked by heterogeneous deformation; there are abrupt, cross-strike variations in degree of deformation.

Schist Zones, Longitudinal Faults, Transverse Faults

There are two general types of fault structures. The most extensive of these are longitudinal faults represented by narrow or broad zones of intensely schistose rocks which trend parallel to stratification. The magnitude of disruptions is seldom determinable, due to both the parallelism to bedding and the multiplicity of individual fault surfaces within a general area of schisted rock. The second type is represented by sets of transverse (oblique) faults which may be indicated by narrow zones of crushed, schistose or gouged material but, generally, are only assumed to account for offsets of contacts.

A broad zone of sheared lavas and serpentine schist trends N.80°W. across the eastern end of range-line VIII/IX and may be presumed to extend westward at least to the township center-line. This zone is probably a series of longitudinal faults.

The pyroclastic rocks in ranges VI and VII, and the southern medial part of range VIII, are traversed by numerous longitudinal schist zones which extend into even the more competent intrusive masses. These strike N.70°E. at the western edge of the area and then may arc to an eastward trend, near the west edge of the Bevcon pluton. The belt of rocks along these ranges is the locus of intense shear deformation and some of the complications in the lithologic patterns (although this is somewhat conjectural) may be attributed to steeply plunging drag-fold contortions which are found in similar circumstances elsewhere in the region.

Zones of intense schisting follow the northern edge of the Trivio Group in the western part of range IV. Norman (1945) extrapolates the Cadillac fault zone across a swampy area a short distance south of here and assumes that it persists eastward to the south tip of Trivio lake. No direct evidence for the fault is found but it is notable that the assumed position corresponds to apparent discontinuities in stratigraphy, grade of metamorphism, and structural style (p. 19).

Transverse faults, oriented between N.10°E. and N.50°E., are probably numerous but the more important of these are recognizable only where some appreciable offset may be discerned. The larger strike-separations are, in most instances, sinistral and average several hundred feet.

An unusually extensive fault of this type, oriented N.30°E., is assumed to offset the volcanic units along a shallow linear depression located 4,000 feet southeast of the Bourlamaque batholith in range VIII. The sinistral strike-separation of a thick layer of andesitic lava near the highway exceeds 1,000 feet. If the fault line is extended southward it could join a fault which crosses the Dunraine diorite sill without appreciable disruption. On the assumption that this is a continuous fault, the differences in strike separations could be attributed to a pivotal-rotational component of movement.

A second set of small-scale (and perhaps some larger) dextral oblique faults, which trend more northerly than the sinistral types, are discerned in outcrops throughout the area. These disrupt schisted fabrics and in general are among the latest tectonic structures.

Folds

An asymmetrical anticline and complementary syncline are recognized by top reversals in the northern part of the area where meagre information on the distribution of lithologies suggests that the axes trend and plunge northwest, to conjoin complex folds in Pascalis township to the north.

Norman (1947) suggests that a regional synclinal axis might pass north of the Bevcon pluton and that the pluton itself might occupy an anticline. These hypothetical folds could explain certain symmetries and asymmetries in the distribution of lithological units: such as the thickening of the central pyroclastic belt near the pluton and the convergence of lava belts east of Louvicourt township. However, evidence available indicates that there is not a regional reversal of tops, or a general nosing-off of units along the hypothetical axes. The few reversals of tops identified are of local extent only.

The scattered outcrops of Pontiac rocks in the south part of the area occasionally display graded beds. At the south end of Trivio lake the beds are overturned and face south – in accord with the general homoclinal form of the volcanic assemblage. At other localities, to the east and west, tops are north. Thus large parts of the Pontiac Group have been folded to face northward. Similar relations exist throughout the region and indicate that the Pontiac rocks are complexly folded.

ECONOMIC GEOLOGY

Auriferous, argentiferous quartz veins, and concentrations of copper and zinc minerals abound in certain parts of the volcanic and intrusive rocks. Small amounts of molybdenite occur in the western end of range IV and a deposit of chrysotile asbestos has been explored by drilling.

Active prospecting in Louvicourt dates from the first decade of this century and discoveries of gold have been developed underground on the properties of Louvicourt Goldfield Corp., Courvan Mining Co. Ltd., Akasaba Gold Mines Ltd., Beacon Mining Co. Ltd., Canadian Metals Exploration Ltd. and Quebec Gold Belt Mines Ltd. The first three of these produced approximately 116,000 ounces of gold. Bevcon Mines Ltd. produced 407,109 ounces of gold and a lesser amount of silver from 1951 until the mine closed at the end of 1965. Dunraine Mines Ltd. (previously Rainville Copper) produced copper, gold and silver, valued at $2,241,280, until the mine closed in 1958.

Gold Deposits

Pyritic quartz tourmaline veins with gold and silver are widespread in the area and occur in diverse host rocks and structural settings. The veins occur in all major varieties of intrusions and thus were emplaced late in the geological events. The grades of the four productive deposits range between 0.120 and 0.150 (average 0.135) ounces of gold per ton.

In general, the auriferous quartz veins are characterized by the presence of pyrite and tourmaline and sporadic chalcopyrite, pyrrhotite and carbonate minerals. Much of the quartz appears in a shattered lustrous variety with a translucent black appearance. The best auriferous sections usually are marked by concentrations of pyrite -- friable aggregates of coarse, crystalline pyrite are considered to be particularly good indicators. Some high-grade gold veins however are barren-looking milky quartz with only the occasional bleb of pyrite. Variable amounts of silver are associated with the gold.

Less common vein minerals are sphalerite, scheelite, selenite and several gold tellurides and tellurobismuthinite (Bi_2Te_3) at the Louvicourt Goldfield and Bevcon deposits. The only substantial amount of arsenopyrite occurs at the old Vicour deposit (Quebec Gold Belt Mines Ltd.).

All localities, known to the writer, for which assays of 0.1 ounce or more have been reported are indicated on the map. It should be noted that many of the assays from drill core could not be documented or otherwise confirmed by the writer.

Although gold metallization is widespread, it appears that only rarely have combinations of factors resulted in the concentration of exploitable quantities of vein material.

One general relation, common to most of the larger gold deposits, is the disposition of the veins in small, discontinuous, transverse structures near longitudinal shear zones. The reason for the development of the entrapping structure can usually be attributed to some peculiarity of the detailed geology — generally the interplay between rocks of contrasting competency. The larger deposits in the area can be grouped on the basis of the salient features of their geologic setting as follows:

1) Veins within the margins of granodiorite plutons:

Vein systems are found within the south and east flanks of the Bourlamaque batholith; along the southeast margin of the Connell plug in western range VIII, and along the northern margin of the Bevcon pluton. Individual productive veins within all these zones are moderately-dipping lenticular bodies which strike between northeast and east. Extensive faults or shear zones transect the host rocks but usually the veins appear to be controlled directly by minor subsidiary fractures. The vein sets tend to pinch against small diorite or porphyry dikes, or to be delimited by some heterogeneity of the intrusion or its contact with the volcanic rocks.

2) Veins in diorite sills:

Auriferous veins are concentrated in many dioritic sills and those in the swarm which extends along range V are particularly noteworthy. At the western end of the range, on the property of Louvicourt Goldfield, the veins lie in sheared and pyritized diorite which perhaps was dilated during mineralization within a framework of anastomizing porphyry dikes. More veins are found 5,000 feet to the east, along the same zone of shearing, within diorite and porphyry. At the old Vicour deposit, in the central, north part of range V, gold veins are concentrated in silicified quartz diorite or granodiorite along the south margin of an unusually large gabbro-diorite sill. The belt of serpentine schists located in the east part of ranges VIII and IX are intruded by small masses of diorite. Gold

veins in this sector tend to be concentrated within the north (hanging-wall) edges of these diorites as a result of the preferential fracturing of competent diorites, encased in soft serpentine.

3) Veins in schist and fault zones in volcanic rocks:

Numerous gold veins have been found in the volcanic rocks, usually within or near small or large schist zones. In general, the evaluation of these occurrences by diamond drilling has been difficult, presumably because individual auriferous zones tend to be irregular or discontinuous. However, some extensive vein zones do occur in the broad schist zones along the south flank of the Bourlamaque batholith.

A few auriferous veins may be related to transverse faults. A good example is the Lapaska deposit on the property of Canadian Exploration Ltd., in range V (Figure 5). Here the best veins occur within step-faults and are confined to the interval where the faults traverse a layer of cohesive lava, between zones of flow breccia. The host rock is the spherulitic lava unit which extends across the township. Several other showings have been found within this favorable host rock.

Mineralized transverse shear zones also transect the Akasaba deposit at the west end of range IV (Figure 2). Here, however, the main orebody was coextensive with a tabular, concordant zone of sulfide-rich metamorphic rocks.

The shear zones at the Akasaba deposit may be subsidiary structures of a regional fault zone which is considered to extend eastward along the southern part of range IV and then to swing southward, across the south tip of Trivio lake. Similar structural complications might be found under the heavy overburden in the medial part of the range.

Copper and Zinc

Virtually all concentrations of pyrite, pyrrhotite, chalcopyrite and sphalerite in the area are found within the central pyroclastic belt (Figure 1), a complex stratigraphic unit of volcanic rocks which underlies range VI and range VII. The unit has an outcrop breadth of approximately 2 miles in its medial part and is characterized by unusually extensive pyroclastic rocks and intercalated dacitic lavas. These rocks are highly schistose, and variably sericitized, carbonatized, and otherwise altered.

Extensive, semi-continuous, metallized zones occur within certain members of the pyroclastic material. One of these, the Dunraine Mines Ltd. deposit, enters the area at the western end of range VI. The sulfides here are disseminated pyrite, chalcopyrite and sphalerite and

stringers and lenses of sulfides in schisted tuff and agglomerate. Near the western nose of a large sill of diorite these were sufficiently concentrated to form minable shoots. Other sulfide deposits have been intersected by drill-holes at intervals over a distance of 6 miles to the east of the Dunraine deposit; apparently these are enclosed within the same schistose pyroclastic unit.

Small concentrations of sphalerite and chalcopyrite are found in range VI, south of the Bevcon pluton. Notable among these is a copper deposit held by Abitibi Metals Mines Ltd. at the north end of lot 37, range VI. Further to the east, an extensive zone of pyrite and chalcopyrite is exposed in trenches on lots 60 and 61.

Asbestos

Near-economic quantities of chrysotile asbestos have been outlined in the mass of serpentine at the west end of range IX (Courvan Mining Co. Ltd.). Other serpentine rocks in the area along the east part of range IX, and at the south end of Trivio lake, are severely sheared and do not contain appreciable asbestos where they are exposed.

Sand and Gravel

Glacio-fluvial sand and gravel are abundant in the two large eskers which trend northward across the area.

Descriptions of Mining Properties

Abitibi Copper Mines Ltd.

Ref.: Que. Dept. Mines, P.R. No. 205, Part II, p. 42

Abitibi Copper Mines Ltd. holds 18 claims which straddle the center-line of Louvicourt township in ranges VI and VII. These are numbered C.89446, C.89530, claims 1 to 5 each, and C.40557, C89529, claims 1 to 4. The claims were held previously by Kencour Gold Mines, which drilled 15 holes, and by Jocor Mines. Abitibi Copper did a magnetometer survey and drilled 28 holes during the years 1951, 1952 and 1962.

A zone of chalcopyrite at the north end of lot 37, range VI, is exposed in an old trench located 50 feet south of the range line. Twenty-five drill-holes in this area outlined a lensoid zone of metallization in fractured amphibolitized volcanic rocks. The zone strikes N.85°E., dips 80°N., is 400 feet long, 50 feet wide in the medial part and was intersected to depths of 700 feet. The copper-bearing sections within the general zone

of metallization have an irregular distribution but tenors averaging 1% Cu over widths of 10 feet were reported for several intersections; one hole (#A9) contained 0.89% Cu over a core-length of 59 feet. The chalcopyrite is closely associated with magnetite.

A second zone with sphalerite and chalcopyrite was intersected by drill-holes in the north part of lot 35, range VI, 1,000 feet south of the range line. The sulfides are dispersed in schistose, sericitic and chloritic agglomerate. One hole was reported to have intersected 8.7% Zn over a core length of 2.3 feet.

Adelemont Gold Mines Ltd.

Adelemont Gold Mines holds 7 claims numbered: 7216, claims 1 and 2; 7217, claims 1 to 3, on lots 48 to 51, range IX; and C.20968,claims 1 and 2,covering Highway No. 58. The company made a magnetometer survey and drilled 31 holes in 1946, 1947 and 1950. Most of these are located near a gold showing in the west end of lot 48.

Intercalated peridotite, talc-serpentine (chlorite) schists, mafic lavas and pyroclastic rocks and small intrusions of diorite strike N.80°W. across the property. The gold mineralization occurs along a distance of 400 feet in the hanging (north) wall of a concordant intrusion of quartz-diorite and is associated with pyritic quartz-carbonate veins within fractured, sheared, silicified and carbonatized zones in the diorite.

The best intersections were made in drill-holes through the medial part of the mineralized zone at a depth of 450 feet. The higher gold assays in this sector were reported by the company as: 0.17 ounce per ton over 24 feet; 0.395 ounce per ton over 6 feet; 0.347 ounce per ton over 10 feet; 0.18 ounce per ton over 17 feet. These core-lengths could represent true widths of 2 to 10 feet.

A fault, oriented N.10°E., is assumed to pass through the auriferous zone to account for apparent relative offsets, east-side-north, of the contacts of the intrusive units.

Akasaba Gold Mines Ltd.

Ref.: Que. Bur. Mines, Ann. Rept. 1930, Pt. C, p. 93; P.R. No. 126, p. 3; P.R. No. 150, p. 35.
Que. Dept. Mines, P.R. No. 190, Pt. II, p. 42; P.R. No. 330, p. 65.

Akasaba Gold Mines, a former gold producer, holds block 44 (mining concession No. 467) and 21 claims numbered: C.3773, claims 2, 3, 4;

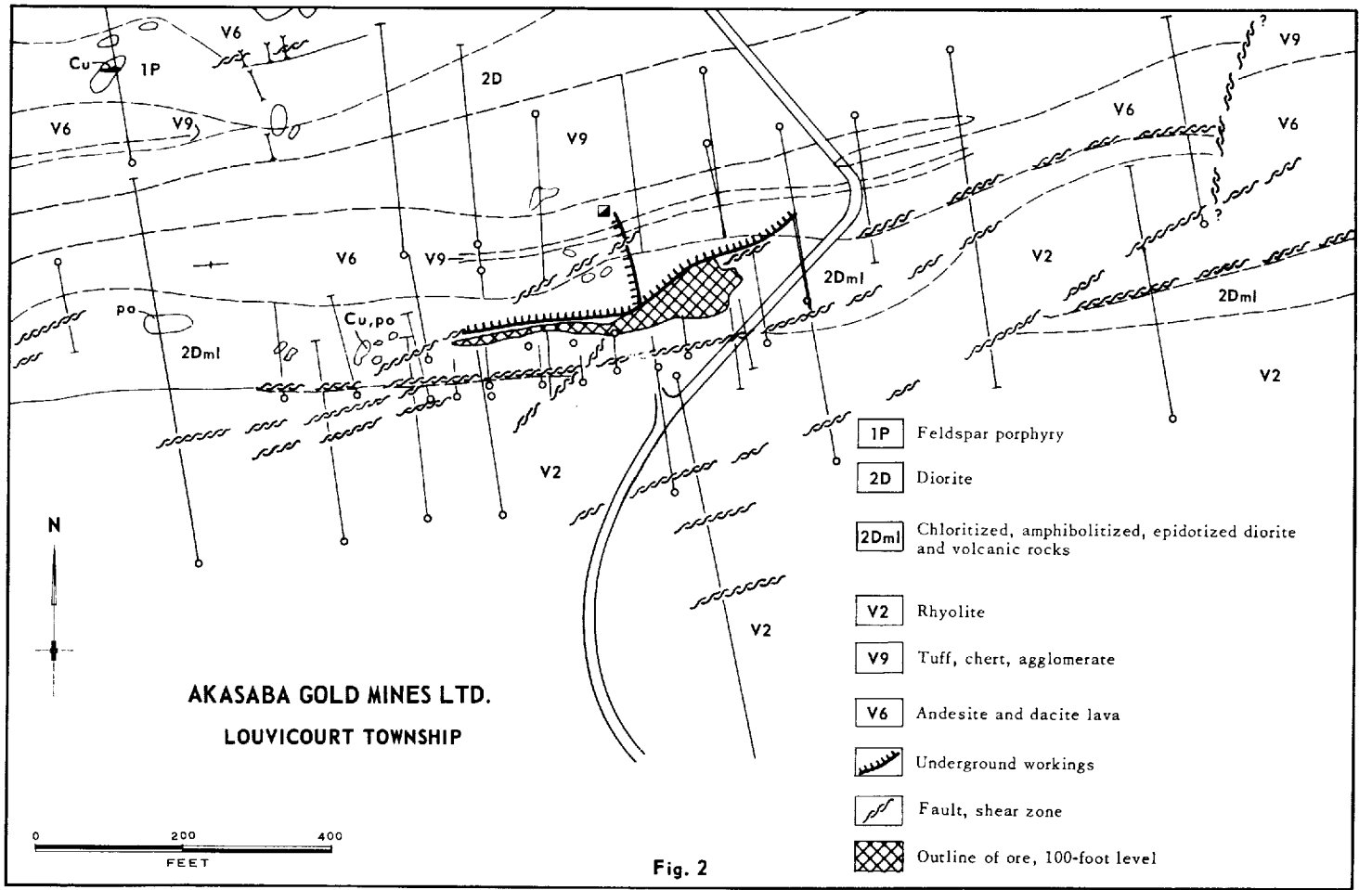


Fig. 2

J.I. SHARPE, 1964

D.N.R.Q. 1967 B-898

C.3774, claims 1, 3, 4, 5; and C.3775, C.3776, C.3779, claims 1 to 5 each. The property is contiguous to the west boundary of the township between ranges III and IV.

The area of these claims was prospected by the Victoria Syndicate in 1926 and sequentially by Obaska Mines, Valbec Exploration, Minecreators and Frobisher Exploration. Obaska Lake Mines Ltd. sunk a shaft and outlined a small gold deposit between 1951 and 1952. Summaries of the results of this work are given in pre-mentioned references. Akasaba Gold Mines, reopened the workings in 1960, and,before the mine was closed in 1963, produced 289,428 tons of ore containing 43,485 ounces of gold and 12,746 ounces of silver. The ore was milled at Bevcon Mine, 11 miles from the deposit.

The deposit lies within a concordant lens (Figure 2) of amphibolite and diorite, 100 feet thick (known as "chloritite" at the mine), which is intercalated between rhyolitic rocks and stratiform intermediate lavas and tuffs.

Longitudinal faults, marked by broad zones of schist, occur south of the deposit and near the ore zone. Subsidiary transverse shear zones which trend N.60°E. transect the host rocks.

The "chloritite" ore host is impregnated with erratic gold. Disseminated pyrrhotite, chalcopyrite and sphalerite occur within or near the rock for a length of 2,000 feet west of the shaft.

The ore occurred as a steep tabular mass with irregular extremities which bottomed above the 300-foot level. The wider shoots had a moderate westward plunge. Exploration drilling down to 1,000 feet below surface and east and west of the stopes failed to outline extensive ore, though a number of isolated intersections of good grade were reported.

The ore differs in some respects from usual types in the area, being associated with dispersed chalcopyrite and other sulfides in amphibolite, rather than mainly in vein structures(although some quartz-tourmaline veins are present).

The general geologic relations suggest that the gold was introduced along the subsidiary fault structures and deposited along the north margin of the chloritite; perhaps precipitated by, or with, the unusual amount of iron (and copper) in the chloritite as suggested by Eakins (1962, p. 117) for some of the orebodies of the Malartic area.

B. Nixon Apple Claims

Ref.: Que. Bur. Mines, P.R. No. 120, p. 23; P.R. No. 126, p. 3; P.R. No. 135 p. 42.
Que. Dept. Mines, P.R. No. 205, Pt. II, p. 32.
Que. Dept. Mines, Geol. Rept. 20, Vol. III, P. 277.

This property consists of 18 claims numbered 187007 to 187009, claims 1 to 5 each, and 199074, claims 1 to 3, adjoining the west boundary of the township between the properties of Louvicourt Goldfield Corp. and Akasaba Gold Mines Ltd. The property was held previously by Val d'Oro Gold Mines Ltd. and Bourlacourt Gold Mines Ltd. and they did considerable drilling and trenching on several auriferous zones. The work done up to 1945 is summarized in the references. Between 1946 and 1947, approximately 21,000 feet of drilling was done.

The central part of the property is underlain by mafic lavas adjoined to the north and south by pyroclastic rocks and intruded by diorite, gabbro and feldspar porphyry dikes. Two main areas of gold mineralization have been discovered: one is centered near the township boundary, 4,200 feet south of the median line; the other lies near the south boundary of the property east and west of a gravel road.

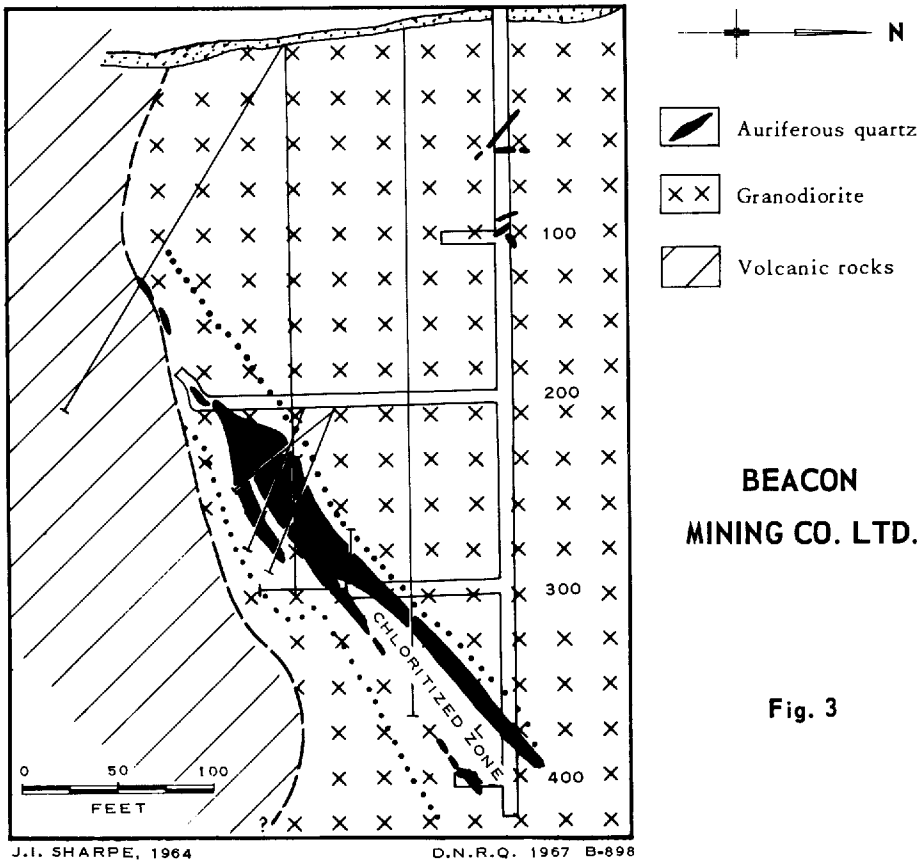
The mineralization in the first area consists of a zone of small stringers and veins of quartz-tourmaline-carbonate in pyritized diorite and feldspar porphyry. Drill intersections of the veins and pyritized intrusions yielded substantial widths of high-grade gold. The correlation of the high-grade sections would require more drilling but the general zone of auriferous material appears to trend N.50°E. and was traced for at least 600 feet.

The second mineralized zone lies near the south boundary of the property where diorite dikes traverse thick lenses of agglomerate, chert and tuff. Disseminated pyrrhotite and chalcopyrite, and small quantities of gold, were found in these rocks and, in a few drill-holes, assays over 0.1 ounce of gold per ton from sulfide-rich rock were reported.

Beacon Mining Co. Ltd.

Ref.: Que. Bur. Mines, Ann. Rept., 1930, Pt. A, p. 95
Que. Bur. Mines, Ann. Rept., 1931, Pt. A, p. 108; 1931, Pt. B, p.91; 1932, Pt. A, p. 99; 1932, Pt. B, p. 6, P.R. No. 116, p. 65; P.R. No. 126, p. 3
Que. Dept. Mines, G.R. 20, Vol. III, pp. 275-276.

The property of Beacon Mining Co. Ltd. extends north from Highway 59 in the northwest quarter of the township. It consists of mining



BEACON
MINING CO. LTD.

Fig. 3

VERTICAL SECTION THROUGH BEACON SHAFT

Concession No. 356, including blocks 18 to 39, and claims A.33699 to A.33703, A.33705, A.33706, A.33964, A.33969, A.33977, A.33978, A.60295 to A.60317, and A.66786.

There are numerous auriferous quartz veins on the property and two vein zones were developed underground. Descriptions of the early work are cited above and summarized by Dresser and Denis (1949, p. 275).

A gold deposit was developed underground by Le Roy Gold Mines between 1930 and 1934. This property and more claims to the east were then incorporated as Beaucourt Gold Mines Ltd. Between 1935 and 1946, approximately 200 holes were drilled by Teck Hughes, McIntyre and Sullivan Consolidated within this area. This work led to the discovery of other veins one of which was developed underground by Beacon Gold Mines in 1950. Little work has been done since then.

The property is underlain by the southeast flank of the Bourlamaque batholith and complex volcanic units which trend east in the southern part of the property, then swing northward around the batholith. The volcanic rocks are extremely schistose and intruded by plugs and small dikes of granodiorite, diorite and related rocks.

The main areas of metallization can be referred to as: 1) Le Roy shaft area, 2) Beacon shaft area, 3) No. 3 vein zone, 4) No. 2 vein zone, and 5) Connell plug zone.

1) The Le Roy shaft area is at range-line VII/VIII, 2,500 feet east of the western township boundary. The shaft extends to a depth of 269 feet and approximately 1,200 feet of lateral openings were made on two levels.

The workings followed a sinuous zone of pyritic quartz-tourmaline veins and stringers which pinch and swell along a lateral distance of 700 feet. The zone strikes northeast and dips 55° south. It outcrops 250 feet north of the margin of the granodiorite which, near the shaft, dips 80° south. A drill-hole collared 600 feet south of the shaft intersected a quartz vein with low gold values at a depth of 450 feet, adjacent to the granodiorite contact. This vein lines up with the down-dip projection of the Le Roy vein.

From incomplete data on assays, the writer estimates that the medial part of the Le Roy vein, 110 feet in an east-west direction and 300 feet down the dip, has a tenor of the order of 0.20 ounce of gold per ton and an average width of 3 to 4 feet.

2) The Beacon shaft area is 6,500 feet east of the western township boundary and 2,200 feet south of range-line VIII/IX. The deposit was explored in 1950 from a shaft 425 feet deep by 2,150 feet of drifts, crosscuts and raises. The main vein strikes N.60°E, dips 50°W. and lies along a sheared zone within a small apophysis of granodiorite, 50 to 200 feet from its contact with volcanic rocks (Figure 3).

The gold occurs in a zone of small veins and in a large lens of quartz with tourmaline, pyrite, chalcopyrite and, locally, tellurides. The maximum dimensions occur between the 200-foot and 300-foot levels where the lens is 360 feet long and 5 to 25 feet thick. To the east and west and up the dip (where the vein approaches the margin of the granodiorite) the lens pinches abruptly. The thickening of the vein coincides with a local southward bulge of the granodiorite's contact.

The deposit is estimated to contain 37,000 tons with approximately 0.6 ounce of gold per ton.

3) The No. 3 vein zone is 2,500 feet east of the township boundary and 2,000 feet south of range-line VIII/IX. This area of granodiorite outcrops has been extensively trenched, and explored by 12 drill-holes by Sullivan Cons. Mines.

Many small en échelon auriferous quartz veins occur over the explored length of 2,700 feet. These trend N.75°E., commonly dip south, and are usually less than 2 feet thick. A trench at the northwest edge of the outcrop area exposed a small mass of pyrite and chalcopyrite in quartz, reported to be highly auriferous.

4) The No. 2 vein zone is a zone of sheared tuff and agglomerate located between the railroad tracks and highway 59, in range VII, three quarters of a mile east of the township boundary. The zone trends N.64°E. and includes eastern and western sections. Both were tested by drill-holes spaced 100 feet apart over distances of 700 feet and 1,200 feet respectively.

High gold assays were reported from quartz veins throughout the two sections.

5) The "Connell plug" is a satellitic pluton, similar in composition to the Bourlamaque batholith. The southeast margin of the plug, which is situated 8,800 feet east of the township boundary and 1,500 feet north of range-line VII/VIII, has a concentration of en échelon veins and irregular masses of pyritic auriferous quartz. Parts of these were exposed in trenches and tested by 23 drill-holes and numerous short drill-holes.

Individual veins appear to be discontinuous but tend to follow erratically developed schistose zones within both the granodiorite and, to a lesser extent, the adjacent volcanic rocks.

Low quantities of gold are present in most intersections of the veins; generally less than 0.1 ounce of gold per ton over widths of the order of 2 feet. Individual veins or groups of veins in the explored sector apparently lack sufficient continuity and tenor to be mined. The most continuous zone of veins is 30 to 40 feet wide and lies 50 feet within the granodiorite. In this zone the veins tend to be richer where they adjoin narrow chloritized dikes.

Bevcon Mines Ltd.

Ref.: Que. Bur. Mines, Ann. Rept. 1931, Pt. A, p. 109; 1931, Pt. B, p. 97; 1932, Pt. B, pp. 15-19.

Que. Bur. Mines, P.R. No. 116, p. 67; No. 126, p. 2; No. 205, Pt. II, p. 30, pp. 34-36.

Geology of Canadian Ore Deposits, Vol. II, pp. 416-419 (Can. Inst. Mng. and Met., Congress Volume, 1957).

The Bevcon Mines property straddles Highway 59 and adjoins Highway 58 to the west in the northeast quarter of Louvicourt township. It consists of mining concessions 357, 382 and 468, and 48 claims numbered: CG.647, claims 1 and 2; CG. 512, claim 5; C.2795, claims 1, 2 and 4; C.2796, claims 1 and 2; C.2797, claims 1 to 4; C.5021, claims 1 and 2; C.5078, claims 1 to 5; C.5079, claims 4 and 5; C.5181, claims 1 to 4; C.5592, claims 1 to 3; C.5846, claims 2 and 3; C.5848, claim 5; C7629, claims 1 to 3; C.20138, claims 3 and 7; A.48879 to 83, A.87514 to 16, A.87953 to 58. These claims include parts of properties once held by Lencourt Mines Ltd. and Buffadison Gold Mines Ltd.

The north margin of the Bevcon granodiorite pluton which extends eastward across the medial part of the property contains numerous auriferous quartz veins. A shaft was sunk by Buffadison Gold Mines in 1946 within the western part of the auriferous zone and, until 1948, extensive underground development work was done on 6 levels, to a depth of 960 feet. Bevcon's production shaft is located 2,300 feet eastward from the Buffadison shaft and extends 2,286 feet below surface. The Bevcon ore has come from 15 main levels, between 500 feet and 2,225 feet below surface. Approximately 3,493,243 tons of ore have been milled and 407,409 ounces of gold recovered from 1951 to the mid-part of 1965, when the mine closed. The average grade of heads was 0.135 ounce of gold per ton. In June 1965, reserves contained above the 2,225-foot level were estimated at 154,000 tons with a grade of 0.13 ounce of gold per ton. Since then, a total of 52,500 tons was mined.

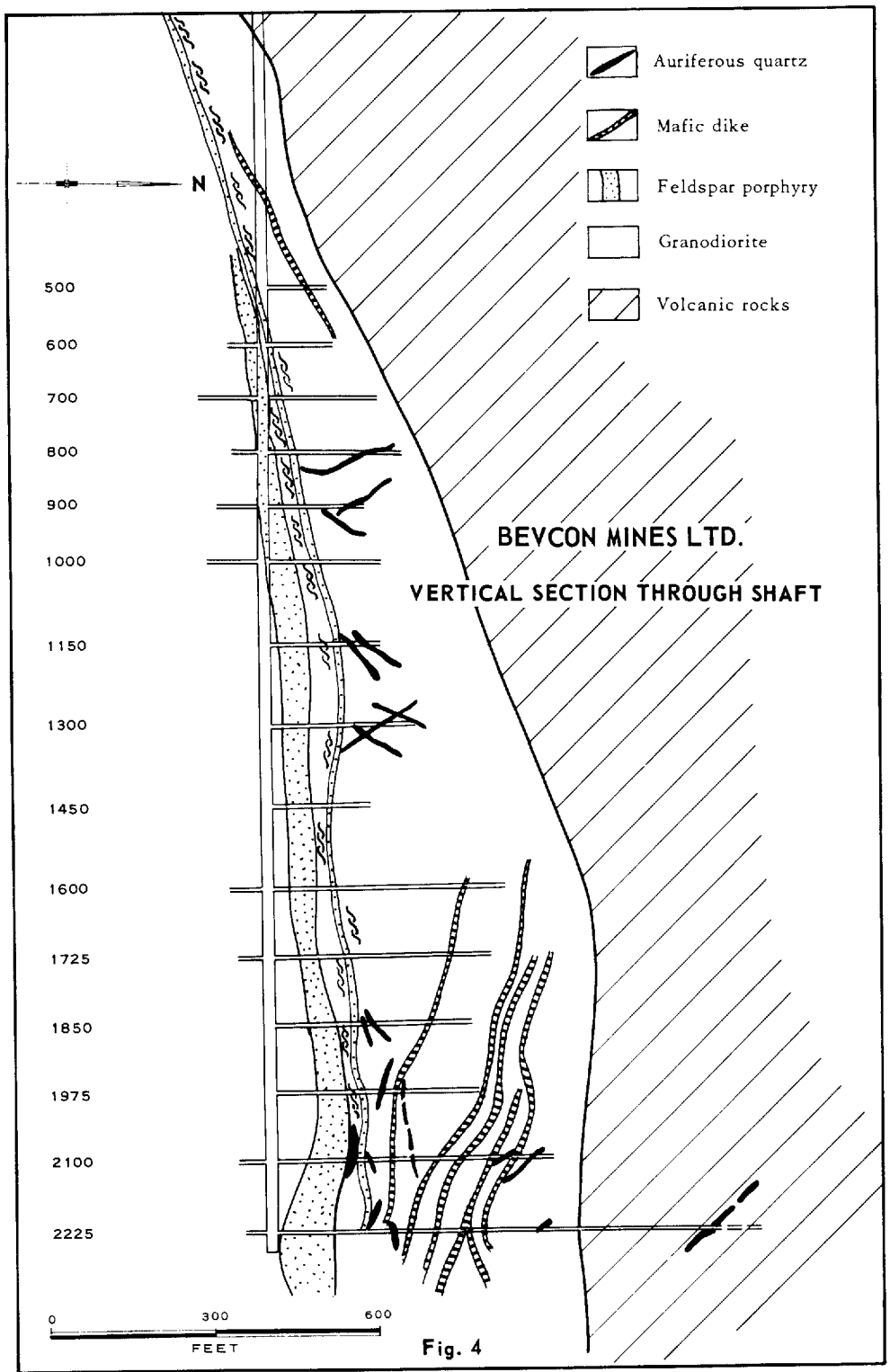

Auriferous quartz
Mafic dike
Feldspar porphyry
Granodiorite
Volcanic rocks
N
500
600
700
800
900
1000
1150
1300
1450
1600
1725
1850
1975
2100
2225
BEVCON MINES LTD.
VERTICAL SECTION THROUGH SHAFT
0
300
600
FEET
J.I. SHARPE, 1964
D.N.R.Q. 1967 B-898

Fig. 4

General Geology

The north contact of the Bevcon pluton dips an average of 70° northward near the Bevcon shaft but steepens at depth (Figure 4). To the west the contact becomes sinuous but maintains a general eastward strike, concordant to the adjacent volcanic rocks. Narrow feldspar porphyry dikes extend along the margin of the pluton. The most continuous of these is 30 feet wide, dips an average of 85° north, and extends through the zone of auriferous veins. The porphyries are intruded by dark green mafic dikes and swarms of these tend to reach maximum development at depth within the auriferous zone. Both the porphyry and mafic dikes are veined and therefore pre-ore in age. The only large post-ore intrusion is a Late Precambrian gabbro dike which strikes northeast across the area east of the main shaft.

The granodiorite is a medium- to coarse-grained rock, characterized by numerous grains of "opalescent" quartz. The rock is generally altered but markedly sheared, chloritized silicified and locally carbonatized within the mineralized zones.

Veins

Sets of auriferous veins are concentrated in the north margin of the granodiorite pluton, within 500 feet of its edge, and along an east-west distance of 4,300 feet. The veins consist mainly of quartz, carbonate, tourmaline, chlorite and pyrite with sporadic chalcopyrite, scheelite, selenite, tellurobismuthinite and other tellurides. The pyritic sections tend to be enriched in gold. Individual veins are characteristically narrow and lenticular and have lengths of some 150 feet. The more persistent veins strike eastward and three main types are recognized: 1) north-dipping veins, 2) south-dipping veins, 3) composite veins. Types "1" and "2" dip 30 to 50 degrees. Type "3" veins include stringer zones and ladder-like apophyses of larger veins. In the deeper levels of the mine, zones of bleached, tourmalinized granodiorite may contain minable quantities of gold. The veins are confined to the granodiorite except for an unusually rich vein discovered in the hanging-wall volcanic rocks at the 2,225 level and another at the 600-foot level. The 2,225-foot level vein strikes N.80°E., dips 45° south, and has an average thickness of 0.5 foot.

The veins in the western part of the property (the old Buffadison property) occur both north and south of the extensive porphyry dike mentioned above. Those to the north generally strike east and dip southward. Those in the "south zone" commonly strike northeast or northwest and dip northward. Some 36 separate veins are distinguished within the north zone and the south zone. The most extensive veining occurs near the 810-foot level. For example, a south-zone vein, located 480 feet north of the Buffadison shaft, was followed by drifting and was reported to contain 0.9 ounce of gold per ton over a length of 270 feet and an average width of 1 foot.

The veins near the Bevcon shaft, which have provided most of the ore, are restricted to the selvage of granodiorite between the main porphyry dike and the north contact of the pluton. At the 500-foot level this selvage is generally less than 200 feet wide but, as the dike dips more steeply northward than the granodiorite's contact, the restricting zone widens with depth, becoming approximately 600 feet wide near the 1,600-foot level.

The genetic interrelations of the various fracture structures are known only in general terms. The long porphyry dike occupies a steep shear zone which strikes eastward. The dike forms the foot wall of the zone of veining near the Bevcon shaft, and individual veins pinch where they impinge obliquely on the dike. The most persistent veins strike parallel to the porphyry dikes but dip obliquely. Either north-dipping veins or south-dipping veins may predominate from place to place. These veins may follow subsidiary shear zones or have adjacent "gash" veins; features which indicate that the confining structures of the main veins follow a conjugate set of shear fractures. The bisectrix of the acute angle between the two shear sets is usually perpendicular to the wall of the porphyry dikes. Veins within these structures tend to pinch abruptly on entering any oblique structure, such as a small mafic dike. Short tension fractures, oriented northeast and northwest (oblique to the "shear veins"), are in places veined and some of the diorite dikes follow a set of these which strike northwest, dip northeast and cut across the veins which strike eastward.

Camflo Mattagami Mines Ltd.

Camflo Mattagami Mines Ltd. holds claims covering the north halves of lots 32 to 35 and lots 36 to 41, range IX. Between 1954 and 1964 the company made a magnetometer survey and drilled 4 holes. Three of these, located near the south end of lots 40 and 41, intersected talc-serpentine schists, schistose volcanic rocks and small porphyry and diorite intrusions. The company reports that a few auriferous veins were intersected.

Courtmont Gold Mines Ltd.

Ref.: Que. Dept. Mines, P.R. No. 205, Pt.II, p. 38, P.R. No. 227, p. 86.

Courtmont Gold Mines Ltd. holds a large block of claims covering lots 42 to 47, and the west half of lot 53 in range IX, the south half of lots 46 and 47 and the south quarter of lots 48 to 53, in range X.

The company drilled 34 holes in 1945 and 1946. Several holes, collared in the south end of lot 45, range IX, intersected serpentine

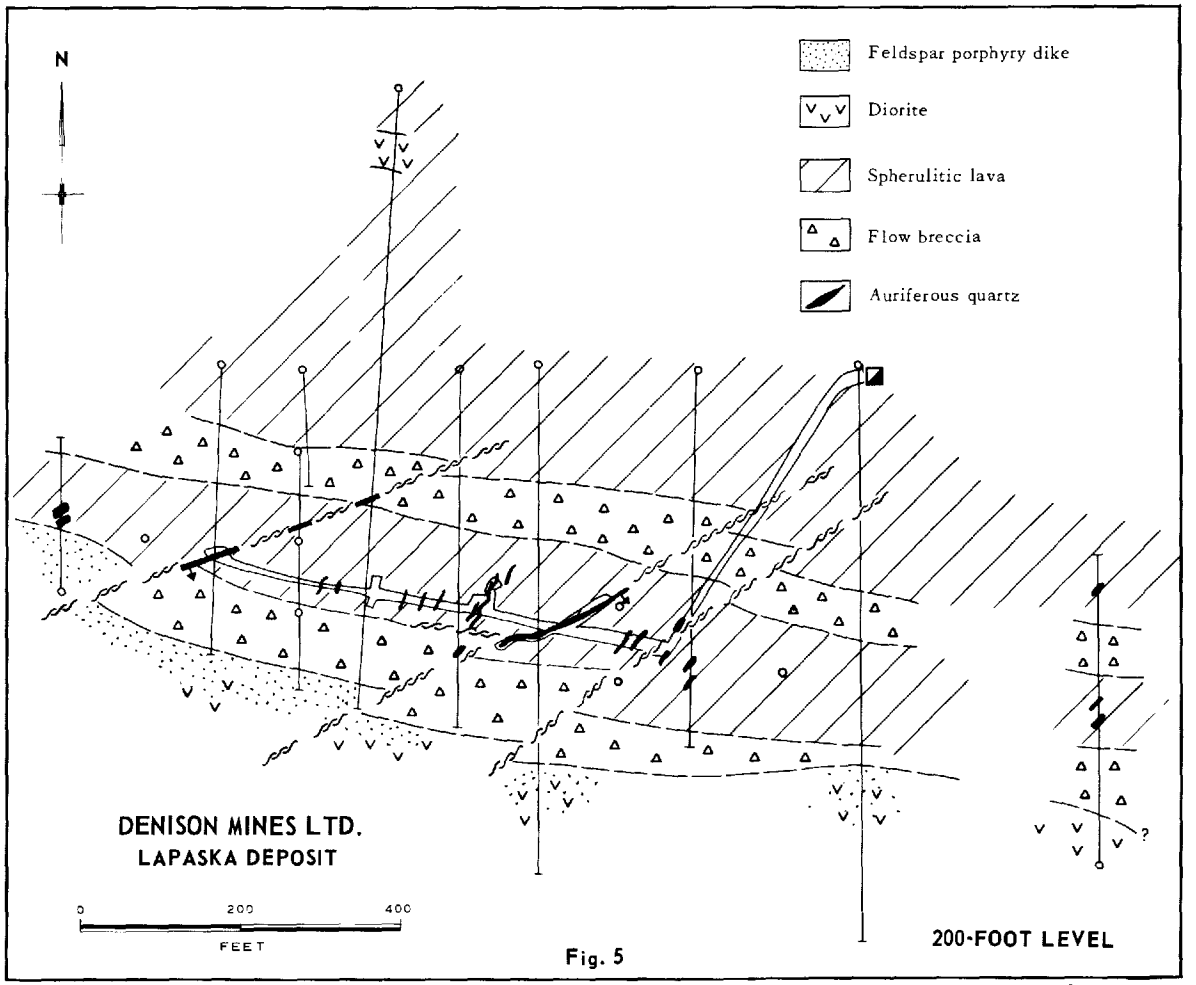


Fig. 5

J.I. SHARPE, 1964

D.N.R.Q. 1967 B-898

schists, mafic lavas, and diorite cut by pyritic quartz veins along an east-west distance of 600 feet. The best assays reported by the company ranged up to 0.80 ounce of gold per ton over 2.2 feet of core.

Courvan Mining Co. Ltd.

(Cournor Mining Co.)

Ref.:Que. Bur. Mines, Ann. Rept. 1931, Pt. B, p. 110, Ann. Rept. 1932, Pt. B, p. 19; P.R. No. 116, p. 65; P.R. No. 120, p. 23.

Que. Dept. Mines, P.R. No. 390, p. 59; Geol. Rept. 20, Vol. III, pp. 272-274.

Courvan Mining Co. Ltd. holds mining concessions No. 280 and No. 295 covering blocks 1 to 10, 12 and 13, and claims A33189, A33779, A33784, A34043, A34044, A34100,A 34175, A34176, A34186 to A34189, A34639 to A34653, A34656 to A34658, A34873, A34876,A34877, A34880 to A34882, A35950, A37454 and A62137. The property is in the northwest quarter of the township and extends north into Pascalis township. It was first explored by the Treadwell Yukon Company in 1931, developed underground and brought to production by Bussières Mining Co. From the end of 1932 to 1935, 100,949 tons of ore grading 0.15 ounce of gold per ton was mined. In 1934, Treadwell was incorporated with the property of Beaufor Mining Corp. to the north and became Cournor Mining Co. Ltd. The latter mined gold from the original deposit and the Beaufor deposit in Pascalis township until 1942. In 1952, Quebec Asbestos Corporation optioned 5 claims and drilled 31 holes into asbestos-bearing peridotite. East Sullivan drilled 40 more holes into the peridotite between 1956 and 1957 for a total of 16,854 feet. In 1963 and 1964, 46 holes were drilled by East Sullivan Mines in a gold zone north of the peridotite.

The sinuous east contact of the Bourlamaque batholith extends northward across the property and generally dips moderately to steeply eastward.

At the south end of the property a lobate mass of serpentinite occurs as a re-entrant in the margin of the granodiorite. The western and eastern margins of the serpentine appear to be fault zones and narrow schist zones, trending between east and northeast, across the contact of the batholith.

The mineralized zones can be denoted as follows:

a) Auriferous quartz veins along the granodiorite contact in range X, between the shaft and the area near Colombière river ("Creek area").

b) The "southwest gold zone"; the area of granodiorite north of the peridotite mass, 3,500 feet southwest of the shaft.

c) The asbestos zone; located near the road where it crosses range-line IX/X.

a) Specific descriptions of the productive quartz veins are given in the above references. In general the gold is associated with pyritic quartz veins which lie within the margin of the batholith. Most ore came from a set of en échelon veins which strike eastward and dip 25^{0} to 35^{0} north, oblique to a set of schist zones and small mafic dikes. The ore near the shaft occurred in a zone of veining which dips 80^{0} south and extends east-west for 2,400 feet. The zone has a width of 500 feet in the medial part and veins within it were mined to depths of 700 feet. A few veins dip steeply south, following the margins of mafic dikes.

A long crosscut on the 650-foot level follows the contact of the granodiorite 2,000 feet northward to the area under the creek. Several small veins were mined along this crosscut and parts of four relatively large veins were stoped in the hanging-wall of the schist zone which extends northeast along the creekbed.

The total ore mined from these workings amounts to approximately 310,000 tons grading 0.12 ounce of gold per ton.

b) The "southwest gold zone" trends N.80^{0}E. and has been intersected for a distance of 1,500 feet by East Sullivan Mines Ltd. It consists of numerous auriferous quartz veins and veinlets in granodiorite, north of the re-entrant of peridotite and volcanic rocks. Many of the veins appear to dip moderately south or north and appear to be concentrated below a narrow mafic dike which dips 45^{0} south.

c) Chrysotile asbestos occurs in the serpentinite noted above mainly as cross fibers in reticulating joints (Plate III). The serpentinite may be derived from pyroxenite as small areas exhibit pseudomorphic pyroxenitic textures. Many of the short drill-holes bottomed in granodiorite. Thus, part of the serpentinite mass has a limited vertical extent.

Two blocks of asbestos-bearing rock have been outlined in the northeast and southwest extremities of the mass. The company estimates that the two zones and a small intermediate area contain 4,000,000 tons of asbestos-bearing rock with an average fiber content of 2.5% (mean value $3.95 per ton, at 1957 prices). The tonnage was calculated for thickness down to approximately 300 feet from surface.

Denison Mines Ltd.

Ref.: Que. Bur. Mines, P.R. No. 161, p. 22; Ann. Rept. 1932, Pt. B, p. 52.
Que. Dept. Mines, Geol. Rept. 20, vol. III, p. 277.

Denison Mines Ltd. holds 22 contiguous claims in range V adjacent to the median line in the southwest quarter of the township. These are numbered: CG-390, claims 1 and 2; CG-646, claims 3 and 4; CG-697, claims 2 to 5; CG-698, claim 1; CG-710, claims 1 to 4; C.3453, claims 1 to 4; and claims A.86844 to A.86848. The property was held previously by Metcalfe, Consolidated Mining and Smelting, Lourmet Mines and Lapaska Gold Mines and they drilled numerous holes. Lapaska sunk a shaft to 250 feet on claim 3453 - 1, and, before work stopped in 1947, did 1,740 feet of lateral exploration openings.

Interfingered lavas and pyroclastic rocks and a diorite sill trend east across the property. These are traversed obliquely by a large feldspar porphyry dike. Two areas of gold veins have been discovered: one in the western end of the property on claims CG-710 - 2 and CG-710 - 3 and the other which was developed underground on claim 3453 - 1.

The western zone is a series of small auriferous quartz veins within and near the south edge of the big porphyry dike. Drill-holes in this area transected veins at intervals along a length of 1,500 feet and numerous assays of the order of 0.5 ounce of gold per ton were reported. Individual veins are narrow and difficult to correlate. It is noteworthy that the best values are found where sheared zones, oriented east, transect an open, Z-shaped configuration of the dike.

The zone of veins near the shaft was followed by drifting 600 feet in a direction N.80°W. The level plans (Figure 5) show that the zone consists of numerous short quartz-tourmaline veins which strike between N.10°W. and N.10°E. and dip 40°-60°E. Two larger veins, oriented northeast and dipping moderately east, were also developed. These follow dextral transverse fault zones. The best vein of this type was found at the west end of the workings where a high flowage of water impeded development. Channel samples were reported to contain more than 0.3 ounce of gold per ton over widths of 2 feet.

The veins described above are distributed along a massive fractured lava which is bounded on either side by incompetent layers of breccia.

Dumont Nickel Corp.

Ref.: Que. Dept. Mines, P.R. No. 256, p.42.

Dumont Nickel Corp. holds 5 claims numbered 181567, claims 1 and 2, and 181568, claims 1, 2 and 3 on parts of lots 35 to 39, range VII. The claims cover the western end of the Bevcon pluton where it becomes intercalated with volcanic rocks. The claims were held previously by Buffadison Gold Mines whose work is described in the above reference.

The company made a magnetometer survey in 1962 and drilled 4 holes. Two of these (located in lot 36, 2,300 feet north of range-line VI/VII) intersected metallized granodiorite in which a 1-foot core length was reported to contain 2.92% Cu. Another hole, 500 feet south, also intersected disseminated chalcopyrite in a schisted tuff.

Dunraine Mines Ltd.

Ref.: Que. Bur. Mines, Ann. Rept. 1932, Pt. B, p. 53, p. 55.
Que. Dept. Mines, Geol. Rept. 20, Vol. III, p. 276.

Dunraine Mines Ltd. holds a large property located south of Highway 59 and extending into Bourlamaque township. In Louvicourt township it includes mining concessions Nos. 428 and 450 (Blocks 42 and 43) and claims numbered A.36182 to A.36184, A.36186, A.36187, A.36521 to A.36530, A.44736 to A.44738, A.49101 to A49105, A.49209 to A.49213, A.49298 to A.49302, A.54902 to A.54911. This property has been explored by several companies since 1932 (Wolverine Mines, Moffat-Hall Mines, Columbière Mines, Fleming Mines, Sylvanite Gold Mines, Cartier Mines). Between 1951 and 1957 Rainville Copper Mines Ltd. did extensive underground development and, between 1956 and 1958, produced 3,978 tons of copper, 1,486 ounces of gold and 25,508 ounces of silver valued at $2,241,280 from 280,768 tons of ore. The company carried out an induced polarization survey over the southwest part of the property in 1964.

The predominant geological feature is a sill of diorite which is 1,400 feet thick and trends N.70°E. Agglomerate, flow breccia and dacitic lavas which lie along the flanks of the intrusion have been extensively sheared and impregnated with pyrite, chalcopyrite, sphalerite and small amounts of gold.

The "No. 4 zone" lies adjacent to the southern contact of the western nose of the sill. The general zone of metallization trends east, dips 75° north, and was followed by drifting along a strike length of 2,400 feet. Shoots and lenses of copper ore, usually 5 to 10 feet thick, were mined along the zone. Below the 600-foot elevation the sulfides appear to be more dispersed.

A similar metallized zone lies in sericite schists along the north edge of the sill. Drill-holes indicate that the zone extends (with occasional discontinuities) for 11,000 feet but the metal content over minable widths is usually less than 1% Cu. The western extremity of the zone ("No. 2 west zone"), in Bourlamaque township, contained higher-grade lenses and was developed in seven levels, from the No. 2 shaft. Mining stopped in 1958 and at this time the company estimated that ore reserves were 650,430 tons with 1.22% Cu.

East Sullivan Mines Ltd.

Ref.: Que. Bur. Mines, P.R. No. 161, p. 21.
Que. Dept. Mines, P.R. No. 205, Pt. II, p. 39, No. 330, p. 64.

East Sullivan Mines Ltd. holds 36 contiguous claims which extend westward from the center of Louvicourt township, in range VI, and are numbered: 220271 to 220273, 220294 to 220297, 1 to 5 each, and 224811 - 5. These cover areas that were explored or held at different times by Consolidated Astoria Mines Ltd., Nemrod Mines Ltd., Lapaska Mines Ltd., Orcour Gold Mines Ltd., Croscourt Gold Mines Ltd. (Centrecoeur), Dikor Mines Ltd. and Cambridge Mining Corp. Ltd.

Twenty scattered holes were drilled in the west part of the property by Consolidated Astoria without discovering significant gold values. An area of gold metallization was found in drill-holes by Croscourt 400 feet west of the township center post. The gold occurs with pyritic quartz tourmaline veins in pyritized zones in quartz diorite dikes. Assays up to 0.78 ounce of gold per ton over 0.7 feet were reported. A similar occurrence was located by drilling 1,600 feet to the south in range VI outside the actual property and assays between 0.1 ounce and 1.3 ounces of gold per ton were obtained.

Louvicourt Goldfield Corp.

Ref.: Que. Bur. Mines, P.R. No. 161, p. 23.
Que. Dept. Mines, Mining Ind. in 1944, p. 114; 1945, p. 126.

Louvicourt Goldfield Corp., a former gold producer, holds mining concessions Nos. 340 and 348 including blocks 15, 16 and 17. This is an area of 557 acres which straddles the west end of the eastwest median line of Louvicourt township.

The claims were staked in 1939 following the discovery of a gold showing and acquired by the present owners in 1944. Between 1947 and

1949, when the mine closed, a four-compartment shaft was sunk to 975 feet and extensive lateral work done on six levels. During this time 261,590 tons was milled to produce 31,915 ounces of gold worth $1,121,162 (approximately equivalent to a tenor of 0.123 ounces per ton). No work appears to have been done on the property since 1950.

Complexly intercalated lavas and pyroclastic units trend east across the property. These are intruded by semi-concordant diorite dikes cut by feldspar porphyry dikes. The main porphyry dike extends N.80°E. from the property's west boundary, anastomoses in the vicinity of the shaft, and then appears to swing to an east bearing. The north limit of the porphyry-diorite complex in the vicinity of the ore zone is marked by a zone of intensely sheared rock. Other east-trending shear zones traverse the diorite and pyroclastic rocks south of the shaft.

The gold occurred in pyritic quartz veins and associated with pyritized and altered diorite. The veins contained minor amounts of pyrrhotite, chalcopyrite and, rarely, tellurobismuthinite*. In the few specimens examined by the writer, some of the gold occurs as fine specks along small fractures lined with chlorite in the quartz and sulfides.

The ore came from 3 zones; from north to south these are the "B", "A", and "C" zones. The first two were linear structures north and south of a porphyry dike and the shaft. The "B" zone was the most extensive and consisted of a series of shoots usually in the diorite along its contact with the porphyry dike. The shoots were seldom more than 20 feet wide, tended to rake moderately westward, and consisted usually of a system of short quartz veinlets oriented obliquely to the trend of the metallized zone. They occurred discontinuously over a strike distance of 1,600 feet.

The "C" zone, which was partly mined in 1949 lies 500 feet south of the shaft and trends eastward. The quartz veins follow a shear zone in a diorite dike cut by porphyry dikes. In 1950, surface drill-holes intersected an auriferous shear zone and quartz vein 600 feet east of the last heading. The zone dips approximately 50°S. and has a length of 300 feet.

The localization of the main part of the gold deposit might be attributed to the fact that the porphyries preferentially intruded the altered diorite forming a framework which, during stress, led to the development of numerous local tensional or dilational openings susceptible to metallization. A good argument for this is the distribution of gold in

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*Identified for the company by the Laboratories of the Quebec Department of Natural Resources.

the short oblique veins adjacent to the porphyry's contact in the "A" and "B" zones. These are probably tension joints, formed because of buttressing by the relatively cohesive porphyry.

Quebec Gold Belt Mines Ltd.

Ref.: Que. Bur. Mines, Ann. Rept. 1931, Pt. B, p. 119; 1932, Pt. A, p. 104; 1932, Pt. B, p. 48; 1935, Pt. A, p. 73; P.R. No. 161, p. 24.
Que. Dept. Mines, Geol. Rept. 20, Vol. III, p. 277.

Quebec Gold Belt Mines Ltd. holds a block of 69 claims extending eastward from the center of the township and numbered A.34516-17, 35135-37, 35515-19, 37237-38, 37455-62, 37465-66, 37980-84, 38033-37, 38243-46 38477-83, 40731-32, 40811-16, 41575-76, 43117-21, 45364-65, 48776-80, 52321-24.

A diorite sill complex,1,200 feet thick, crosses the property in a direction N.70°W. In the west part of the property the south margin of the intrusion has a granodiorite facies (or a later intrusion) and is transected by numerous small auriferous quartz veins. The early development work on this zone is summarized in the above references. Between 1940 and 1942 Vicour Mines Ltd. sunk a shaft to 475 feet and completed 7,840 feet of exploration lateral work on three levels (150- 300- and 450-foot levels). The workings extend for 1,700 feet along the south margin of the sill. Approximately 40 surface holes were drilled in 1945 and 1946 throughout the property. Little work has been done since then.

The auriferous zone is confined mainly to the granodiorite which, near the workings, is 300 feet thick and dips vertically. The gold occurs in small quartz veins and lenses which commonly dip southward at 20 to 40 degrees. Small amounts of pyrite, pyrrhotite, arsenopyrite, chalcopyrite and tourmaline occur in the veins. The wall rocks are markedly fractured, silicified and pyritized in the sections with the higher gold values.

The auriferous zone was traced eastward from the shaft by drifting for approximately 800 feet and surface drill-holes were reported to have intersected the extension of the zone to the east of the workings. Drifting west of the shaft went along the zone for 900 feet. At this point the company considered that the zone was cut off by a transverse diabase dike. The western nose of the sill complex appears to be offset southward by a transverse fault.

The company estimated that the deposit contains approximately 500,000 tons with a grade equivalent to 0.135 ounce of gold per ton.

Uranium Ridge Mines Ltd.

(G. Duval Claims)

Ref.: Que. Bur. Mines, Ann. Rept. 1931, Pt. B, p. 118; 1932, Pt. B, p. 15.
Que. Dept. Mines, P.R. No. 190, Pt. II, p. 40.

Gérard Duval holds 15 claims including most of lots 42 to 46, range IV, and parts of lots 44 and 45, range V, adjacent to the west bank of Trivio lake and Marrias river. The property was held in 1944 by Edwaska Gold Mines Ltd. which drilled approximately 12 holes in the central part of lot 44, range IV. These intersected beds of schistose, carbonatized tuff and spherulitic lava with veinlets of quartz containing tourmaline, pyrite and chalcopyrite. The zone crops out on the river.

Several drill-hole intersections in the mineralized zone were reported to contain more than 0.1 ounce of gold per ton over lengths of core from 6 to 20 feet. The zone strikes east and was drilled over a length of 500 feet.

In 1962, six more holes, a total of 1,004 feet, were drilled near the showing. Only low gold values were reported. Uranium Ridge Mines Ltd. did a magnetometer survey in 1963 and, in 1964, drilled 8 holes in areas east and west of the showing. Only very low quantities of gold were reported.

Gold Occurrence on lots 53, 54 and 57, Range V

Ref.: Que. Dept. Mines, P.R. No. 205, Pt. II, p. 50.

A diorite sill, marked by a strong magnetic anomaly trending N.80°W., crosses lots 53, 54 and 57, range V. Four holes were drilled by Tasmaque Gold Mines Ltd. during 1945 and 1951 near the west side of the highway.

The most westerly hole, located 2,000 feet west of the road, intersected the north contact of the diorite and the company logs record that a sample of a vein of quartz and tourmaline contained 0.14 ounce of gold per ton for 0.6 foot of core. Small amounts of chalcopyrite are also reported.

Copper Showing at East Ends of Ranges V and VI

Ref.: Que. Dept. Mines, P.R. No. 190, Pt. II, p. 46.

The area at the east ends of ranges V and VI has been explored by several mining companies and includes an extensive area of copper metallization exposed in old trenches on lots 60 and 61, range VI.

The most recent work was by Newlund Mines Ltd., which drilled 4 holes into the zone mentioned above. Previous to this, a total of 27 holes in the same area was drilled by The Consolidated Mining and Smelting Co. in 1943, Val d'Bell Mines Ltd. in 1945, Alta Mines Ltd. in 1952 and East Sullivan Mines Ltd. in 1955.

This work indicated two general zones of metallization: one centered on lot-line 60/61, 2,000 feet west of the township line, and another located 1,400 feet west of the first and on strike with it. The host rocks are schists and breccias derived from tuff, agglomerate and dacitic lava. These are variably silicified, chloritized, sericitized and impregnated with splotches, veinlets and disseminated forms of pyrite, chalcopyrite and sphalerite.

The most intensely metallized rocks occur along a 400-foot length of the zone centered 2,000 feet west of the township boundary. Drill-hole intersections along this section were reported to contain 1.59% Cu over 19 feet, 1.76% Cu over 15 feet, 1.5% Cu over 19 feet and 1.25% Cu over 9 feet. Holes drilled between had lesser amounts of copper and the distribution of the higher values appears to be erratic. One hole intersected the zone at a vertical depth of 280 feet.

Disseminated chalcopyrite, other than that described above, was noted in drill-holes in lot 50, range V, and lot 51, range VI, located near the highway. One hole, drilled south, beside the highway, was reported to have intersected rocks with small quantities of gold and sphalerite.

A drill-hole located north of Louvicourt river and 800 feet east of the highway on lot-line 58/59 was reported to have intersected carbonatized agglomerate with a 5-foot core length which contained 0.125 ounce of gold per ton.

Gold Occurrence at West End of Range VI

Ref.: Que. Dept. Mines, P.R. No. 205, Pt. II, p. 46.

Ten claims numbered 222927, claims 1 to 5, and 222928 claims 1 to 5, near the west end of the median line of Louvicourt township were previously held by Petitclerc Mines Ltd. which drilled approximately 30 cross-sectional holes between the years 1944 and 1947. The first six of these are described in the reference cited above.

Auriferous quartz tourmaline veins are reported in several of the cores. The best values were from a hole located 3,600 feet east of the township boundary and 600 feet north of the median line. These were 0.16 ounce of gold per ton over 1.6 feet and 0.22 ounce over 0.9 feet. Adjacent holes were barren. Low values were also found in drill-holes located 1,800 feet east of the above zone.

Recent Work

(1) Abitibi Copper Mines Ltd. completed 19 holes in 1965 and 1966 scattered throughout ranges VI and VII on lot 37. The drilling amounted to about 20,000 feet and helped to explore a low-grade copper zone of considerable extent.

(2) In 1963 two adjacent groups of claims under option to Hollinger (Quebec) Exploration Co. Ltd. were drilled. The claims straddle the north-south center line of range VIII. Thirteen holes, totalling 10,000 feet, were bored on the Hoyle group and six on the Agar group to the west.

(3) Naganta Mining and Dev. Co. Ltd., which holds a property of 102 claims situated mostly to the west of the north-south center line in ranges VIII, IX and X, carried on an extensive program of drilling from 1964 to 1966, following magnetic, electromagnetic and geochemical surveys. The purpose of this work was to explore auriferous zones, especially in the center of range IX and south of range X. In 1965 alone, 29 holes were put down for a total of 14,201 feet.

Other recent drilling on the property of Nemrod Mining Co. Ltd. (4 holes in 1966) in range VI and on the Apple Nixon claims between ranges IV and V in the west limit of the township is shown on the map supplementing this volume.

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