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PRELIMINARY REPORT ON THE WEST HALF OF LAMOTTE TOWNSHIP, ABITIBI-EAST ELECTORAL DISTRICT

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PROVINCE OF QUEBEC, CANADA
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MINERAL DEPOSITS BRANCH

PRELIMINARY REPORT
ON THE
WEST HALF OF LAMOTTE TOWNSHIP
ABITIBI - EAST ELECTORAL DISTRICT

BY

W. R. LEUNER



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PRELIMINARY REPORT

ON

THE WEST HALF OF LAMOTTE TOWNSHIP

ABITIBI-EAST ELECTORAL DISTRICT

by

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INTRODUCTION

LaMotte township is located in the electoral district of Abitibi-East, about midway between the towns of Amos and Malartic and approximately 27 miles northwest of Val d'Or.

The area mapped at one inch to 1,000 feet during the summer of 1958 has an extent of approximately 50 square miles. It is bounded by latitudes $48^{\circ}17'$ and $48^{\circ}26'$ and by longitudes $78^{\circ}07'$ and $78^{\circ}14'$. It is easily accessible from Val d'Or and Malartic through highways Nos. 59 and 61 and from Amos by highway No. 61 which crosses the eastern part of the area. Colonization roads along range lines and a road from St-Mathieu to the northwest corner of the township also afford ready access to almost any point in the region, none of which are more than three miles from a road.

There are three distinct types of topography in the area: granite highlands, sand plains, and lowlands underlain by lacustrine clays. Cadillac river, which flows southward in the west half of the southwest quarter of the township, is the main stream. Rock exposures are generally not abundant in the area.

GENERAL GEOLOGY

The rocks of the area are all Precambrian in age. They include folded Keewatin-type volcanic and sedimentary rocks which have been intruded by sill or dyke-like bodies of metamorphosed peridotite, dunite, gabbro, and diorite, and by abundant acidic or granitic material including quartz monzonite, biotite granodiorite, and their associated pegmatites and aplites. Gabbro dykes of apparently Late-Precambrian age transect both the batholithic and pre-batholithic rocks.

The general structural trend of the rock formations is east to south of east. The schistose and foliated rocks have a remarkably constant strike.

Table of Formations

Quaternary	Recent Pleistocene	Stream and swamp deposits Marine and esker material, lacustrine clays
Late- Precambrian	Keweenawan- type intrusive rocks	Gabbro dykes
Early- Precambrian	Post-Keewatin- type intrusive rocks	Epidote rich aplitic granite Pegmatites and aplites Muscovite-biotite quartz monzonite Biotite granodiorite Peridotite, dunite, associated metagabbro, a little metadiorite
	Keewatin- type rocks	Quartz-biotite schist derived from greywacke (Kewagama group?)
		Amphibolite-rich, schistose, acidic to basic lavas (Malartic group?)

Keewatin-Type Rocks

Volcanic Rocks

The volcanic rocks of the area can be broadly grouped into three main belts of various lengths and widths. The northern belt is exposed only from lots 1 to 8, range VI. The central belt appears to be possibly made up of at least 5 bands separated one from the other by sills or dykes of ultrabasic intrusive rocks. Exposures of this belt occur from lot 3, range V, to lot 31, range II. The southern belt, composed of two bands, crops out on lots 6 to 9, range I. In 1941, Ambrose* identified a large area of volcanic rocks (Malartic group) in La Pause township. In 1944 Norman** traced these rocks eastward across Preissac and LaMotte townships and suggested that they lie on the northern limb of a westerly-plunging anticline, the nose of which would be located in La Pause township.

The greater proportion of the volcanic rocks cropping out in the present area are of the basic to the intermediate varieties and they have been altered to fine-grained hornblende schists in which none of the ordinary volcanic features have been preserved. More acidic flows are, however, well exposed in lots 9 and 20 of range IV and consist of fine-grained, light green, white-weathering rhyolite or siliceous tuff. Most of the lavas are schistose, and the strike of the flows probably parallels that of the schistosity which trends south of east.

Investigations of the volcanic rocks of the area are hampered by the scarcity of exposures and by the similarity of the altered volcanic with the ultrabasic intrusive rocks. Examination of core samples from lot 9, range V, has shown that peridotite intrusions and lavas are intimately mixed in places, and the granitic material added during the intrusion of the batholiths has contributed further to the obliteration of the distinguishing features of the two rock types.

Hornblende and plagioclase are the main constituents of the volcanic rocks which commonly contain pyrite as an accessory mineral.

Sedimentary Rocks

Quartz-biotite schist forms a narrow belt between granitic and volcanic rocks in lots 1 to 6, range VI, and is found as small inclusions in granite on lot 28, range VIII. Norman**

* Ambrose, J.W. (1941) - Cléricy and La Pause Map-Areas, Quebec; Geol. Surv., Canada, Mem. 233.

** Norman, G.W.H. (1944) - LaMotte Map-Area, Abitibi County, Quebec; Geol. Surv., Canada, Prel. Paper 44-9.

has followed this belt (Kewagama group) along the eastern margin of the La Motte batholith, in the northeast quarter of LaMotte township, and into a belt of similar rocks in Preissac and La Pause townships to the west.

Originally the quartz-biotite schist may have been a sandy, argillaceous sediment which has recrystallized. The alignment of biotite flakes in the quartz- and feldspar-rich matrix is a conspicuous textural and structural feature striking parallel to the regional structure. No characteristic sedimentary structures were seen in the rock probably on account of their obliteration during the intrusion of the batholithic rocks.

Post-Keewatin-type Intrusive Rocks

Ultrabasic and Basic Intrusives

Ultrabasic and basic intrusive rocks are abundant and widespread in the area. Exposures of them and the result of a study of the aeromagnetic anomalies discovered in the area indicate that they underlie most of range VI and large tracts of range III, IV, V and VII. They also form isolated zones and areas in ranges I and II.

The ultrabasic facies of this group, which consists of more or less serpentinized peridotite and dunite including talc, talc-serpentine, and tremolite-actinolite schists, has a dark bluish colour on fresh surfaces and weathers to various shades of greenish grey or brown. Patches containing radiating platy structures, probably composed of tremolite and chlorite, are a distinctive feature for which Jones* suggests the term "hachured structures". Polygonal fracture patterns somewhat similar to pillow structures are also present in the ultrabasic rocks and light green serpentine is common along joints and fractures. Asbestos stringers are present here and there in the peridotite and dunite.

Metagabbro and, in places, amphibolite and metadiorite occur here and there in close association with the peridotite and dunite. Ambrose** working on similar rocks in Destor township has suggested that the peridotite-gabbro assemblage forms "possibly a composite dyke". The contacts between the ultrabasic and basic rocks appear to be definitely gradational in drill cores from the mining property of Marchant Mining Co. Ltd. and it seems likely that the intrusion of the two facies closely followed one another in time.

* Jones, R.E. - The Northeast Quarter of LaMotte township, Abitibi County, Quebec; Que. Dept. Mines., Manuscript Report.

** Reference cited, page 3.

Biotite Granodiorite

Exposures of a uniformly medium grained, greyish white biotite granodiorite are scattered in range I to IV and form isolated occurrences along and near the eastern boundary of the area, in ranges VI and VII. The southern groups of exposures lie in an area of low farm lands and they are relatively of a small extent which makes their study more difficult.

The rock appears to the naked eye to be made up mostly of biotite, quartz, and of two types of feldspar. The plagioclase feldspar seems to be much more abundant than the alkali variety and constitutes about 50 per cent of the rock. In places, short parallel fractures give the granite a sheared appearance.

Muscovite-biotite Quartz Monzonite

The largest and most abundant rock exposures of the area are those of a white-weathering variety of acidic intrusive here called a muscovite-biotite quartz monzonite which represents the major part of the La Motte and Preissac batholithic masses in the area. The rock is massive and coarse-grained and appears to the naked eye to be made up of quartz, feldspar, muscovite, biotite, and garnet. In addition, concentrations of epidote and of a distinctive light greenish-yellow mica are here and there visible in the rock.

Although the exposures of the two batholiths are separated by a zone of volcanic rocks, biotite schist, and ultrabasic intrusives in the extreme western part of range VI, it is the writer's definite opinion that the two masses are linked at depth on account of their strikingly similar appearance and mineralogical composition.

Pegmatites and Aplites

Granitic pegmatites, feldspathic quartz veins, quartz veins, and aplite dykes, which represent the late phases of the batholithic intrusion, cut across the batholithic and pre-batholithic rocks, although they are most abundant near the contact between the two varieties. Pegmatites cropping out within the limits of the La Motte mass, in the northern part of the map-area, have sharp boundaries with the granite, whereas those located along the border of the batholith have gradational contacts.

Epidote-rich Aplitic Granite

Between lots 22 and 26, near the road between ranges V and VI, occurs a small group of outcrops which Norman*

* Reference cited, page 3.

described as being made up of syenite which he considers an early differentiate from which the granitic group was derived. From a preliminary study of thin sections, the writer has found that the rock is an epidote-rich aplitic granite representing not an early facies but a very late differentiation product of the batholithic intrusion.

Keweenawan-type Intrusive Rocks

Gabbro Dykes

Three large dykes of gabbro characteristically similar to the Late-Precambrian (Keweenawan?) intrusive bodies found elsewhere in the Rouyn - Bell River area crop out in the west half of LaMotte township. One of them extends across lots 1 to 8 of ranges VIII and IX, and the other two, located about 6,000 feet apart, lie in the southeastern part of the map-area. Their width varies between 100 and 300 feet and their strike averages about N.55°E. The dyke in range IX differs from the other two in having a series of narrow offshoots parallel to its south-east edge, and all three have a set of longitudinal and transverse cooling joints.

The rock of the dykes has a remarkably fresh appearance and consists primarily of feldspar and pyroxene, with minor quantities of epidote and pyrite. The dyke of range IX contains feldspar phenocrysts haphazardly oriented in a ferromagnesian-rich groundmass. Chilled margins of basaltic textures are found along the borders of the dykes.

Pleistocene and Recent

Glacial striae are commonly found on the surfaces of soft talcose peridotite outcrops, and they indicate that the ice moved approximately S.30°E. across the area.

All the unconsolidated deposits are typical of those found elsewhere in the "clay belt" of northwestern Quebec, and consist of clay, in places well varved, and of sand, gravel, and drift. The large esker of the northwestern part of the map-area is flanked on both sides by a series of sand dunes.

STRUCTURAL GEOLOGY

Broad extents of drift material make a detailed structural study of the area hardly possible, but foliation, schistosity, and the distribution of rock exposures show that the general structural trend of the formations is east to south of east.

Norman* is of the opinion that the general

* Reference cited, page 3.

structure is anticlinorial, the batholith having irrupted along the axis of the major anticline. The northern and southern sedimentary belts which would lie on the flanks of the anticline are not exposed in the present area. It appears on the other hand that the pre-batholithic rocks of the area have been isoclinally folded with a general dip of 60° to 80° to the northeast. The repetition of peridotite masses is apparently due to folding rather than to multiple sill-like bodies.

The rocks of the La Motte batholith commonly show, except for the core of the batholith, an alignment of mica flakes parallel to the regional foliation or schistosity. Pegmatite and aplite dykes in the granite follow joints which strike in all directions.

Although geophysical surveys suggested the presence of several faults in the area, no evidence of major faulting or of the presence of important shear zones was found in the course of this survey.

ECONOMIC GEOLOGY

Three types of mineral deposits have been found in the region: nickel-bearing sulphide bodies of the replacement type, quartz veins and granitic rocks with molybdenite mineralization, and spodumene-beryl pegmatites. Extensive exploration for base metal sulphides was being carried out at the time of the survey upon which this report is based, whereas in 1955 and 1956 the search was primarily for spodumene and beryl, in the northeastern part of the area.

Marchant Mining Company Ltd.

Marchant Mining Company Ltd., a subsidiary of Peruvian Oils and Minerals Ltd., was formed in 1957 to explore a nickel discovery made earlier in the year in a peridotite zone in lot 9, range V of LaMotte township. The company's property included, at the beginning of June 1958, lots 6 to 17, range V, and lots 16 to 19, range IV.

The ground was covered later in 1957 by a series of magnetometric, resistivity, and electromagnetometric surveys and a geological reconnaissance mapping. The preliminary geophysical surveys outlined an oval-shaped anomaly approximately 3,500 feet long and 1,200 feet wide. Three smaller zones were subsequently discovered within this area through detailed geophysical work, and 43 diamond-drill holes totalling 20,197 feet were put down on the occurrence during 1957. The drilling indicated the presence of a zone of massive to disseminated nickel-bearing sulphides 400 feet along and averaging close to 8 feet in width.

The main sulphide is pyrrhotite, but chalcopyrite, pentlandite, and pyrite are also present. The company has reported indicated ore reserves amounting to 352,961 tons to a depth of 800 feet and averaging 2.95 per cent nickel.

The country rock consists of folded peridotite and related intrusive rocks not easily distinguished from the intruded intermediate to basic volcanics. Mineralization was however found to occur in all of those rock types. Faulting appears to have limited the size of the orebody.

Cubric S. Claims (Continental Mining Exploration Ltd.)

S. Cubric holds a group of claims covering lots 29 to 32, range II; lots 24 to 28 and lot 31, as well as the north half of lot 23, range III; lots 20 to 22 and the south halves of lots 23 to 29, range IV, LaMotte township.

Most of the property is underlain by peridotite and dunite except for a narrow northwesterly-trending zone of acidic to intermediate volcanic rocks, a little metagabbro, a small area of biotite granodiorite, and a northeasterly-trending late-Precambrian gabbro dyke. Nickel-bearing sulphides were discovered in lot 20 of range IV in 1957 in a 5-foot-wide brecciated zone carrying pyrite, pyrrhotite, and pentlandite and included in the narrow band of acidic to intermediate volcanic rocks mentioned above.

Continental Mining Exploration Ltd. conducted a series of geophysical surveys on part of the property and drilled 13 short diamond-drill holes totalling 262 feet on the main sulphide occurrence. The best assay results obtained in the drilling were 8.33 per cent nickel for a core length of 8 feet.

Ataman J. Claims (Violamac Mines Ltd.)

The group of claims covering lots 8 to 15 of range IV was held in 1957-58 by John Ataman and was optioned to Violamac Mines Ltd. in 1957 for the period of one year. The claims are underlain by acidic to intermediate volcanic rocks intruded in the southwest half by peridotite and biotite granodiorite. Sulphide mineralization, consisting of pyrite and small amounts of chalcopyrite and pyrrhotite, is present here and there in the volcanic rocks. As early as 1938, shallow trenching was done on the mineralized exposures and some sampling for gold gave negative results. Violamac Mines Ltd. performed in 1957 a series of magneto-metric, resistivity, and electromagnetometric surveys with negative results on the northern half of the property.

East Sullivan Mines Ltd. and Sullivan Consolidated Mines Ltd.

These two companies held in 1957-58 the mining rights on lots 1 to 5 of range V and lots 1 to 7 of range VI.

Peridotite, dunite, and quartz monzonite are the most important varieties of rock cropping out on the claims but important areas of intermediate to basic volcanic rocks and of quartz-biotite schist are also present. The owners carried out in 1957 magnetometric surveys followed by 20 diamond-drill holes totalling 14,054 feet. The drilling revealed that the anomalies discovered in the magnetometric work were apparently due to the presence of concentrations of magnetite and of other iron rich minerals in the ultrabasic or volcanic rocks.

Ascot Metals Corporation Ltd.

The western 3/4 of lots 28 to 33, range VII, which are part of the ground held by Ascot Metals Corporation Ltd. in LaMotte township are within the limits of the northwest quarter. The bedrock of the claims is made up of peridotite and dunite intruded by a small boss of biotite granodiorite and by pegmatites and aplites. In 1955, electromagnetometric, magnetometric, and geological surveys were carried out and 27 holes totalling 12,780 feet were drilled in the search for lithium-bearing pegmatites and aplites. Most of the drilling was, however, concentrated on the claims lying in the eastern half of the township and only 7 holes are located in the present map-area. No economical lithium deposit was discovered in the drilling.

Dupas Metals Ltd.

This company's mining claims, which comprise lots 3 to 7 of range II, are underlain by quartz monzonite with large inclusions of peridotite and dunite, metagabbro, and volcanic rocks. In the middle of lot 5, along the east slope of a ridge of monzonite, a quartz vein is exposed over an average width of about 10 feet and a length of 800 feet. The vein strikes about N.15°W. and its dips are generally below 30° to the southwest. It contains a few inclusions of aplitic material and some pegmatite segregations.

Patches of molybdenite 2 to 3 inches in diameter and one inch thick are occasionally found in the vein, but most of this mineral occurs in small, well formed hexagonal crystals sparsely disseminated in the quartz and in the pegmatitic material. A few crystals of bismuthinite are also present. Two zones of mineralization were trenched after a geological examination of the property was made in 1951. In March 1957, four holes totalling 640 feet were drilled across the vein and 4 assays indicated between 0.05 to 0.43 per cent MoS₂ with one giving 0.06 per cent bismuth.

Savigny-Ouellette Claims

These claims comprise lots 2 to 4 and the south half of lot 5, range VII, and they are almost completely underlain by quartz monzonite. The zone of contact between this rock and quartz biotite schist, to the south contains scattered inclusions of the schist. A molybdenite occurrence in monzonite has been exposed by stripping in the southeast corner of lot 4, range VII. The mineral, which is possibly associated with minor shearing in the granite, is present in patches and in a few disseminated crystals. The grade and size of the mineralized zone had not yet been determined at the time of this study, but a more detailed examination was scheduled to be carried out at some future date.

Other Mining Properties

Geophysical studies, geological surveys, stripping, and prospecting were also carried out at various times in the area by a good number of companies and individuals for base metals or lithium-bearing minerals. The results of that work were generally inconclusive but many of the claims have been kept in good standing for further exploration in the future.

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