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AMOS - BARRAUTE AREA, ABITIBI-EAST COUNTY

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PROVINCE OF QUEBEC, CANADA

DEPARTMENT OF NATURAL RESOURCES

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GEOLOGICAL REPORT 109

AMOS-BARRAUTE AREA
ABITIBI-EAST COUNTY

by

W.W. Weber and Maurice Latulippe



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No. 1346	" " " (Centre sheet)	"
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AMOS-BARRAUTE AREA

Abitibi-East County

by

W.W. Weber and Maurice Latulippe

INTRODUCTION

General Statement

The present report is a summation of the geological studies carried out for the Quebec Department of Mines (now, Department of Natural Resources) by W.W. Weber and Maurice Latulippe in the Amos-Barraute area, Abitibi-East county, in the northwest part of Quebec. Five preliminary reports - Nos. 200, 228, 246, 255 and 257 - have already been published by the Department on various parts of the area here described and quarter township geological compilation maps of the area are also available at the scale of 1,000 feet to the inch.

Most of the original field work upon which this report is based was carried out by W.W. Weber; Maurice Latulippe completed the geological mapping and added a considerable amount of new data made available through exploration work done during the last few years in the area by a great number of mining companies or individuals. Some of the original work of Weber was also revised taking into consideration the new information available, thus making some parts of this report somewhat at variance with the previously published preliminary information.

Location

The Amos-Barraute map-area extends from north latitude 48°30' to 48°43' and from west longitude 78°13' to 77°33'. It occupies an area of approximately 450 square miles and includes all of the townships of Dalquier, Duvernay, and La Morandière and the northern half of Figueray, Landrienne and Barraute townships. Its centre lies about 300 miles north-west of Montreal, its western limit is approximately 60 miles east of the Ontario-Quebec boundary, and its southern limit is about 25 miles north of the Malartic - Val-d'Or mining belt.

Access

The district is well provided with roads which are connected to the main highways of the Province. The region surrounding Amos and Barraute can be reached by a network of secondary roads and additional colonization roads. The transcontinental line of the Canadian National Railways traverses the southern part of the area. Amos, Landrienne and Barraute are the main accessible shipping points. The main water routes in the area are the Harricana and Laflamme rivers.

History

The Amos-Barraute area was one of the first regions in the northwest part of Quebec to show promise of bountiful natural resources. The first prospectors invaded the district shortly after the turn of the century. Most of this early history is lost. The earliest records of appreciable exploration and development are linked with the arrival of the railroad and the expediency of wartime demands for base metals during World War I. With the discovery of the more lucrative fields of endeavour in the Noranda, Malartic and Val-d'Or districts, the interest in the Amos-Barraute region waned. For three brief periods - 1935 to 1939, 1944 to 1947, and 1950 to 1953 - the district regained the spot light only to be cast aside as the prospectors flew northward to the new discoveries in Chibougamau, Bachelor Lake, Matagami Lake and intermediate points.

Previous Work

In 1906 Wilson made a geological reconnaissance survey along the Harricana river (1, p.120)*. His map, on a scale of 1 inch equals 4 miles, (2) includes most of the present area. During the period 1933 to 1937, Weeks mapped the present map-area on a scale of 1 inch equals 1 mile (3), (4), (5). Parts of the adjoining area to the south were mapped by James and Mawdsley in 1925-26 (6), (7), (8), by Norman in 1943 (9), and by Tremblay in 1945-46 (10), (11), (12), (13), and to the east and north by Faessler in 1934 (14), and Longley in 1941 (15).

Field Work

The area was mapped on a scale of 1 inch equals 500 feet and in part 1 inch equals 1,000 feet. Aerial photographs enlarged to the

* References are at the end of the report.

scale of mapping were used for plotting. These were supplemented by large-scale plans of the various mining properties in the area. In certain instances, the results of geophysical surveys on the properties served to extrapolate geological features beyond the limits of outcrops. The geology of the area is shown in detail on a scale of 1 inch equals 2,000 feet on 18 quarter-township sheets, as follows:

Barraute Township:

Northwest Quarter
Northeast Quarter

Dalquier Township:

Northwest Quarter
Northeast Quarter
Southwest Quarter
Southeast Quarter

Duverny Township:

Northwest Quarter
Northeast Quarter
Southwest Quarter
Southeast Quarter

Figury Township:

Northwest Quarter
Northeast Quarter

La Morandière Township:

Northwest Quarter
Northeast Quarter
Southwest Quarter
Southeast Quarter

Landrienne Township:

Northwest Quarter
Northeast Quarter

These sheets may be obtained from the Quebec Department of Natural Resources.

The maps Nos. 1345, 1346, 1347 that accompany this report are on the scale of 1 inch equals 2,000 feet.

Relief and Drainage

The area lies within the great 'clay belt' of northern Ontario and Quebec (16, p.104). The surface is a plateau-like clay-covered plain, in places pierced by ridges of rock and glacial debris or dissected by streams (Plates I-A and I-B). The low-lying land, particularly the central part of Dalquier township, almost all of La Morandière township,

and the greater parts of the north halves of Figury, Landrienne and Barraute townships, is well suited for farming. The clay-covered plain is interrupted in places by small rocky islands and rounded ridges or long sinuous eskers of sand and gravel. The eskers have in general a north-south orientation.

The highest beach terrace noted along an esker is at an elevation of 1,050 feet. This terrace is preserved along the southwest flank of the gravel ridge at the west end of range VII, Figury township. The hilly parts of the area are largely underlain by granite. The maximum relief is 350 feet but the average is 100 feet.

The area is drained by the Harricana and the Laflamme rivers, which run north and eventually join to flow into James bay. The mature character of these sluggish, muddy rivers suggests that their present channels were also preglacial channels.

Acknowledgments

The authors are indebted to the officials of the various mining companies who generously gave information to aid in the preparation of this report. The senior author, W.W. Weber, also wishes to express his appreciation of the good services of the field assistants, in particular the seniors, M. M. Ritchie, R. L'Espérance, J. Charron, G.E.P. Eastwood, and L.G. Murray. He is also pleased to acknowledge his deep gratitude to Dr. E.S. Moore, former Head of the Department of Geological Sciences, University of Toronto, and to Dr. W.W. Moorhouse of the same university for their considerable help in the preparing of this report. The Quebec Department of Natural Resources is likewise thanked for having given him permission to use the material published here in the preparation of a Ph. D. thesis at the University of Toronto.

The analyses of all samples taken by the writers were made in the laboratories of the Quebec Department of Natural Resources.

GENERAL GEOLOGY

General Statement

All the consolidated rocks of the area are of Precambrian age. Nearly four fifths of the exposed rocks are Keewatin-type volcanics. Except for local occurrences of stratified pyroclastic rocks and of iron formation, the only known sedimentary rocks of either Keewatin or Temiscamian-type within the map-area are the Castagnier Lake sediments in range X, La Morandière township.

The oldest rocks, the Keewatin-type volcanics, are considered equivalent to the Malartic group of Gunning and Ambrose (17) or Norman's (18) Kenojevis group. The sequence of the Keewatin-type volcanic rocks bears a remarkable resemblance to that found in the Dubuisson area (18). The Keewatin-type volcanic rocks consist of siliceous to basic lavas, tuffs, agglomerate and breccia and their low-grade metamorphic equivalents.

Numerous types of concordant and discordant intrusives occur throughout the volcanics. It is apparent in some instances that these rocks are nearly contemporaneous with the lavas. This is particularly true in the case of the sills and pseudo-sills of diorite and gabbro in the basic lavas of earliest age. In other instances chilled contacts and irregular outlines transgress the regional structure and suggest a definite post-Keewatin age. A wide variety of rocks ranging from serpentinized peridotite to granitic pegmatite is represented. Age relationships are uncertain in many instances although it seems clear that the final period of intrusion is marked by diabase and olivine gabbro of late Precambrian age.

The following table of formations shows as clearly as is known the relationship of the exposed rock types of the area.

Table of Formations

	Pleistocene	Clay, sand, gravel
Unconformity		
	Keweenawan (?)	Olivine gabbro, diabase
	Intrusive contact; Northeast faulting	
		Quartz veins, quartz gabbro, albitized quartz porphyry, pegmatite, aplite, lamprophyre Microcline-albite granite, quartz monzonite, amphibolite
P	Recurrent movement on east and northwest faults; Carbonatization	
R		Albite granodiorite, diorite
E	North to northwest faulting	
C		Quartz diorite
A		Quartz porphyry, feldspar porphyry, lamprophyre, quartz diabase, quartz diorite, gabbro
M	Recurrent east-west shearing	
B		Gabbro-peridotite-pyroxenite complexes
R		Gabbro, diorite, amphibolite
I	Major folding and east-west faulting	
A	Keewatin intrusive rocks	Gabbroic and dioritic rocks, felsitic rocks, rhyolite porphyry
N	Keewatin (?) sedimentary	Slate, argillite, greywacke, conglomerate and ferro-dolomite
	Keewatin-type volcanic rocks	Upper volcanic series Mainly intermediate lavas Lower volcanic series Mainly basic lavas Occasional intermediate lavas and siliceous to intermediate fragmental and pyroclastic rocks

The oldest recognizable shear zones are parallel to the regional trend. The movement probably originated during the period of major folding. Cross faulting and cross shearing are associated with granitic intrusion. The northwesterly-trending faults appear to have originated at this time. At the intersections of the shear zones with later cross faults, readjustments and recurrent movements have been noted on the shear zones. Post-Granite fractures or lineations and the late granitic differentiates are aligned in a northerly direction, suggesting tension. Late faults of northeasterly trend have in places provided zones of weakness which have been intruded by Proterozoic dykes. Some of the greatest apparent displacements in the area are caused by the northeasterly-trending faults.

Keewatin-type Volcanic Rocks

The Keewatin-type volcanic rocks are so extensively altered that a true petrological classification is difficult to apply. Therefore, a brief explanation of the names as used in this report is warranted.

Basalt

The basaltic lava is a dark green to blackish, soft, quartz-free extrusive rock in which whitish feldspar makes up 30 per cent or less of the visible constituents. Grain size is rarely seen in the dense, finely granular, in places diabasic aggregates of secondary ferromagnesian minerals. Massive, pillowed and amygdaloidal varieties are the commonest. The pillow structures have bun-like, semi-ellipsoidal or bulbous forms, generally small and poorly developed. Thicknesses of individual flows are extremely variable, reaching 300 feet. Pyroclastic zones are sparse and tuffaceous bands, generally on the upper side of the flows, are susceptible to shearing and therefore difficult to recognize.

Under the microscope primary characteristics are not recognizable. The main secondary minerals are albite, hornblende, chlorite, epidote, sericite, zoisite, carbonate, leucoxene and iron oxides. Talc and antigorite suggest olivine in some instances but no pseudomorphs were observed. The basic lavas are apparently the most altered.

Chemical analyses of two specimens of typical basic lava from Duvernoy township are given below.

Table 1 - Chemical Analyses of Basalt

	1	2		1	2
SiO ₂	52.62	50.20	K ₂ O	0.88	0.34
Al ₂ O ₃	13.56	15.90	H ₂ O +	2.78	3.47
Fe ₂ O ₃	1.29	0.60	H ₂ O -	0.02	0.005
FeO	6.32	5.09	CO ₂	6.75	8.80
MgO	1.80	5.60	TiO ₂	1.52	0.76
CaO	9.29	6.77	P ₂ O ₅	0.22	0.11
Na ₂ O	2.92	2.40	MnO	0.22	0.10
			Total	100.15	100.16

- 1.- Relatively unaltered andesite basalt from lot-line 15-16, range VI, Duvernoy township, 2,250 feet south of the range line.
- 2.- Strongly carbonatized andesite basalt from lot-line 12-13, range VI, Duvernoy township, 600 feet south of the range line.

Andesite

This term is in common usage by geologists to designate the typical pale "greenstone". Andesite in the present work designates a pale to medium green, dense, quartz-free, intermediate volcanic rock containing whitish feldspathic constituents of the order of 40 to 60 per cent. The size of the grains is variable, ranging from fine to coarse. In the coarse-grained varieties diabasic and porphyritic textures are common. Pillow structures are common and, owing to sluggish flow, tend to large well-formed mattress or ellipsoidal forms. Lengths up to 30 feet were noted in the map-area. Many of the 'diorite' sills and pseudo-sills are believed to be a part of this group.

Mineralogically, the secondary products are similar to those of the basalts, though the proportion of silica and products of alteration of feldspar are larger. There is a higher proportion of pyroclastic material among the andesites than among the basalts, and the agglomerates contain fragments of lighter-coloured, more siliceous material.

Dacite

The term dacite is used to designate those lavas in which quartz is present in the order of 20 to 30 per cent by volume. These are the typical 'grey lavas'. Massive, pillowed and porphyritic varieties

PLATE I



A— View of a bare rocky granitic ridge in the central part of the map-area.



B— Topography of the southern part of Duvernoy and the northern part of Landrienne townships.

PLATE II



A— Coarse porphyritic ring with inner vesicular bomb-like core in dacite.
Lot 13, range X, Landrienne township.



B— Typical brecciation in siliceous lavas. Cherty white fragments in
acidic lava matrix. Lot 17, range II, Duvernoy township.

occur (Plate II-A). The pillows tend to be spherical, with highly irregular margins. Agglomeratic layers are more common than in the two previously described types of rock. Tuffs of dacitic composition form recognizable bands useful as horizon markers.

Mineralogically, the feldspathic constituents predominate and in some specimens primary structures are apparent. The ferromagnesian minerals appear as nests of secondary products.

Rhyolite and Trachyte

These rock-types are considered together since the physical properties are very similar. Trachyte designates those siliceous lavas having a predominantly feldspathic groundmass. The rhyolites are quartz rich. Amongst these siliceous lavas there is a wide variation of colour from the common pale lemon-yellow or dull white, through greys to delicate rose or pink. A conchoidal fracture is distinctive. Owing to the low ferromagnesian content, chloritization and carbonatization are less developed than sericitization. The size of the grains ranges from extremely fine as in devitrified glass to fine as in felsites. Brecciation is typical of the siliceous lavas (Plate II-B). Fragmental lavas, tuffs and agglomerate are common and suggest explosive activity during the emplacement of the siliceous extrusives.

Quartz, albite and acid oligoclase have been noted as phenocrysts. Untwinned albite is the commonest feldspar; microcline and oligoclase were, however, also identified, but no orthoclase was found.

An incomplete analysis of the rhyolite from Duvernoy township, used in the manufacture of roofing granules, is given below. The analysis of a rhyolite from Duprat township is also given for comparison. With the exception of the alkalis, the two analyses are very similar.

Table 2 - Chemical Analyses of Rhyolite

	1	2
SiO ₂	74.80	78.78
Al ₂ O ₃	11.43	11.21
Fe ₂ O ₃	0.37	1.04
FeO	2.24	2.77
MgO	0.14	1.33
CaO	1.25	0.21
Na ₂ O	6.00	3.13
K ₂ O	2.66	0.80

1.- Rhyolite from lots 10 and 11, range I, Duvernoy township.

2.- Rhyolite from Duprat township (19, p. 79).

Distribution of Keewatin-type Volcanic Rocks

The Keewatin-type volcanic rocks have been divided into an upper and a lower series. The upper series comprises the formations lying within the Duvernoy synclinal basin. The lower series comprises those cropping out on the limbs of the complementary anticlinal structures, the Soma anticline in the north and the Amos anticline in the south.

Lower Volcanic Series

The lower series of Keewatin-type volcanic rocks consists mainly of basic lavas with occasional intermediate flows and siliceous to intermediate fragmental and pyroclastic rocks.

The oldest rocks of the series are siliceous tuffs and agglomerates with some siliceous to intermediate lavas. These rocks are particularly well represented on the nose of the Amos anticline throughout the northeastern part of Barraute township. Excellent surface exposures occur on the northern part of lots 34, 35, 41 and 42, range VIII, of lots 46 to 55, range VI, and on the range-line VI-VII from lots 59 to 62, Barraute township. Drilling has further cross-sectioned this band to the north on lots 47 to 50, range VII, the south end of lot 36, range VIII, and to the west in lots 12, 13 and 25, range VIII. It would appear that the Amos anticline has there a westerly plunge because the distribution of these pyroclastic rocks in the western part of Barraute is suggestive of inter-tonguing and also because of a partial loss of the entity in a heterogeneous group of volcanic rocks cut in lot 25, range VIII, cross-sectional drilling. The main rock types are siliceous tuffs and agglomerates with minor inter-digitation, in the eastern part of Barraute township, of siliceous to intermediate lavas. These have increasing importance in the western half of the township.

To the west of Barraute township, the westerly plunge appears to continue with the pyroclastic band giving way to intermediate lavas throughout the eastern half of Figury township. Exposures are sparse but typical pyroclastic rocks have been mapped on the north limb of the fold at the south end of lot 31, range IX, and lot 7, range VIII, Ländrienne township. West of Harricana river, the siliceous lavas and pyroclastic rocks reappear on both limbs of the anticline, thus suggesting a reversal in the plunge of the fold. Exposures are limited to lots 29 to 32, range VII, and lots 7 to 11, range IX, Figury township.

The Amos anticline is believed to lie within a group of basic lavas containing well-defined bands of agglomerate in lots 23 to 27, ranges VIII and IX, Figury township. On account of a limited number of

exposures in this band, little information is available from it for correlation purposes.

In the west half of range VI, Landrienne township, there are a number of small rock exposures mainly of siliceous tuffs along the diabase dyke. These tuffs form a lens in otherwise mostly basic surroundings.

The equivalent siliceous to intermediate volcanic rocks on the flanks of the Soma anticline in the north rests on two possibilities. On the north limb, there is a narrow band of siliceous lavas and pyroclastic rocks cutting across the northwest corner of La Morandière township. On the opposite or south limb, a band of mainly pyroclastic rocks is exposed on lots 4, 5, 10 and 11 in the northern part of range VIII, Duvernoy township. Exposures throughout this entire northern part of the map-area are so limited that the possibility of establishing a definite correlation must await drilling work.

Overlying these siliceous rocks is a layer of intermediate to basic lavas about half a mile thick. The rock types are almost entirely massive, pillowed and amygdaloidal basaltic lavas. These rocks are well exposed on lots 19 to 24 and 32 to 38 of range VII and on lots 43 to 52 of range VI, Barraute township.

These lavas are overlain by a zone of pyroclastic rocks upwards of 1,000 feet thick, consisting mainly of siliceous to intermediate tuffs and agglomerates with considerable graphite-bearing material and, locally, enclosed flow rocks. In Barraute township, this zone is well represented on the south limb of the Amos anticline on lots 10 to 21, range VII, and lots 45 to 52, range VIII.

At the top of the lower series is a series of flows of basic lavas which is exposed over widths ranging from one mile to several miles. Pillow lavas predominate. Some of the flows are of considerable thickness. Second in order of abundance are massive fine-grained to medium-grained lavas. Amygdaloidal tops are common in the flows, but do not persist as mappable horizons. Flow breccia is common, but agglomeratic zones are rare. Tuffs are present in the flows but they generally are difficult to recognize on account of shearing which has commonly converted them into chloritic schist with a variable amount of carbonatization. Where there has been large-scale intrusion, the volcanics have been metamorphosed to amphibolite. Sills and pseudo-sills, mainly of gabbroic composition, are intercalated with the flows.

Upper Volcanic Series

The rocks of the upper series of Keewatin-type volcanics are mainly of intermediate composition.

The lower beds consist of intermediate lavas and pyroclastics of mixed affinities. The flows are mainly massive and pillowed dacite. Good exposures, in contact with the basic lavas of the lower series, can be seen in lots 15 to 21, ranges I and II, Duvernay township. Coarse-grained and porphyritic varieties of the dacite are seen in the northern parts of lots 16 and 17, range I.

Next in the succession is a prominent layer of siliceous fragmental lavas and pyroclastics. The rock types are rhyolite, dacite and andesite. The main exposures are on lots 30 to 46, ranges II and III, and lots 33 to 39, range V, Dalquier township, and on lots 19 to 40, ranges III and IV, Duvernay township.

The siliceous rocks are overlain by predominantly intermediate lavas. These lavas, which outcrop in the axial region of the Duvernay syncline, are the youngest exposed volcanic rocks in the area. They are mainly massive and pillowed dacites and andesites.

Locally, narrow layers and lenses of basic lava are found between the siliceous volcanics and the underlying and overlying intermediate volcanics. In these layers and lenses pillow lava is common, with local occurrences of flow breccia and agglomerate.

Keewatin (?) Sedimentary Rocks

Sedimentary rocks underlie a large part of the north half of La Morandière township. Their structure appears to be conformable to that of the Keewatin-type volcanic rocks, and the contact zone, as shown in drilling on the property of Trinity Chibougamau Mines which covers the south part and south shore of Castagnier lake, suggests an interbedded sequence of lava flows, tuffs, agglomerates and sedimentary rocks. Nevertheless there is no direct evidence to prove or disprove the existence of an unconformity. No exposures of a contact between definitely volcanic and sedimentary rocks were observed. There are within the sedimentary sequences thick bands of volcanic rocks particularly in the south part of range X, in lots 43 and 44, and in the north part of range VIII, in lots 42 to 52. It appears from top determinations that some of these volcanics overlies some of the sedimentary rocks.

The sedimentary rocks are made up of slates, cherts, greywackes, argillites, quartzites and carbonate rocks (ferro-dolomite and limestone), which strike west to S.30°E. and dip 70° to 85° south. The argillites, slates and greywackes show prominent, graded bedding which can be used to determine the top of formations. These tops are all south except for those penetrated by two drill holes on Castagnier lake. A few outcrops of pillowed lavas along the south edge of the sedimentary belt also indicate a southward top for the flows. The axis of a syncline must pass diagonally across the north half of La Morandière township from near Castagnier lake southeasterly through the south end of lot 52, range VI. The complementary anticlinal axis to the north lies outside the map-area in Vassal township. South of the synclinal axis, the outcrops in lots 43 and 44, range VI, are of pillowed and flow brecciated andesitic lavas interbedded with fine-grained, highly ferruginous carbonate rocks. These carbonate rocks resemble some of those seen interbedded with argillites, quartzites and conglomerates north of the synclinal axis. Drill holes put down at the north end of lot 60, range IV, La Morandière township, and in the central part of lot 3, range IV, Rochebaucourt township, cut well-bedded slate, graphitic slate, argillite, chert and carbonate rock. These rocks could also lie on the south limb of the syncline. Except for these few examples, all other rocks south of the synclinal axis appear to be of volcanic origin.

The conglomerates are made up of angular to sub-rounded or elliptical fragments and pebbles of chert, carbonate rock, argillite and graphitic slate in a carbonaceous and argillite groundmass. They vary in size from 1/10 of an inch to 6 inches with a few angular blocks up to 1.5 feet across. Outcrops in lots 46 and 47, range VI, La Morandière township, have bands of conglomerate with granules 1 to 3 mm. in diameter. In lot 18 of range X, La Morandière township, ditching through an outcrop near the road exposed a band of conglomerate at least 50 feet wide. It contains angular and elliptical pebbles 1/2 inch to 7 inches in diameter in a carbonate and argillite groundmass. The pebbles are more numerous and larger towards the north contact of the conglomerate with a carbonaceous rock. This may indicate that the top of the conglomerate formation is towards the south. The pebbles and fragments in these conglomerates are composed of the same materials as the ones making up the surrounding sedimentary rocks. They were therefore of local provenance and probably originated from the same basin of deposition.

The argillites, greywackes, cherts, slates and quartzites all contain varying amounts of carbonate. Some ferrodolomites and limestones, particularly in lot 30, range VIII, La Morandière township, and on islands in Castagnier lake are coarse grained and resemble the crystalline limestones of the Grenville sub-province. There are also many beds of fine-grained ferrodolomites which are white to grey on a fresh surface but weather to a

dark brownish colour from the oxidation of their iron-bearing minerals. At the northwest end of a large outcrop area in lot 27, range X, La Morandière township, beds of carbonate rock contain oölite-like masses of carbonate 1 to 3 mm. in diameter.

The greywackes, argillites, slates and quartzites grade into one another. They are commonly thinly bedded from fractions of an inch to several feet. The lower part of the graded beds are made up of greywacke containing fragments 1 mm. across which grades upward into a very fine-grained argillitic material. Slaty cleavage is present only in the argillitic parts of the bed. The slates are locally graphitic. Pyrite is common as nodules and metacrysts. There are some narrow bands of chert which have a tendency to be brecciated.

Keewatin Intrusive Rocks

Apparently, most of the earliest intrusive rocks in the area, which are metadiorite, metadiabase, metagabbro, felsitic rocks and rhyolite porphyry, form tabular masses intercalated with the volcanic rocks. The acidic varieties, however, generally constitute an exception to this rule. The metadiorite, metadiabase and metagabbro are commonly associated with the basic volcanics and, although the rocks are altered, their texture is preserved and it serves as a basis for identifying the rock, especially in those cases where the texture is diabasic. Coarse, squat pyroxene crystals in places stud the weathered surface of the metagabbroic rocks. The general characteristics are suggestive of sheet-like or sill-like intrusions. In part, these intrusive rocks are linked with the vulcanism and thus are contemporaneous or quasi-contemporaneous with the extrusion of the enclosing lavas. The vague irregularities of the boundaries are ascribed in part to injection coincident with the volcanic activity and in part to later deformation. Chilled margins are commonly present, but are narrow.

The degree of alteration observed under the microscope approximates that of the enclosing lavas. The original ferromagnesian minerals have been altered to amphiboles, mainly uralitic hornblende and fibrous amphibole. In places the lath-like form of the feldspars is preserved, although they are altered to a saussuritic aggregate of minerals of the epidote group embedded in a groundmass of albite, white mica and carbonate. Quartz commonly occurs in the groundmass but, in virtue of its occurrence with secondary products, it is not considered primary. No residual pseudomorphs of olivine were noted. Leucoxene and the iron oxides are common accessories.

The best of these rocks are in range IX and X, Barraute township; range VIII, Duverny township; the eastern part of range IX,

Figury township; ranges I and VII, La Morandière township; and the western parts of ranges IX and X, Landrienne township. These intrusive-like masses have been mapped as separate units only where they are of appreciable size.

Lack of field evidence leaves room for doubt regarding the age and origin of some of the masses of metadiorite, metadiabase and metagabbro. They are assumed to be sills, but the rocks have some textural characteristics similar to those of the Post-Keewatin intrusives described below. Examples of this type are seen in lot 42, range I, Dalquier township. The coarse-grained pseudo-sills in lots 15 to 26, range X, Barraute township, show evidence of transgression and disturbance of the adjoining lavas and are therefore considered to be intrusive. A single sill-like diabasic mass intrudes the pyroclastic rocks in lots 10 and 11, range VIII, Duverny township. Coarse-grained basic rocks were intersected in many diamond-drill holes to the south of this outcrop, but they are believed to be largely contemporaneous with the lavas.

Generally associated with the siliceous volcanics are intrusive bodies or dykes of reddish felsitic rocks and rhyolite porphyry. For the most part they are small and appear to be feeders and show intrusive cross-cutting characteristics.

There are a number of these dyke-like bodies on the New Formaqué property and in lots 18 to 20, range IV, Duverny township.

Post-Keewatin Intrusive Rocks

Gabbro and Altered Gabbro and Diorite

Intrusive bodies of gabbro and altered gabbro occur in Dalquier, Duverny and La Morandière townships. Most of these intrusive masses are highly altered. They are commonly amphibolitized along the margins and carbonatized throughout. The rock is medium to coarse grained and equigranular, but may be diabasic. The colour ranges from yellowish green to greenish grey. In contrast with the Keewatin-type metadiorite and metagabbro, the rocks of this group have a recognizable original composition and display strong evidence of transgression.

A tongue-like mass of greenish-grey gabbro extends from lot 21, range X, Figury township, westward through range I, Dalquier township, and beyond the limits of the present map-area. Amphibolite, resulting from the partial digestion of the adjoining basic lavas, occurs near the margins of the main mass and also around engulfed blocks of lava. Greyish feldspathic dykes, probably diorite, penetrate beyond the zone of amphibolitization into the volcanic rocks in lots 1 to 3, range I, Dalquier township.

Another intrusive gabbroic mass extends from lots 17, ranges VII and VIII, to lot 52, range VI, Duverny township. The surface exposures in the western part of the intrusive are a rusty, heavily carbonatized rock with mineral constituents being almost indistinguishable. The fresh material from the underground workings of the New Goldvue mine in the central part of the intrusive is a dark greenish-grey mottled rock with about equal proportions of greyish-white feldspar and dark greenish ferromagnesian minerals. Some indications of a diabasic fabric and an occasional high content of quartz, possibly secondary, are found in otherwise completely altered sections. At the northern extremity of the outcrop in lot 39, range VII, a medium-grained, iron-stained, reddish-weathering rock with a diabasic fabric intrudes the pillow lavas lying to the north. On the fresh surface this rock is deep green, flecked with greyish feldspar and similar to the rock from the New Goldvue mine. A peculiarity of this outcrop is the flat sheeting fractures filled with secondary products. In lots 39 to 41, the diabasic texture gives way transitionally to one which is equigranular in a highly carbonatized diorite-gabbro. In the south half of lot 41 the ferromagnesian content is high owing to amphibolitization. On account of the alteration, little information was gained from microscopic examination.

Mottled greenish-grey diorite-gabbro similar to that in the New Goldvue property is exposed in lot 50, range V, Duverny township. It has also been intersected by diamond-drill holes in the vicinity. The extent of the metamorphic aureole which surrounds this outcrop indicates that the intrusive body may be of considerable size.

A mass of dark green, amphibole-studded, coarsely crystalline gabbro straddles the VIII - IX range line on lots 47 to 51, Duverny township. It is amphibole rich, particularly near the margins, and is altered in irregular zones by carbonatization.

In La Morandière township, a mass of similar gabbro extends from lot 23, range VI, to lot 42, range V. Massive amphibolite occurs near the margins of this mass. Numerous quartz veins, all apparently barren, are traceable for lengths up to 400 feet within this mass in lots 33 to 37.

A small mass of gabbro similar to the two which have just been described outcrops in lot 4, range VIII, and lot 13, range IX, Duverny township. Primary features are barely discernible owing to excessive carbonatization which has converted this rock into a mottled and speckled greenish grey mass of clotted secondary products. The weathered surface is studded with altered pyroxene, which gives it a coarsely crystalline appearance. The texture is equigranular except for a diabasic margin outlined by diamond drilling in lot 4. Under the microscope the rock is seen to consist almost totally of secondary products.

Another small mass of gabbro, similar to the last three, outcrops in lots 27 to 35, range II, Duvernoy township. It consists of an aggregate of brownish-green pyroxene and feldspar now completely altered to secondary products. A large part of this mass appears to be diabasic in fabric.

A small mass of greenish-grey gabbro is exposed in lots 11 and 12, range I, Duvernoy township. It consists of an aggregate of pyroxene and feldspar with minor accessory minerals. Pyroxene ordinarily makes up to 50 per cent of the volume but it reaches 70 per cent in pyroxene-rich zones of irregular distribution.

Small diorite porphyry dykes cut the gabbro and extend beyond its margins into the lava.

Thin sections of the fresh gabbro show euhedral pyroxene crystals, surrounded or in part replaced by urralite locally interwoven with chlorite. The feldspars are broad laths, diffusely twinned and have their outer margins marked by albitic embayments. The composition of the feldspar ranges from acidic to basic andesine. Olivine mesh structures occur in a poor state of preservation. Alteration products include minerals of the epidote group, albite, carbonate, talc, chlorite, quartz and the iron oxides.

A small body of quartz diorite-diabase outcrops on lots 39 to 42, straddling the VII-VIII range line, Dalquier township. This is a medium-grained greyish rock with opalescent bluish quartz eyes speckled throughout a diabasic fabric. Numerous fine-grained 'andesite' or lamprophyre dykes cut this mass and extend into the volcanic rocks. The dykes trend N.45°W. and dip vertically.

In lot 11, range VI, and lots 13 to 15, range VII, Duvernoy township, there are two outcrops of coarse-grained diorite-like rock of unknown extent. These rock types are probably hybrid and indicate the possibility of a larger intrusive mass lying beneath.

In lot 56, range VI, and lot 62, range VII, Dalquier township, and lot 6, range VII, Duvernoy township, there are 3 outcrops of a peculiar brownish-green highly-weathered gabbroic rock which may possibly be interconnected. Books of biotite are contained within the otherwise highly talcose, completely-altered rock. This rock type, by virtue of its excessive talcose alteration, has been considered gabbroic.

Gabbro-peridotite-pyroxenite Complexes

Three composite intrusives of basic to ultrabasic rocks were identified in the area. All three appear to conform closely to the regional trend of the enclosing rocks. The principal intrusive, which has a maximum width of 1,300 feet, is exposed in disconnected outcrops or has been indicated by geophysical anomalies over a length of close to 15 miles in range X, Figury township, and ranges IX and X, Landrienne township. A second body of similar rocks extends from lot 12, range VII, to lot 49, range VI, Barraute township, a distance of about 7 miles, and a third has been indicated by geophysical surveys and diamond drilling in lots 16 to 30, range V, La Morandière township.

The main rock type is a medium- to coarse-grained greenish gabbro. Associated with the gabbro are dyke-like bodies of peridotite and pyroxenite which represent multiple injections within the gabbro. In general they are aligned with the gabbro but locally there may be a divergence up to 35° in direction. At the contacts, there is no decrease in the size of the grains in the gabbro. Clusters and rosettes of actinolite occur in the gabbro along the contact zone. The gabbro has been intruded by dykes of siliceous porphyry and basic pegmatite and dykelets of calcite-serpentine-actinolite.

The gabbro consists chiefly of feldspar, pyroxene and amphibole. The least-altered plagioclases are all andesine in the range Ab₆₀₋₆₄, An₄₀₋₃₆. Albitic embayments and saussuritization are common. Quartz, mainly secondary, is present in varying amounts as inclusions in hornblende and as myrmekitic intergrowths with plagioclase. The pyroxenes remain as relicts associated with clots of chlorite, epidote and quartz. A mauve-coloured amphibole, and fibrous amphibole of the tremolite-actinolite group, are common. Talc and serpentine occur in tiny veinlets in the groundmass. Antigorite mesh structures with grains of magnetite form rare pseudomorphs after olivine.

In lots 18, 27, 38 and 42, range IX, Landrienne township, the gabbro is quartz-bearing. Under the microscope it is seen that the original more calcic feldspar has been completely replaced by a sodic plagioclase. Hornblende, both as a primary mineral and as a pseudomorph after pyroxene, and plagioclase are the essential constituents. Myrmekitic intergrowths appear in the sodic feldspar. Small veinlets of fine-grained albite and quartz cut the groundmass, suggesting hydrothermal alteration. Saussurite, minerals of the epidote group, biotite-chlorite, leucoxene and magnetite are the main secondary minerals. Sections made from specimens collected in lots 38 and 42 contain considerable carbonate, pyrite and pyrrhotite, further indications of hydrothermal alteration.

Serpentinized gabbro and pyroxene-rich phases of the gabbro are confined to zones along the margins of the peridotite dykes. Original pyroxenic material in some sections is estimated to have been in the neighbourhood of 70 per cent of the volume. This is largely inferred from secondary structures and relicts of former material. In the serpentinized gabbro it is not possible to identify olivine mesh structures. The olivine has been inferred from the appearance of talc-serpentine veinlets and may be attributed to serpentinizing solutions pervading the gabbro. The halo of this alteration is generally irregular and not visible beyond a distance of 3 to 5 feet from the peridotite. A narrow shear zone generally occurs in this serpentinized contact zone.

Chemical analyses of two specimens of gabbro are given in Table 3.

Table 3 - Chemical Analyses of Gabbro

	1	2		1	2
SiO ₂	53.10	50.69	H ₂ O +	2.89	2.16
Al ₂ O ₃	13.86	14.55	H ₂ O -	0.12	0.07
Fe ₂ O ₃	3.12	1.47	CO ₂	0.03	0.00
FeO	10.44	9.14	TiO ₂	1.08	0.84
MgO	5.08	7.35	P ₂ O ₅	0.03	0.02
CaO	7.87	9.69	MnO	0.17	0.21
Na ₂ O	2.04	2.04	Cr ₂ O ₃	0.00	0.02
K ₂ O	0.02	1.94	S	0.02	0.09
			Total	99.87	100.28

- 1.- Quartz-bearing gabbro from the northern part of lot 18, range IX, Landrienne township.
- 2.- Serpentinized gabbro, 600 feet south of No. 1.

The peridotite is highly serpentinized. The colour on the weathered surface varies from a greyish blue or azure blue to a brownish green. The fresh surface is a deep vitreous green or greenish black. Veinlets of chrysotile asbestos are common in all of the outcrops of peridotite.

Examination under the microscope reveals that serpentinization and shearing have obliterated the original minerals. Faint green to colourless serpentine or fibrous chrysotile or flaky and rarely massive antigorite is the main mineral. The most common type of serpentine is in the form of grains showing octagonal structures laced with seams of magnetite suggesting that it was derived from olivine. Aggregates of fibrous

serpentine and talc occurring as grains having rectangular cross sections suggest that these minerals replace pyroxene crystals; vestiges of schiller structure were observed in such grains. Other minerals observed were chrysotile in microscopic veinlets which criss-cross the groundmass, magnetite, ilmenite, and in some sections a reddish-brown granular opaque mineral believed to be chromite. Secondary minerals include talc, actinolite, epidote, carbonate, chlorite, iddingsite and leucoxene. Brucite was identified in one section. No trace of original feldspar is apparent.

Representative specimens of the peridotite bear a distinct resemblance to members of the harzburgite and dunite rocks of more recent origin (20 p.29).

Table 4 - Chemical Analysis of Peridotite

SiO ₂	39.50	H ₂ O +	11.49
Al ₂ O ₃	3.55	H ₂ O -	0.22
Fe ₂ O ₃	2.06	CO ₂	0.35
FeO	4.55	TiO ₂	0.23
MgO	36.31	P ₂ O ₅	0.00
CaO	0.71	MnO	0.18
Na ₂ O	0.02	S	0.08
K ₂ O	0.00	Cr ₂ O ₃	0.65
		<hr/>	
		Total	99.90

The pyroxenite is brown to brick red and is studded with pyroxene on the weathered surface. Thin sections from the wider dykes show a honeycomb-like network of altered olivine and pyroxene crystal. Up to 80 per cent olivine content is inferred in some selected specimens. The original minerals have been completely replaced by secondary minerals, principally serpentine.

On lots 18 and 19, range IX, Landrienne township, narrow dykes of basic pegmatite cut the gabbro, following an east-west fracture system. Under X-ray examination the pegmatite was found to contain tremolite, actinolite and axinite as essential minerals.

Other Post-Keewatin Intrusive Rocks

There are a large number of small dykes in the area which cut the Keewatin-type rocks. They range in composition from quartz porphyry, feldspar porphyry and allied types to lamprophyre, quartz diabase, quartz diorite and gabbro. Their relationship to the other intrusive rocks of the area is not known.

A quartz porphyry dyke cuts a feldspar porphyry dyke in lot 34, range II, Duvernoy township. The original character of the rock is barely perceptible under the microscope. Translucent to transparent phenocrysts of quartz are sparsely distributed in a fine-grained siliceous groundmass. The original feldspar has been identified as oligoclase; it is irregularly twinned. Untwinned albite has penetrated the margins of the oligoclase and in extreme cases has invaded the twin lamellae, so that little of the original oligoclase remains. Chlorite and pale greenish hornblende constitute up to 10 per cent of the volume. Grains of pyrrhotite and pyrite occur in association with the narrow quartz filaments which cross the groundmass.

Feldspar porphyry dykes cut the volcanic rocks in lots 30 and 32, range I, Duvernoy township, and in lot 26, range X, Landrienne township. Another occurs in the gabbro mass in lot 34, range II, Duvernoy township. In thin sections of the feldspar porphyry large euhedral phenocrysts of oligoclase ($Ab_{70-74} An_{30-26}$) are predominant. A few shreds of chlorite and clusters of epidote and leucoxene are the products of alteration of the original dark minerals. The groundmass is felty; the rod-like feldspars are in a fluidal alignment curving around the margins of the phenocrysts.

The siliceous porphyry is a pinkish-grey, fine- to medium-grained feldspathic rock with prominent feldspar phenocrysts and, in places, quartz eyes. Dark minerals are sparse. Dykes of this rock, now completely albitized, cut the gabbro in Landrienne township and, throughout lots 35 to 40, ranges IX and X, are found also in the volcanic rocks up to 1/2 mile distant from the gabbro. Most of the dykes are parallel to the volcanic rocks, but a minority strike northeast.

Numerous small dykes of 'andesite' or lamprophyre cut the volcanics, especially in the lower series. The general trend of these dykes is N.35°W. to N.70°W. Some are apparently associated with the volcanic rocks, whereas others cut the gabbro. These dykes consist of fine-grained aggregates of feldspar and dark minerals. In the sections examined, the degree of alteration is high, and precise classification is impossible. Threads of uralitic hornblende and fibrous amphibole and shreds of micaceous material, mainly chlorite, constitute the entire mineral assemblage. Original feldspar was not found. Epidote, carbonate, sericite and leucoxene constitute the bulk of the visible constituents in the groundmass.

Two dykes of altered quartz diabase are exposed in lots 36 to 38, range V, Dalquier township. The greatest continuous exposed length is 700 feet. The thickness of the dykes ranges between 12 and 20 feet. The typical hand specimen is a medium-grained diabasic rock. In places milky to bluish quartz 'eyes' stand out on the weathered surface.

Under the microscope, the highly altered nature of the rock is apparent. The plagioclase has been altered to an aggregate of epidote, albite, sericite and carbonate. The lath-like development in the original plagioclase can be seen only in thin sections of the least-altered rocks. The remnants of hornblende are surrounded by shreds of chlorite and intimately clustered with grains of epidote, leucoxene, magnetite and fibrous amphibole. The hornblende has in places a poikilitic texture with inclusions of quartz, albite and epidote. Quartz occurs as granular mosaics or distributed in the interstices. It is in part pellucid and in part greyish owing to inclusions.

Dykes of quartz diorite and gabbro, which make up the majority of the basic dykes, intersect the upturned volcanic rocks at oblique angles. They are probably of post-folding age. In general, they are short and thin. These dykes strike N.30°W. and dip vertically.

Granitic Intrusive Rocks

Two varieties of granite are common in this district: an earlier greyish basic 'granite' and a later pinkish 'granite' richer in potash and silica. Both varieties are found in the present map-area. Gussow (21, p.132) has shown that the 'granites' may be classified as high sodic and high potassic, based on the potash to soda ratio. All of the granitic rocks within the map-area are of the high sodic type, despite the fact that the Lacorne batholith, which is of the high potassic type (13, p. 51), lies only 10 miles to the south. The largest granitic bodies in the map-area are the Dalquier, the Duvernoy and the Claverny stocks.

The Dalquier stock, which consists mainly of microcline-albite granite, underlies the western part of Dalquier township and extends to the west and north beyond the limits of the present map. The part within the map-area is only a small fraction of the stock. Around the stock there are a number of small granitic cupolas which project through the enclosing volcanic rocks, as for example in the eastern part of ranges IX and X, and in the western half of range VII, Dalquier township. The core of the Dalquier stock is a highly siliceous pinkish microcline-bearing granite. The border zone is a greyish quartz-poor facies. In a zone extending from lot 9, range IX, to lot 26, range X, Dalquier township, the rock is extensively amphibolitized.

The Duvernoy stock underlies the western parts of ranges I to IV, Duvernoy township, and the eastern parts of the same ranges in Dalquier township. There are several cupolas beyond the margin of the main mass. Examples of these are seen in lots 44 and 45, range V, lots 38 to 43, range VI, and in lots 50 to 54, range VI, and beyond into ranges V and VII,

Dalquier township. The Duverny stock is similar to the larger Dalquier stock and consists of a core of highly siliceous pinkish microcline-bearing granite surrounded by a greyish-green feldspathic border facies of quartz monzonite. The northern part of the stock consists of mottled greenish-grey altered quartz diorite or 'grey granite'.

The Claverny stock, which consists of albite granodiorite, lies in the central part of Duverny township. The body outlined in lots 14 to 20, ranges IV and V, is considered to be an offshoot from the stock. The main mass is a mottled pinkish- to rose-buff rock. Toward the margins the rock is a pale greenish colour. On the north margin of the stock the granodiorite is heavily carbonatized. The western part is made up of a hybrid 'mixed' rock. Alteration is particularly strong in lot 20, range VI.

Several other small masses of granitic rock, apparently unrelated to those mentioned above, were mapped in Barraute, Figuery and La Morandière townships.

A petrographic description of the different facies of the main acidic intrusive masses of the area is given below.

Microcline-albite Granite and Quartz Monzonite

Microcline-albite granite forms the cores of the Dalquier and Duverny stocks. The border facies is quartz monzonite. The typical rock of the stocks has a pinkish colour and biotite is the principal ferromagnesian mineral. Hornblende increases in amount as the margin is approached. Quartz is exceptionally high in the inner zone but is appreciably lower in the greyish-green feldspathic quartz monzonite.

Under the microscope, quartz, microcline, a plagioclase and biotite or hornblende are seen to be the essential minerals. The relative amounts of the constituent minerals show considerable variation. The microcline has undergone extensive metasomatic alteration. Perthitic intergrowths are noted throughout all of the specimens. Untwinned albite charged with secondary minerals also occurs. The well-twinned plagioclase is generally saussuritized and is consequently more sodic than before alteration. The composition of the plagioclase feldspar, as determined by immersion and by optical methods, varies slightly throughout the mass. In the marginal quartz monzonite, the composition of the original plagioclase ranges between $Ab_{76} An_{24}$ and $Ab_{85} An_{15}$. Within the cores of the stocks the albite content is slightly higher, with the range from $Ab_{85} An_{15}$ to $Ab_{90} An_{10}$. However, the majority of the determinations centre about $Ab_{86} An_{14}$. In the narrow sheared zone separating the granite from the quartz diorite the original plagioclase is albitized and little of the original material remains. Rutile, magnetite, sphene and zircon are the common accessories.

The two analyses given below are representative of the core and border facies of the Duverny stock. The first is a quartz-rich pink granite from the core of the stock and the second is a hornblende quartz monzonite from the margin.

Table 5 - Chemical Analyses of Granite and Quartz Monzonite from the Duverny Stock.

	1	2		1	2
SiO ₂	75.20	69.47	K ₂ O	2.77	2.07
Al ₂ O ₃	13.24	14.35	H ₂ O +	0.73	1.38
Fe ₂ O ₃	0.52	0.70	H ₂ O -	0.00	0.07
FeO	1.82	3.18	CO ₂	0.56	1.15
MgO	0.01	0.67	TiO ₂	0.20	0.46
CaO	0.99	2.67	P ₂ O ₅	0.03	0.05
Na ₂ O	3.86	4.00	MnO	0.02	0.05
			Total	99.85	100.51

1.- Pink granite from lot-line 14-15, range IV, Duverny township, 2,600 feet south of the range line.

2.- Hornblende quartz monzonite from lot 13, range II, Duverny township.

Comparison of the analyses of the core and border facies of the Duverny stock and the Taschereau, Palmarolle, and Flavrian batholiths (16, pp. 97, 98) shows that they are chemically similar and thus are probably a part of one large granitic invasion.

Quartz Diorite

Highly-altered quartz diorite or grey "granite" is exposed along the northern flank of the Duverny stock. The typical rock is a mottled greenish-grey, medium- to coarse-grained equigranular rock. Feldspar is the predominant mineral; it occurs as indefinite blades to anhedral grains. The ferromagnesian minerals are even more irregular in form and appear to be largely chloritized. Quartz is present as bluish opalescent grains, and characteristically such grains are not found in the other granitic rocks in the area. The alteration of the quartz diorite is uniform throughout.

Under the microscope the degree of alteration is seen to be intense. The feldspar has been almost completely altered to minerals of the epidote group, white mica, and carbonate in an albitic base. Diffuse zoning is commonly observed in the plagioclase remnants. Fragments of this material, determined by immersion methods, have the composition of basic oligoclase in the range Ab₇₂ An₂₈ to Ab₇₆ An₂₄. Untwinned albite charged with sericite

replaces the margins of the grains of oligoclase and totally obscures the feldspathic grains in the groundmass. Potassic feldspar is entirely absent, a feature which has been confirmed by stain tests. Quartz, interstitial to the feldspars, forms about 20 per cent of the volume. The anhedral grains appear as cloudy mosaics or rosettes, filled with inclusions which impart an opalescent hue. The original ferromagnesian minerals, estimated at 15 to 18 per cent of the volume, have been completely altered to matted flaky coatings or clustered grains of intimately associated epidote, chlorite and leucoxene. Magnetite, zircon and apatite are present as accessories. Sericite is highly developed in the groundmass, exceeding chlorite in amount. Carbonate of a calcitic variety is irregularly distributed throughout the groundmass.

The analysis of a specimen of unweathered quartz diorite from lot 17, range V, Duvernoy township, 200 feet east of the 16-17 lot line and 50 feet north of the range line is given below.

Table 6 - Chemical Analysis of Quartz Diorite from the Duvernoy Stock

SiO ₂	66.07	K ₂ O	1.47
Al ₂ O ₃	14.15	H ₂ O +	2.45
Fe ₂ O ₃	0.88	H ₂ O -	0.005
FeO	3.84	CO ₂	2.16
MgO	1.91	TiO ₂	0.61
CaO	2.93	P ₂ O ₅	0.14
Na ₂ O	3.72	MnO	0.05
		Total	100.39

Despite the albitization, the altered quartz diorite preserves a content of lime, magnesia and potash typical of a tonalite or quartz diorite. Since the feldspar was apparently entirely of intermediate composition, the rock was originally a quartz diorite.

Albite Granodiorite, Diorite

The central part of the Claverny stock is a mottled pinkish-to rose-buff equigranular rock consisting of feldspar and altered ferromagnesian minerals with minor amounts of visible quartz.

The plagioclase in the least altered granodiorite is seen under the microscope to be oligoclase. In the majority of the sections, which are of altered rock, albitization has transformed the original oligoclase to a diffusely twinned and cloudy feldspar of a composition near the albite-oligoclase boundary. Quartz grains are interstitial to the feldspar, with the exception of the myrmekitic intergrowths within the

albitized feldspar. Sericite or white mica largely replaces the feldspathic material. Chlorite, mainly after biotite and hornblende, sheathes a large proportion of the mineral constituents in many instances. Uralitic hornblende is rare in the central part of the mass but near the contacts it is a predominant mineral. Minerals of the epidote group are abundantly associated with the uraltic hornblende. Perthitic microcline, as small interstitial grains, appears in various stages of replacement in the least altered parts of the pinkish granodiorite. Magnetite, ilmenite, leucoxene and limonite are everywhere present and in general are more common than in the other granitic rocks.

Toward the margins of the stock the proportion of ferromagnesian minerals is greater and the rock has a pale greenish colour. The entire western part of the stock is a hybrid or mixed rock. The relatively unaltered patches of granodiorite are mottled greenish-grey aggregates of greyish feldspar and greenish amphibole crystals in varying proportions. Quartz does not appear in this hybrid zone and the rock is dioritic. The granodiorite along the north margin of the stock is heavily carbonatized. It is rusty brown on the weathered surface and whitish grey on the fresh surface. In the immediate vicinity of the contact with the volcanic rocks the carbonatized granodiorite is flecked with greenish amphibole.

Carbonatization is present throughout the granodiorite and also in the immediately adjacent volcanics, particularly along fault zones extending into the volcanics from the granodiorite. The carbonate metacrysts in many instances form more than 10 per cent of the volume. On weathering of the carbonate a limonite lining is left in the cavities formerly occupied by the metacrysts. Spot tests of the carbonate confirm the presence of manganese, iron, magnesium and calcium, and X-ray determinations show that the main framework is a dolomite lattice. It is therefore classed as a ferrodolomite, although in the district such carbonates are usually termed ankerite. It should be emphasized that this ankeritic type of carbonatization is confined, or related, to the granodiorite and the hybrid zone and is considered to have been brought about by the incorporation mainly of iron and magnesium by marginal assimilation of the basic lavas during their intrusion by the granodiorite.

A calcitic type of carbonatization, later than the ferrodolomite, was noted in quartz veins in the granodiorite.

In contrast to the quartz diorite, which alters to albite, calcitic carbonate, sericite and subordinate chlorite, the granodiorite alters to albite, ankeritic carbonate, amphibole and subordinate chlorite.

The chemical analyses of two specimens of albite granodiorite are given in Table 7.

Table 7 - Chemical Analyses of Albite Granodiorite from the Claverny Stock

	1	2		1	2
SiO ₂	69.19	68.41	K ₂ O	0.86	0.71
Al ₂ O ₃	14.36	13.66	H ₂ O +	1.92	1.72
Fe ₂ O ₃	0.92	1.46	H ₂ O -	0.015	0.03
FeO	3.60	3.16	CO ₂	0.95	1.93
MgO	1.17	0.83	TiO ₂	0.80	0.80
CaO	1.57	2.26	P ₂ O ₅	0.17	0.18
Na ₂ O	4.60	5.00	MnO	0.03	0.06
			Total	100.16	100.21

1.- Moderately-altered albite granodiorite from lot-line 28-29, range V, Duverny township, 2,400 feet south of the range line.

2.- Strongly-carbonatized albite granodiorite from lot-line 29-30, range V, Duverny township, 2,200 feet south of the range line.

In the two analyses a close agreement in composition is apparent, despite the fact that they represent the extremes of variation in the granodiorite. The granodiorite is the most severely albitized of the granitic rocks. Stain tests of 12 specimens of relatively unaltered pinkish granodiorite indicate that 9 of the 12 specimens contain potassic feldspar varying from negligible amounts to 4 per cent by volume. The fact that the pinkish granodiorite contains some potassic feldspar, although less than the microcline-albite granite, suggests that there may be some relation between the two rock types.

Relationships of the Granitic Intrusive Rocks

The contact of the quartz diorite and the adjacent volcanic rocks has been intersected by diamond drilling in lot 15, range IV, Duverny township. There is no sharp demarcation line between the two but the altered greenish-grey quartz diorite grades into a fine-grained rock of the contact zone. The rhyolitic volcanic rocks beyond a zone of granitized material 20 feet wide are strongly sheared and brecciated. There is no appearance of appreciable metamorphism except a faint pinkish cast associated with silicification. In the typical yellowish-green siliceous volcanics there is no suggestion of recrystallization beyond that which is usual in these rocks throughout the area.

The contact of the albite granodiorite with the quartz diorite is a fault zone which is marked by a narrow valley. Along the fault zone the albite granodiorite is strongly sheared. The zone is strongly carbonatized across a width of 175 feet. The rusty brown ankeritic carbonate extends into the quartz diorite for a distance of 400 feet on the west side

of the fault. Since the ankeritic carbonatization is considered to be associated with the granodiorite intrusion, it is believed therefore that the quartz diorite is older than the granodiorite.

Throughout the whole length of the exposed contact between the granite and the quartz diorite in lots 18 to 21, range IV, Duvernoy township, there is a zone of hybrid rock about 100 feet in width. The unaltered granite grades into a mottled albitized pinkish rock at the edge of the hybrid zone. In lot 15, range IV, a single deep drill hole collared in quartz diorite penetrated the granite at a depth of 556 feet. At the contact there is a shear zone about 50 feet in width. The aspect of the contact zone as a whole does not suggest a gradational relationship but rather a definite intrusion by the granite.

No contacts between granite and granodiorite were observed, although outcrops of the two rock types lie close together in lot 22, range IV, Duvernoy township. Since the granite lacks the alteration and shearing present in the granodiorite, the writer believes that the granite is younger than the granodiorite. However, the proximity of the two intrusives and their similar composition suggest a close genetic relationship.

Post-Granite Intrusive Rocks

Intrusive bodies of lamprophyre, aplite, pegmatite, quartz porphyry and quartz gabbro are found within the granitic stocks. The relationship of these intrusives to the dykes which cut the Keewatin-type volcanics is not known.

Lamprophyre

Within the Duvernoy stock lamprophyre dykes are common, especially in the pinkish core. In lots 1 to 15, ranges II and III, Duvernoy township, the dykes have a common northerly strike. The dips are vertical in most instances. In the small cupola of albite granodiorite in lots 17 to 20, on the IV-V range line, Duvernoy township, a number of parallel lamprophyre dykes extend across the entire width of the outcrop. The trend is almost due east, and the dip is vertical in all instances. The largest of these dykes has a width of 3 feet. This is a fine-grained deep-greenish rock in which reddish flecks are visible; the texture is sugary. The rock type is indistinguishable from that which forms the lamprophyre dykes cutting the granite.

Under the microscope the rock types were identified as probably kersantites or camptonites. The alteration is very considerable, apparently greater than in the enclosing intrusive, and this is partially

attributed to the susceptibility of the basic rocks to alteration. The original plagioclase has been entirely replaced by a heavily-saussuritized untwinned albite. The outlines of the former amphibole crystals are partially hidden in the flaky sheaths and intermingled grains of biotite (in part primary), chlorite, minerals of the epidote group, urallite, magnetite and leucoxene. With the exception of minor inclusions in the poikilitic hornblende, quartz is not present. Carbonate and sericite are mainly associated with the breakdown of the feldspar. Apatite is a very common accessory mineral.

Aplite

Aplite dykes are confined to the Dalquier and Duvernoy stocks, particularly the inner cores. The aplite is a fine- to medium-grained pinkish rock with scattered small blackish flecks of biotite. Stain tests reveal a high content of potash-bearing feldspar.

Under the microscope, microcline is seen to constitute up to 35 per cent of the rock. Of note is the gradual increase in microcline from nil in the quartz diorite to sparse in the granodiorite, to common in the granite and to abundant in the aplitic dykes. Quartz is present, mainly in the fine-grained groundmass, in proportions almost equal to the microcline. Plagioclase, of a composition near the albite-oligoclase boundary, is present in amounts up to 20 per cent. Minor chlorite flakes, scattered grains of magnetite and ilmenite in clumps of leucoxene, and some hematite are the remaining mineral constituents.

Pegmatite

There are numerous dykes of pegmatite in the northwestern part of Dalquier township, both in the Dalquier stock and in the enclosing volcanic rocks. However, no pegmatite was found in the other granitic intrusives in the map-area. This is in sharp contrast with the profusion of pegmatite dykes in the Lacorne batholith, which lies only 10 miles to the south.

Albitized Quartz Porphyry

A dyke of highly-albitized quartz porphyry almost a mile long intrudes the granite in the western part of range III, Duvernoy township. The strike of the dyke is N.40°W. and the dip, vertical. The width reaches 40 feet and averages 28 feet over the exposed length. The contact is sharply defined by a narrow chilled aplitic margin. Near the south margin of the dyke, the contact zone is sheared.

In hand specimen, the rock appears as a mottled, smoky grey aggregate of milky to bluish opalescent quartz 'eyes' and greyish feldspar. The quartz eyes reach 9 mm. in diameter. A bluish micaceous material occurs as shreads in most of the groundmass.

Under the microscope the rock is seen to be almost totally altered, with little indication as to the original constituents. Albite, white mica and quartz are the main essential minerals. The 'eyes' or porphyroblasts of quartz do not appear to be affected by the lineation and mylonitization noted within the matrix. Diffusely-twinning albite-oligoclase crystals have been noted in only one section. Chlorite, epidote, carbonate, sericite, saussurite and iron oxides are scattered in the fine-grained mylonitized groundmass.

Quartz Gabbro

A small mass of quartz gabbro intrudes the granite in the southern parts of lots 11 and 12, range VI, Dalquier township. It is wholly enclosed within the granite. The outcrops display chilled margins at the contacts.

Associated Quartz Veins

Veins and masses of quartz are common in the cores of the Dalquier and Duvernoy granitic stocks. In Dalquier township, quartz veins form a stockwork in lots 11 and 12, range VI. In Duvernoy township, there are numerous quartz veins up to 5 feet thick and 150 feet long throughout lots 4 to 15, ranges II and III. They are closely associated with the lamprophyre and aplite dykes to which they are parallel. All are barren of visible mineralization, but several are reported to have low tenors in gold. In lots 3, 8 and 9, range III, vertical quartz-filled tension fractures cross the albitized quartz porphyry dyke and extend into the granite for distances up to 90 feet. In lot 14, range IV, closely-spaced parallel quartz veins form a network which extends over a width of 90 feet and a length of 350 feet. In the veins there are recognizable fragments of granite which appear to be partially digested and much silicified.

Late-Precambrian Basic Dykes

Late-Precambrian basic dykes are numerous in the Rouyn - Bell River area. They can be grouped into two distinct sets, striking N.50°E. to N.60°E. and North to N.20°W. (16, pp. 101, 102).

The northeast set is represented in the present map-area by four dykes of olivine gabbro having general strikes of N.40°E. to N.50°E.

and vertical dips. They are commonly sinuous and show considerable variation in width. One of these dykes which crosses the northwest corner of Dalquier township has been traced, through discontinuous exposures, from the southwest corner of Dufay township northeasterly for a distance of over 90 miles (16, p. 102).

The rock is coarse grained at the centre of the dykes but has a fine-grained diabasic fabric at the margins. The chilled marginal zone is rarely more than 1 foot thick. In the hand specimen plagioclase needles of an incipient lath-like development are the only recognizable part of the chilled facies.

Microscopically, the typical rock of the northeast dykes is a coarse-grained aggregate of feldspar laths with pyroxene grains moulded around their margins and filling the interstitial spaces. Augite accounts for up to 80 per cent of the original ferromagnesian minerals. Reaction rims around the margins of the augite may exhibit a minor breakdown to secondary uralite and, in some instances, a little chlorite and biotite or, in more altered specimens, leave only cores of the original mineral remaining. Olivine occurs as small tear-drop-like grains which may be criss-crossed by irregular fractures containing serpentine and magnetite or may be entirely converted to antigorite. Minor amounts of minerals of the epidote group, quartz, sericite, talc, iddingsite, chlorite and carbonate were noted as secondary products. The feldspar, entirely plagioclase, tends to form broad laths, well twinned and generally free from alteration in some specimens but saussuritized in others. The laths stand out very sharply. The composition of the plagioclase is near the andesine-labradorite boundary.

The chemical analysis of a specimen of olivine gabbro representative of the northeasterly-trending dykes is given in Table 8, analysis No. 1 (p. 32).

The north set is represented by four diabase dykes. These dykes are shorter and generally narrower than those of the northeast set. They consist of a dark, greyish-green mottled aggregate of feldspar and altered pyroxene. The surface is generally iron stained. Lath development of the feldspar is strong but in places a tendency to a porphyritic texture is apparent.

The microscope reveals, in some instances, a considerable alteration of the rock. Quartz does not appear in the groundmass, but is commonly associated with the secondary products. Faintly pleochroic hornblende is the principal ferromagnesian mineral and is in many cases accompanied by a fibrous amphibole of the tremolite-actinolite variety. The feldspars are completely saussuritized and indeterminate. There are no indications of residual olivine structures.

The chemical analysis of a specimen of diabase from one of the northerly-trending dykes is given below (No. 2).

Table 8 - Chemical Analyses of Late-Precambrian Dyke Rocks

	1	2		1	2
SiO ₂	43.81	48.96	H ₂ O -	0.11	0.09
Al ₂ O ₃	15.75	13.34	CO ₂	0.27	0.00
Fe ₂ O ₃	1.71	1.99	TiO ₂	2.39	0.41
FeO	14.21	7.08	P ₂ O ₅	N.D.	0.003
MgO	6.43	11.35	MnO	0.35	0.19
CaO	6.74	12.40	S	0.31	0.02
Na ₂ O	3.13	1.24	Cr ₂ O ₃	0.01	0.04
K ₂ O	0.94	0.18	NiO	N.D.	0.00
H ₂ O +	3.72	2.64			
			Total	100.18	99.93

1.- Olivine gabbro from lot 31, range VIII, Landrienne township.

2.- Diabase from lot 18, range IX, Landrienne township.

The analyses show a decided difference in composition. The first is a soda-rich olivine gabbro, whereas the second appears to have the chemical composition of a more normal gabbro.

Pleistocene Deposits

The area lies within the great 'clay belt' of northern Ontario and Quebec, which represents the former bed of a vast glacial lake known as Barlow-Ojibway lake (16, p. 104). The lowland parts of the area are covered by extensive beds of clay and, in places, ridges of sand and gravel. Most of the ridges are crescentic or circular annual moraines, but there are some long sinuous eskers. The flanks of the eskers grade off into sand-covered plains and finally into the clay-covered lowland. The valleys in the highlands are largely filled with debris.

METAMORPHISM

In the Amos-Barraute area, as in the greater part of north-western Quebec, the rocks have been subjected to metamorphism partly coincident with shearing during the period of major folding and faulting and partly as a result of the passage of hydrothermal solutions emanating from the intrusives. In the present area, shearing has affected only the Keewatin-type volcanic rocks but hydrothermal solutions were responsible both for endomorphic alteration within the intrusives and the exomorphic changes in the adjacent formations. A detailed discussion on the metamorphism of the rocks

of the area is beyond the scope of this work. However, the principal changes noted in the volcanic rocks of the area are outlined below.

Where the metamorphism has not been intense as it is in shear zones or close to intrusives, strain shadows and bent crystals observed in thin sections indicate that the formations have been subjected to stress. The original volcanic textures and structures have been preserved and vestiges of the original mineral assemblage can be distinguished amongst the minerals produced by incomplete metasomatic replacement. The siliceous volcanic rocks, which are the least altered, are formed of an assemblage of albite, oligoclase, quartz, biotite and chlorite; microcline and hornblende rarely occur. In the intermediate volcanic rocks, there are remnants of twinned oligoclase or andesine; hornblende, quartz, biotite and chlorite are the principal accessory minerals. The basic volcanics are the most altered and are now formed of an assemblage of albite, hornblende, biotite, chlorite, epidote, sericite and zoisite; their distribution, as observed in parts of the thin sections, suggests the outlines of the original feldspar and pyroxene crystals.

In the shear or fault zones, evidence of stress, such as granulation and crushing, is pronounced, and there has been partial recrystallization. The original textures and structures have been obliterated and the original minerals replaced. The siliceous volcanic rocks have been altered to albite-quartz-sericite schists; epidote and carbonate are present in minor amounts. The intermediate volcanic rocks have been altered to chlorite-sericite-quartz-fibrous uralite-amphibole schists; epidote and carbonate are common. The basic volcanic rocks have been altered to talc-chlorite schists; carbonate, fibrous uralite, amphibole and albite are common.

Near the intrusive, evidence of stress is not generally apparent, although vestiges of mylonitic or mortar structures were identified in some places. The rocks have been completely reconstituted with the formation of relatively simple mineral assemblages having a tendency to a monomineralic composition. The siliceous volcanic rocks have been altered to quartz-albite microgranulites with, in places, quartz porphyroblasts. The basic volcanic rocks have been changed into amphibolites.

STRUCTURAL GEOLOGY

The earliest and most pronounced structural disturbance in the area was the major folding and faulting that preceded the intrusion of the granitic rocks.

Folding

There are four major folds in the map-area. They are from north to south: the Trinity syncline, the Soma anticline, the Duverny syncline and the Amos anticline. They generally trend close to east-west or southeast-northwest and their plunge is usually gentle towards the west.

The Trinity syncline passes diagonally across the north half of La Morandière township, from near Castagnier lake southeasterly through the northern part of lot 55, range V.

The Soma anticline appears in the northeastern part of Dalquier township, it follows the contour of the Duverny stock and would probably extend to the northeast corner of the township. It was observed also in the northeast part of Duverny and farther to the southeast, into La Morandière township.

The Duverny syncline was recognized from the margin of the Dalquier granite in range V, Dalquier township, southeasterly to near the Duverny stock in range III. The same fold reappears on the east margin of the Duverny stock and trends slightly south of east passing out of the map-area in the southern part of range II, La Morandière township.

The Amos anticline extends in a nearly east-west direction across most of the southern part of the area from its western boundary in range VIII, Figuery township, across Landrienne and into Barraute township.

The Trinity syncline lies south of the contact zone of the sedimentary and volcanic rocks. Excellent top determinations have been made in an outcrop area at the south end of lot 56, range VI, La Morandière township, where tops face south. Determinations on exposures in lot 31, range VII, and at the south end of lot 18, range IX, appear also to face south but these are not so reliable as the ones mentioned above. Top determinations in the sedimentary rocks in La Morandière township were made on outcrops and in a few drill holes from graded beds in greywacke and argillite. The upper parts of the beds are to the south except for those in two drill holes in Castagnier lake where they appear to be to the north.

In the northern part of Dalquier township the strata on both limbs of the Soma anticline dip 80° north indicating an overturn of 10° of the south limb. Farther east, in Duverny and La Morandière townships, the amount of overturn is approximately 20° . The Amos anticline is likewise overturned, the amount ranging from a few degrees in Figuery township to a maximum of 20° in the eastern part of Barraute township. The attitude of the Duverny syncline appears to be that of a normal fold, with vertical dips adjacent to the axis.

Minor variations and flexures have been noted in the major folds. In addition, deformation has occurred in the vicinity of the large intrusive masses. These changes, though in some instances notable, are local in their extent and unrelated to the regional structure.

It has not been possible to determine the plunge of the Soma anticline. The disposition of the formations on the flanks of the Duvernoy syncline indicate a gentle plunge to the west. Similarly, the Amos anticline appears to plunge west in Barraute and Landrienne townships. In Figuery township the disposition of the volcanic rocks suggests a reversal of plunge. Close detailed support for this hypothesis is lacking, however, owing to limited exposures.

Faulting and Shearing

The faults and shear zones in the map-area belong to three sets which strike, respectively, east, north to northwest and northeast.

The easterly-trending faults are associated with the major folding which preceded the intrusion of the granitic stocks. They are of the bedding plane type, being parallel to the flow contacts. Shear zones occur only in incompetent rocks such as the tuffs and agglomerates. There has been recurrent movement in the shear zones, particularly adjacent to the granitic intrusives. The shear zone on the Frebert, Pershcourt, Manitou-Barvue and Bargold properties in Barraute township is the best known, since it is in part an ore-bearing structure. Here the schistosity extends over widths up to 300 feet.

The north to northwest faults are associated with the intrusion of the granitic stocks and are most common around their margins. Dips are for the most part vertical. Strike separations range from a few feet to 180 feet. In most cases the west side has moved north relatively to the east side. Shear zones are exposed for lengths up to 5,000 feet. Their widths reach 300 feet. Northerly-trending tension fractures in the granitic stocks are filled with late magmatic differentiates of the granite.

The northeast faults are more apparent and more numerous than those of the other two sets. Their age is post-folding and probably post-granite. In these faults the east side has moved north relatively to the west side. Strike separations up to 1,700 feet have been noted. The Late-Precambrian dykes in the area are believed to follow fractures of this system.

ECONOMIC GEOLOGY

The principal minerals of economic interest found in the area are gold, chalcopyrite, sphalerite and galena. The gold occurs in quartz veins as native gold, in part associated with pyrite, chalcopyrite, galena and sphalerite. Pyrite-pyrrhotite replacements are common, some of them forming large deposits. In certain places chalcopyrite, sphalerite and galena are associated with the pyrite and pyrrhotite, particularly in schistose zones in the siliceous pyroclastic rocks.

Description of Mining Properties

Barraute Township

Bargold Mines Ltd.

Ref.: Que. Bur. Mines - P.R. 150, pp. 3,4.
Que. Dept. Mines - P.R. No. 227, pp. 6,7.

The original Bargold Mines property covered the south halves of lots 45 to 53, range VI. This included the original holdings, of GrosLouis and Jackson. The first discovery of gold was made on the property in the early thirties. The property was explored in the 1946-47 period and in 1951.

In 1951 the company, through an agreement with Aumaque Gold Mines Ltd., carried out slightly over 5,000 feet of diamond drilling. Two of the holes, drilled in the southwest corner of the property, in lot 45, range VI, traversed the eastward extension of the Barvue mineralized zone. No significant mineralization was encountered. Four other holes were drilled to the east of the Jackson prospect in lots 49 to 50. Some scattered low-grade gold mineralization was intersected. Magnetometric and spontaneous polarization surveys were also carried out on the property in 1959.

G. Dumont was consulting engineer and A.B. Carson was resident manager at the property.

Bar-Le-Duc Chibougamau Mines Ltd.

This company, successor to Barel Duc Mines Ltd., held until late 1961 a block of claims comprising lots 7 to 14, range VII, Barraute township. This property, known formerly as the Graham Bousquet group, was explored in 1945-46. Surface trenching about the margin of a gabbro-pyroxenite mass disclosed sulphide mineralization in a sheared agglomerate. The area in the immediate vicinity of the sulphide mineralization was

further explored by a geophysical survey. In 1951, 7,459 feet of diamond drilling was done on the property. The drilling failed to encounter zinc-silver mineralization similar to that on the adjoining Frebert property to the east.

H.W. Norrie is consulting engineer for the company.

Bar-Manitou Mines Ltd.

This property held by Bar-Manitou Mines Ltd., in Barraute township, included lots 29 to 32 and 37 to 40, and the south halves of lots 33 to 36, range VI.

Outcrops are very rare on the property and no exposed mineralization has been found. The geology has been plotted from information obtained largely by diamond drilling. The extension of the drag-fault zone at the southeast end of the Barvue ore body was traced across lots 31, 32 and 37 to 40, range VI.

Nearly 20,000 feet of diamond drilling was done on the property. According to company records, the mineralized zone was intersected by 14 of the drill holes at depths ranging from 129 feet to 548 feet. Average tenors were 1.20 ounces of silver per ton and 1.81 per cent zinc over an average width of 21 1/2 feet. One section 4 feet in width contained 13.55 ounces of silver per ton, 4.90 per cent zinc and 2.20 per cent lead and another 6 1/2 feet in width contained 1.80 ounces of silver per ton and 5.98 per cent zinc. The financing of the drilling was aided by Lepine Lake Gold Mines Ltd. and Lavalie Mines Ltd.

J.M. Thompson was manager and D. Giachino was resident engineer.

Barrentier Gold Mines Ltd.

Ref.: Que. Dept. Mines - Min. Ind. 1941, p. 52.

This company held lots 59 to 62, ranges V and VI, Barraute township, and two adjoining claims in Carpentier township. Part of the property presently belongs to Canadian Johns-Manville Co. Ltd.

In 1941 the company drilled 6 diamond-drill holes totalling 559 feet at the east end of ranges V and VI. Trenching at this locality has exposed several quartz veins up to 15 inches thick. The larger veins trend N.7°E. to N.12°E. and dip steeply to the east. The veins fill tension fractures in a coarse-grained dioritic andesite. In 1946, a geological

and a geophysical survey of the property were made and 2 diamond-drill holes were drilled in the northern part of lot 59, range VI. No mineralization was noted in the core remaining at the camp site. In 1952-53, three holes were drilled for a total of 1,492 feet in lot 60, range VI. No values of interest were reported from the holes.

F. Joubin was in charge of the drilling and mapping in 1946 and S.C. Farquharson and T. Koulomzine supervised the 1952-53 programme.

Bartec Mining Company Ltd.

Ref.: Que. Dept. Mines - Min. Ind. 1941, p. 52.

The former property of Bartec Mining Company Ltd., which was subsequently acquired by Bargold Mines Ltd., consisted of lots 52 to 58, range V, the north halves of lots 50 to 53, range VI, and the south halves of lots 50 to 52 and 57 to 60, range VII.

A series of trenches in the eastern part of lot 52, range VI, 1,100 feet south of the range line, has uncovered a contorted and dragged shear zone which crosscuts the fragmental, pyroclastic and massive dioritic lavas. This schist zone strikes N.47°W. and dips vertically. It is injected by numerous irregular veinlets of quartz and carbonate which are rudely parallel to the strike. In addition to the quartz-carbonate alteration, there also occurs considerable mariposite, sericite and minor sulphides, mainly pyrite. Company records show that a channel sample across 10 feet of the quartz-carbonate schist in the main trench assayed 0.40 ounce of gold per ton.

In 1941 the company drilled 26 diamond-drill holes having a combined length of 10,294 feet and, in 1959, following magnetometric and spontaneous polarization surveys, 8 diamond-drill holes, totalling 3,357 feet, were put down on the property. No new estimates of ore reserves appear to have been made after the 1959 drilling but the 1941 boring had indicated the gold-bearing structure to have a length of 1,000 feet. The thickness of the mineralized zone ranges between 3 and 10 feet. The dip is vertical, except at the northwest end, where it is steeply southwest.

Ore estimates prepared in 1941 by the company had indicated that the 'A' ore body in the upper northwest part has an average width of 5.1 feet and contains 44,800 tons having an average grade of 0.35 ounce of gold per ton. The 'B' ore body beneath this is considered to have an average width of 6.0 feet and an average grade of 0.28 ounce per ton and contains 12,000 tons. An additional 1,100 tons grading 0.25 ounce per ton has been estimated in the shallow 'C' ore body exposed at the surface. Total reserves

in the 3 ore bodies was then estimated at 57,900 tons and the average grade is 0.337 ounce of gold per ton.

Consolidated Pershcourt Mining Ltd.

Ref.: Que. Dept. Mines - Min. Ind. 1951, p. 63.

This company holds the north halves of lots 25 to 32, range VII, and the south halves of lots 27 to 34, range VIII. The exploration has been almost entirely confined to the south halves of lots 25 to 29, range VII.

During 1951, 35 diamond-drill holes were completed for a total length of 31,073 feet. In addition, a series of short test holes was drilled along the ore zone to determine its position and the depth of the overburden.

The western extension of the Manitou-Barvue ore zone has been traced for 3,000 feet across the Pershcourt property to its west boundary. The mineralization is mainly sphalerite and pyrite in a sheared agglomerate and is very similar to the Manitou-Barvue ore but the width is much smaller. The line of strike traces an open S curve across the property. The dip, however, remains fairly constant, ranging between 72° and 78° north. The main ore zone outlined by the drilling extends downwards to a depth of 1,000 feet or more.

Ore reserves are estimated by the company at 6,763 tons per vertical foot over a width of 24.8 feet, the average tenor being 2.40 per cent zinc and 2.17 ounces of silver per ton. A portion of this zone 10.3 feet in width has an estimated tenor of 3.45 per cent zinc and 3.28 ounces of silver per ton. The amount of ore of this higher tenor is estimated at 2,810 tons per vertical foot.

A shaft located about 300 feet north of the range VII centre line, on lot-line 27-28 was completed in 1952 to a depth of 558 feet. A limited amount of drifting and crosscutting was carried out on the 300- and 450-foot levels. On the 300-foot level, a crosscut was driven from the shaft through the zinc-bearing zone for 158 feet. On the 450-foot level, 351 feet of drifting was carried out in the zone. It gave an average of 4.51 per cent zinc, 0.30 ounce of silver per ton and 0.43 per cent lead across a drift width of 8 feet. On this level another parallel ore zone located to the north was diamond drilled. In the west part of this zone 4.81 per cent zinc and 1.57 ounces of silver per ton were obtained across 33.8 feet along a length of 75 feet, whereas, in the east part, the assay results averaged 8.1 per cent zinc and 3.05 ounces of silver per ton across 8.2 feet along a length of 50 feet.

In November 1952 all work ceased on the property on account of weakening zinc prices.

D. Giachino was resident engineer; Paul Riverin, consulting engineer; and J.M. Thompson, general manager of the property.

D'Aragon Properties (East and West Groups)

Ref.: Que. Dept. Mines - P.R. No. 390, pp. 4, 5.

The east group of the D'Aragon properties was made up of the north halves of lots 48 to 51, range VII, (presently held by Bargold Mines Ltd.) and lots 52 to 54, 60 and 61, the south halves of lots 48 to 51 and the north halves of lots 55 to 59, range VIII, Barraute township.

In 1951, the eastern part of the property was held by Damascus Mines. A magnetometer survey and a diamond-drill hole 400 feet deep were completed. The hole cut mostly graphitic tuffs with some dacitic lavas. Pyrite and pyrrhotite were found in disseminations or in narrow massive sections throughout most of the hole.

In 1955, East Sullivan Mines Ltd. made an electromagnetic survey of the central part of the claim group and drilled 6 diamond-drill holes for a total of 4,841 feet. In 1957, two more holes totalling 992 feet were put down. The holes cut mostly tuffs and agglomerates interbedded with thin flows of andesite and dacite. Graphitic horizons were numerous in the tuffaceous and agglomeratic rocks. Pyrite and pyrrhotite were found in disseminations or in narrow massive bands in the pyroclastic rocks. Only a few grains of chalcopyrite were seen. The best assay result was 0.79 per cent copper across 5 feet.

The west group of the D'Aragon properties covered lots 16 to 21, 30 and 31, and the south halves of lots 22 to 29, range IX, Barraute township.

In 1951, diamond drilling and geophysical surveying were completed at the west end of the property by Consolidated Lebel Ore Mines Ltd.

In 1956, Rio Canadian Exploration Ltd. drilled one hole to a depth of 485 feet at the south end of lot 25. The hole cut tuffs and agglomerates with many graphitic horizons. Pyrite and pyrrhotite were found throughout, in disseminations or in narrow massive bands. Only a few scattered grains of chalcopyrite were seen. The best section assayed 0.4 per cent copper across 0.5 foot.

In 1957, East Sullivan Mines Ltd. drilled 3 holes for a total of 1,531 feet. These were located in lots 24, 25 and 27, range IX. Most of the rocks cut were dacitic lavas, siliceous tuffs and agglomerates with graphitic horizons and disseminated pyrite and pyrrhotite. Only a few grains of chalcopyrite were noted. The highest assay result was 0.15 per cent copper across 5 feet.

The work was supervised by G. Forbes for Consolidated Lebel Oro, C. Pegg for Rio Canadian Exploration and J. Lavallée for East Sullivan Mines.

Frebert Mines Ltd.

Ref.: Que. Dept. Mines - P.R. No. 472, p. 3.

The property of Frebert Mines covers lots 15 to 24 and the south halves of lots 25 and 26, range VII, and lots 20 to 26, range VIII.

The claims are underlain by Keewatin-type lavas and tuffaceous sedimentary rocks intruded by a large sill of ultrabasic rock which trends easterly across the property and dips 60° to 75° north. A large diabase dyke cuts across the property in a northeasterly direction.

During the period 1946-48, Frebert Snow Lake Mines Ltd. trenched and diamond-drilled a zinc-silver zone along the north margin of the ultrabasic sill in about the centre of lots 17 to 19, range VII. Six diamond-drill holes for a total of 1,485 feet were put down in the centre of lot 18, range VII.

During the years 1951 and 1952, Frebert Mines Ltd. drilled 61 holes for a total of approximately 60,000 feet. Most of these holes were located in the central part of lots 22 to 24, range VII, to probe the western extension of the Consolidated Pershcourt and Manitou-Barvue zinc-silver zone. This zone was traced from lot 24 on the Consolidated Pershcourt Mining Ltd. boundary line westward to lot 18. The best mineralization is in lot 24, over a length of 650 feet beginning at the Pershcourt boundary line. The 17 holes drilled in this part of the zone averaged 2.58 per cent zinc and 4.63 ounces of silver per ton over an average width of 16 feet. The deepest intersection, at a vertical depth of 1,200 feet, averaged 1.66 per cent zinc and 9.04 ounces of silver per ton over a core length of 22.5 feet.

The zinc-silver zone is made up of numerous lenticular and parallel bodies of sulphides in a sheared siliceous agglomerate interbedded with tuffaceous sedimentary rocks. A large diorite-gabbro sill with some pyroxenite and minor peridotite lies along the south margin of the mineralized zone.

Five holes were also drilled in the north half of lot 26, range VIII, as a cross section to explore for the westward extension of the Citra Lartic copper-zinc zones. Another five holes form a cross section along lot-line 15 and 16 in range VII. Nothing of economic interest was intersected in these two series of holes.

Work on the property was supervised by A. Denis, W. Weber and I. Christopher.

Gibson Mines Ltd.

Ref.: Que. Dept. Mines - Min. Ind. 1941, p. 52.

This company holds a block of claims comprising lots 50 to 62, range IX. The property was formerly known as the Swanson Option, Swanson Mines and Titanic Mine Holdings Ltd. Prospectors Airways Company Ltd. did some work on the claims before 1941.

Hollinger Consolidated Gold Mines put down, in 1941, 12 diamond-drill holes mainly in the vicinity of the 'B' zone, 300 feet south of the railway line adjacent to lot-line 60-61, range IX. The drilling confirmed the surficial characteristics of the rock in which siliceous granitic and aplitic dykes are cut by veins and masses of quartz containing gold in spectacular but local occurrences. The reticulating pattern of the dykes and the discontinuity made ore estimation impossible. Hole No. 1 in this programme had a section of 11.0 feet of 0.195 ounce of gold per ton.

The 'A' zone is located to the south and east, approximately 200 feet from the 'B' zone, and the 'D' zone, a continuation of the 'A' zone, is located some 600 feet to the west along strike.

The favourable band of schistose and highly carbonatized lavas has a width of over 600 feet and extends from the nose of the ultra-basic mass, at the east boundary of the property, to the limit of outcrop beyond the railways in lot 59, range IX. It strikes slightly north of west. Numerous dykes of aplite, porphyry and lamprophyre intrude the altered volcanic rocks. Quartz veins in tension fractures in the aplitic dykes, and irregular masses of quartz in the granitic dykes, are gold bearing. The trenches and pits in lots 59, 60 and 61 have disclosed at least 5 such dykes in the 'A' and 'D' zones and a similar number of less continuous dykes in the 'B' zone.

In 1955 Swanson Mines conducted resistivity, electromagnetic and magnetic surveys over the property. Four diamond-drill holes were drilled for a total of 1,822 feet. Two holes, drilled under the Hollinger

'B' zone, just south of the railroad track in lot 61, range IX, gave 0.165 ounce of gold per ton across 59.2 feet with a shorter section containing 0.3 ounce per ton across 15 feet, for hole SW-5, and 0.242 ounce of gold per ton for a length of 5 feet, 0.204 ounce for 6 feet and 0.492 ounce for 5 feet in the other hole collared 100 feet to the west of the former. Two other holes were put down to test resistivity and electromagnetic anomalies. These cut siliceous lavas with interbedded graphitic tuffs and disseminated and massive pyrite.

In 1958 Gibson Mines carried out another magnetometric survey of the property and drilled 6 holes for a total length of 2,136 feet. Four of these holes, located in the northern part of lots 56, 57 and 59, cut rocks of the ultrabasic complex. Of the other two, which were drilled in lot 61 near the original exploration work, one, collared 100 feet east of hole SW-5 mentioned above, gave 0.21, 0.11 and 0.23 ounce of gold per ton across 2.5, 5.0 and 3.9 feet respectively.

A.D. Pudifin was in charge of exploration, and J.H. Morgan was consulting geologist for the company.

Malbar Goldfields Ltd.

Ref.: Que. Dept. Mines - P.R. No. 227, pp. 9, 10.

This company held lot 43, range V, the north halves of lots 44 to 48, range V, and the south halves of lots 41 and 42, range VI.

During the winter of 1946-47 the company completed 2,277 feet of diamond drilling in 6 holes at the north end of lot 47, range V. In 1950-51, 8 diamond-drill holes were drilled in lots 41 to 43, range VI. The bearing of the holes is S.22°W. and their aggregate length is 6,279 feet. The pyroclastic rocks traversed by these drill holes contained some pyrite-pyrrhotite mineralization, with negligible amounts of zinc.

D. Giachino directed the drilling.

Manitou-Barvue Mines Ltd.

Ref.: Que. Dept. Mines - Min. Ind. 1951, p. 63.

This company, formerly Barvue Mines Ltd., holds the north halves of lots 33 to 36, range VI, and lots 33 and 34 and the south halves of lots 27 to 32, range VII.

The most pronounced geological feature of the property is a band of pyroclastic rocks consisting of mainly siliceous to intermediate tuffs and agglomerates, interbedded with lenticular fingers of lavas and flanked on either side by considerable thicknesses of largely massive and pillowed lavas of intermediate composition. Intrusive rocks are not significant in size but constitute a variety of types. To the south lies a sill-like mass of gabbroic composition which has penetrated along the contact between the pyroclastic band and the overlying lavas. Intrusive into the gabbro are numerous dykes and local irregular masses of serpentinized pyroxenite. Some of these rocks are almost completely carbonatized.

A silver-zinc body was discovered on the property in 1950. In November 1952 production began and continued until September 1957. During this period 5,601,278 tons of ore was mined containing 144,952 tons of zinc and 3,971,194 ounces of silver. The average recovery per ton was 2.59 per cent zinc and 0.71 ounce of silver per ton. During the years 1953, 1956 and 1957, 208 tons of lead was also produced. The total value of the production was 22.5 million dollars. Mining was done in an open pit until the end of 1956 when such a method became uneconomic at a depth of 250 feet. In 1957, underground methods by way of a unique spiral tunnel around the outside fringes of the ore body were tried. This tunnel, which allowed the use of trucks underground, was sunk from the pit floor to the 500-foot level.

The mill capacity was 5,300 tons per day but this rate was seldom reached during production. Ore reserves at the termination of the open-pit operations were estimated at 4 million tons grading 3.5 per cent zinc and 1.3 ounces of silver per ton.

D. Isbister was resident manager during the construction and production stages.

Matico Mines Ltd.

This company held lots 35 to 39 and the south half of lot 40, range VII, and lots 35 to 38, and the south half of lot 39, range VIII. Lots 35 and 36, range VII, are presently held jointly by Sullivan Consolidated Gold Mines Ltd., East Sullivan Mines Ltd. and Quebec Lithium Corporation Ltd.

In 1946, Matico Mines completed a geophysical survey of the property and 6,589 feet of diamond drilling in 8 holes in lots 36, ranges VII and VIII, and lots 37 and 39, range VII.

During the year 1951, 12,774 feet of diamond drilling in 12 holes was completed by the company under an agreement with Jellicoe Mines (1939)

Ltd. and Transcontinental Resources Ltd. Low-grade gold mineralization was intersected in the margin of the granitic stock in lots 35 to 38, range VII. Massive pyrite-pyrrhotite mineralization was encountered in range VIII along the eastern extension of the Citra-Lartic zone. Zinc tenors were low.

A.C. Lee was the consulting engineer with L. Trenholme and J. McClosky directing the drilling.

Molybdenite-gold Prospect

A molybdenite-gold prospect was discovered in 1959 in lot 56, range VII, Barraute township. The exposure, which is located on the east side of lot 56, 2,800 feet north of the range line or 1,700 feet north of the road to Barville, consists of a quartz vein one foot wide at the east end and 7 feet wide at the west end that has been uncovered for a length of 170 feet. The vein strikes N.70°E. and dips towards the north. Zones containing molybdenite in blebs, streaks and grains are present in the quartz together with scattered chalcopyrite, pyrite and pyrrhotite. Chlorite occurs along the margins of the vein and the enclosing rocks are coarse-grained syenite, syenodiorite and syenogabbro which are part of a large stock. Assay results up to 0.4 ounce of gold per ton are reported to have been obtained from the vein. A selected sample taken by the writer yielded 1.6 per cent molybdenite and 0.01 ounce of gold per ton. Another, which contained a little chalcopyrite, gave 0.02 ounce of gold per ton.

Nealon Mines Ltd.

This company, successor to Citra-Lartic Mines Ltd., held in 1961 the mining rights on the north halves of lots 27 to 34, range VIII, Barraute township.

Early in 1951 Citra-Lartic undertook a geophysical survey by the electro-resistivity method in which several distinct anomalies were outlined. Following the survey, 15,420 feet of diamond drilling in 28 holes was completed. The drilling indicated the presence of a zone of copper-zinc-silver mineralization having a strike length of 1,200 feet in a brecciated volcanic rock. A weak schistosity is locally present. The better intersections located in lot 32 are as follows:

D.D.H.	Core Length	Ag Oz./ton	Cu Per Cent	Zn Per Cent
C-7	4.9 feet	0.25	0.55	5.3
C-8	27.0 "	0.50	1.5	-
C-9	24.3 "	-	-	4.1
C-21 (vert.)	20.0 "	1.9	1.25	2.59

G. Forbes and J. McCannell directed the drilling operation for Citra-Lartic.

Quebec Diversified Mining Corporation Ltd.

Ref.: Que. Bur. Mines - Min. Ind. 1940, p. 53.
Que. Dept. Mines - Min. Ind. 1941, p. 52.

This company held the north halves of lots 41 to 49, range VI, lot 41, range VII, and the north half of lot 40, range VII. Some of the ground is presently held by Bargold Mines Ltd.

Siscoe Gold Mines Ltd., Big Game Mines Ltd. and Hollinger Consolidated Gold Mines Ltd. have done some drilling on this property. One of the Siscoe holes in lot 49, directed S.60°E., penetrated the Laflamme River fault. The siliceous tuff and agglomerates to the west abut sharply against pillowed basalt.

Quebec Diversified completed a geophysical survey of the western part of the property and put down two diamond-drill holes, one in lot 44 and the other on lot-line 45-46, to investigate geophysical anomalies revealed in the survey. No significant mineralization was intersected in the holes.

A narrow gossan zone has also been traced on the surface from lot 49 westward for 3,000 feet.

Dalquier Township

East Dalquier Gold Mines Ltd.

This company held a block of claims that covered lots 54 to 58, range V, and lots 50 to 58, range VI.

There are several pits in an isolated granite outcrop in lot 52, range VI. A northerly-striking quartz vein was exposed for a short distance in the main trench. A magnetometer survey of lots 50 to 58, range VI, was made in 1946. In 1951, following the discovery of scheelite material in one of the old trenches, a programme of surface trenching and pitting was undertaken. A 7 3/4-lb. sample gave 2.34 per cent tungsten trioxide (WO₃).

In 1952 the company drilled 6 holes for a total of 2,601 feet. These were located in the central part of lots 51 and 52 and at the south end of lot 53, range VI. The best assay result was 0.14 ounce of gold per ton over 3.7 feet.

In 1953 a 600-foot hole was drilled at the south end of lot 56, range VI. The results were negative.

T. Koulomzine and L. Wolofsky supervised the work for East Dalquier.

Gordona Mining Corporation Ltd.

This company held lots 52 to 58, lots A and B, the east halves of lots 48 to 51 and north half of lot 48, range X, Dalquier township, together with some contiguous claims to the north in Béarn township.

A lens containing galena, sphalerite, bornite, pyrite and pyrrhotite is exposed in a pit in the east half of lot 54, range X, 200 feet south of the township line. The mineralization occurs as threads, filaments and pods in altered basic lavas. Several smaller lenses, mineralized mainly with pyrite and pyrrhotite, occur in the vicinity, but there is no evident continuity. The main lens is bordered on the southern margin by a variolitic andesite, locally termed dalmatianite.

In the spring of 1949 a geophysical survey of the central part of the property was made. Three strong anomalies were outlined in the eastern part of lot 53, range X. During 1949-50, 16 diamond-drill holes were drilled, for a total footage of 9,155 feet. Four of the holes were drilled to explore the main lens referred to above. The others were drilled to check the anomalies outlined by the geophysical survey. Disseminated to massive sulphides, mainly pyrite and pyrrhotite across widths of up to 250 feet, were encountered in this drilling.

Cross-sectional drilling completed in 1952 the section from the anomaly in lot 53 southwesterly to the granite contact in the east half of lot 51.

J.F. Davis directed the drilling programme.

Kayrand Mining and Development Company Ltd.

Ref.: Que. Bur. Mines - Ann. Rept. 1934, Pt. A, p. 104; Ann. Rept. 1935, Pt. A, p. 63; P.R. No. 116, p. 72; P.R. No. 120, pp. 9-11.

Que. Dept. Mines - Min. Ind. 1944, p. 65; 1945, p. 132.

This company held lots 20 to 26, range IV, lots 7 to 27 and the north halves of lots 12 to 16, range V, lots 12 and 13 and the south halves of lots 14 and 15, range VI, and the south halves of lots 12 to 15, range VII.

Kayrand succeeded Nortrac Mining Company Ltd. which had

succeeded Gold Star Ltd., and Mines Development Corporation Ltd. It also held parts of the Colonial Mines property.

The Nortrac property appears to have been first explored from 1934 to 1937 when a two-compartment shaft was sunk to a depth of 112 feet and 800 feet of drifting and crosscutting were completed on the 100-foot level. Exploration also included the opening of numerous test pits and trenches, and 12,000 feet of drilling in 26 holes.

Eleven quartz veins or vein systems are exposed in lots 12 and 13, range VI. They are found cutting volcanic and intrusive rocks except for the olivine gabbro dykes. The best gold assays are reported from vein sections in which epidote is prominent.

The No. 1 or Shaft vein has been traced on the surface over a length of 500 feet with strike N.20°W. and dip 60° to 70° to the northeast. It has a width of 4 to 5 feet. This vein contains free gold and is the best discovered on the property. It is opened up on the 100-foot level. It lies about 1,500 feet south of the range line on the west side of lot 13, range VI.

The Gold Star vein is exposed in the south part of lot 12, range VI. It is at least 1,400 feet long and up to 100 feet wide. It strikes to the northwest and dips almost vertically. It lies in a brecciated zone in which stringers of milky quartz cement angular fragments of altered country rock which make up from 50 to 70 per cent of the vein material. The vein system is mineralized with disseminated pyrite and chalcopyrite in grains 2 mm. or less in diameter. Assay results reaching 2.57 ounces of gold per ton were reported from this vein.

The Goyette vein is 1,200 feet northeast of the Gold Star vein, in lot 13, range VI. It is exposed for a length of 300 feet and a maximum width of 5 feet. It strikes N.25°E. and dips 60° to the southeast. The north end of the vein lies against an olivine gabbro dyke. The vein consists of quartz mineralized with pyrite, chalcopyrite and some gold.

The No. 9 vein crosses lot-line 11-12, range VI, 1,200 feet south of the range line. It has been traced through trenches and diamond-drill holes for 500 feet on the former Kayrand property and another 900 feet on adjacent ground to the west. It strikes N.30°E. and dips vertically. Widths from 4 to 20 feet have been observed. It is made up of quartz containing pyrite, scheelite and gold.

The No. 7 vein cuts the granite east of an olivine gabbro dyke near the west side of lot 12, range VI, 2,800 feet north of the range

line. It averages 10 inches in width for a length of 135 feet, strikes N.30°W. and dips 70° to the northeast. The vein contains quartz, epidote and free gold with which a high tenor in silver is associated. The wall rock for a width of 16 inches on either side of the vein is mineralized with pyrite, but practically no pyrite occurs in the vein itself, except in association with chloritized included material.

A sulphide deposit is also exposed on lot-line 18-19, range V, about three-quarters of a mile south of the road along range-line V-VI. The deposit lies in a shear zone 10 feet wide and striking N.20°W. in a porphyritic siliceous volcanic rock along which chloritic schists and pillow lavas outcrop. Massive sulphides, chiefly pyrite, are exposed over widths of 4 to 6 feet. Within the shear zone there are several veins of smoky quartz paralleling the schistosity and dipping steeply to the southwest. Besides occurring in massive form, pyrite is disseminated through the schists of the shear zone and along fractures in the quartz veins where it is associated with sphalerite. Material consisting of quartz and pyrite is reported to have yielded the best assay results, which reached 0.13 ounce of gold per ton. The zone of sulphide mineralization has been exposed in seven major trenches over a length of 250 feet and a width of 200 feet.

In 1944-45 Kayrand Mining and Development completed 7,043 feet of drilling in at least 19 holes. Seven of these holes were drilled at the north end of lot 12, range VI, and in the southwest corner of lot 12, range VII. These explored the silicified contact zone between the granite and volcanic rocks. The other holes were drilled on quartz veins in lots 12 and 13, range VI.

In 1947 magnetometer and resistivity surveys were carried out on parts of lots 17 to 21, range V. Previous trenching had uncovered massive sulphides in a schist on the south flank of the outcrop in addition to disseminated and locally massive sulphides in intermediate volcanic rocks on the main part of the outcrop. The exposed mineralization is mainly pyrite and pyrrhotite. Drilling of 5,000 feet in 11 holes was completed in 1947-52. Hole No. 3 in this programme cut 3 feet averaging 0.116 ounces of gold per ton. Only low assays in copper and zinc were obtained from the other holes.

G. Murray was resident engineer for Kayrand and J.H. Morgan, consulting geologist.

New Formaque Mines Ltd.

Ref.: Que. Mines Branch - Min. Oper. 1915, pp. 27, 28; 1916, p. 32.
Que. Bur. Mines - Min. Oper. 1925, p. 122; 1926, pp. 141, 142;

1927, pp. 152, 153; 1928, pp. 129,130.

Que. Dept. Mines - P.R. No. 390, pp. 27, 28.

The present property of New Formaqué consists of lots 41 and 42, range II, and lots 34 to 43, range III, Dalquier township. The company's property has included at one time or another the former holdings of the Campbell and Forbes Syndicate or North Country Mines Ltd. and those of former Jay Copper-Gold Mines Ltd. and Amos Copper-Gold Mines Ltd.

Exploration work was started in 1915 on the Campbell and Forbes Syndicate property. In 1916, a shaft was sunk to a depth of 54 feet in lot 42, range II, and a 44-foot crosscut was driven. In 1928, a two-compartment shaft was sunk to a depth of 115 feet in lot 42, 100 feet north of the old shaft and 150 feet of lateral development work was carried out on the 100-foot level. A test shipment of 39,668 lbs. of ore is reported to have contained 6.44 per cent copper and 1.025 ounces of silver per ton.

Work on the former Jay Copper-Gold Property commenced in 1926. A shaft was sunk to a depth of 525 feet, with 2,932 feet of lateral work completed on 4 levels. According to company reports, a car-load lot of ore from the 200-foot level was shipped to the American Metal Company's smelter at Cartaret, N.J. The tenor of this ore was reported to be 4.41 per cent copper and 4.10 ounces of silver per ton.

In addition to the underground work, trenches and test pits were dug along the strike for a length of 2,200 feet and a width of 300 feet in the siliceous pyroclastic rocks in which the mineralization occurs.

The operations of Amos Copper-Gold Mines Ltd. were confined to lots 28, 34 and 35, range II. A continuous zone of massive sulphide replacing a weathered sericite schist over a length of 1,600 feet and a width up to 25 feet is exposed in the trenches. The occurrence is identical to the mineralized schist zone on the southeast margin of outcrop on the Jay Copper-Gold property. Pyrite, leached and oxidized, is the only visible sulphide. Extensive sampling revealed only negligible amounts of precious or base metals.

The copper-zinc mineralization on the New Formaqué property occurs as lenses, filaments and pods in a pyroclastic band linking the two shafts. The strike is N.65°W. The shearing extends across the entire outcrop. The mineralization on surface is limited to short lenses of which the largest, in the vicinity of the North Country shaft, has a length of 54 feet and a thickness of 2 feet.

In 1945 Paramount Mining Corporation Ltd. optioned the property and completed a plane table geological survey, sampling of the

surface workings, line cutting and a magnetometer survey of the overburdened area between the Amos Copper-Gold and North Country workings.

In 1950 New Formaue Mines Ltd. acquired the property. During that year, the company commenced drilling in the vicinity of the Jay shaft and cross-sectioned the favourable pyroclastic band at 200-foot intervals along strike between the Jay and North Country shafts. D.D.H. 50-6, 100 feet west of the Jay shaft, intersected a zone assaying 2.80 per cent copper and 0.85 ounce of silver per ton for a core length of 10 feet. D.D.H. 50-16, 100 feet west of the North Country shaft, intersected a 5-foot section assaying 5 per cent copper. D.D.H. 50-18, 100 feet east of 50-16 returned a 6.72 per cent copper assay over a core length of 4 feet. Numerous other intersections 1 foot to 3 feet in width ranged from 1 to 11 per cent copper. The total footage drilled was 7,170 feet.

In 1951 ten additional diamond-drill holes totalling 5,611 feet were drilled. Two of the holes were collared in lots 28 and 29, range II, to test the Amos Copper-Gold deposit. The rest of the holes were drilled to the west of the North Country shaft and covered a further extension of 500 feet along strike. Immediately north of the North Country shaft, a vein-type zinc occurrence was traced for 100 feet. The average grade was 4.40 per cent zinc over a width of 3 feet.

A second series of intersections of a similar nature slightly northwest of the above returned assays of 4.42 per cent zinc along a length of 200 feet and an average width of 1.2 feet. A copper zone was located south and west of the North Country shaft. It was traced by the drilling for 100 feet. It has an average width of 5 feet and an average tenor of 4.48 per cent copper.

The underground workings of the Jay mine were dewatered and re-sampled. The company reported 20,000 tons indicated along a length of 125 feet and a width of 5 feet to a depth of 300 feet. The sampling gave an average grade of 0.01 ounce of gold per ton, 2,00 ounces of silver and 4.50 per cent copper.

In 1956-57, New Formaue drilled 67 holes for a total of 33,089 feet. This work was all concentrated on the mineralized zones in the central parts of lots 42 to 44, range II. A headframe, a hoist and some mine buildings were brought in from the Buffadison Gold Mines Ltd. property in Louvicourt township and set up at the Jay shaft. Operations on the property were interrupted at the end of 1957 but further geophysical work and diamond drilling were done in 1959 with inconclusive results.

Thirteen mineralized lenses or lens systems have been outlined on the property. Six of these were estimated to add up to 440,000

tons grading 1.8 per cent copper and 0.43 ounce of silver per ton. A zinc-silver zone, in lot 43, just north of the copper zone was estimated to contain 50,000 tons grading 3.14 per cent zinc and 21.09 ounces of silver per ton.

The sulphide lenses occur in three distinct and parallel zones. At the southeast end of the large outcrop area in lots 44 and 45, range II, a zone which contains only pyrite has been partly trenched for a length of at least 1,000 feet. A copper zone which lies north and northwest of the pyrite zone is made up of chalcopyrite lenses which have been traced discontinuously for a length of 2,200 feet. North of the copper zone lies a zinc zone made up of lenticular bodies of sphalerite and pyrite which have been traced for a length of 3,300 feet.

The diamond-drilling programmes of 1950-51 were supervised by I. Christopher, and W.N. Ingham was in charge of the 1956-57 work.

Oremonte Mines Inc.

Ref.: Que. Bur. Mines - P.R. No. 116, p. 72; P.R. No. 135, pp. 28, 29.

The Oremonte Mines property consisted of lots 15 to 24, range I, Dalquier township. This ground was staked in 1924; in 1927 Dalquier Mining Company was formed to develop it and in 1937 it was acquired by Oremonte.

Numerous pits and trenches were excavated to expose chalcopyrite- and gold-bearing quartz veins. In 1936, three holes for a total of 450 feet were drilled in the central part of lot 18, range I.

In 1956, a magnetometer survey was done on the property and the anomalies revealed in the survey were tested by spontaneous polarization methods. A limited amount of drilling was also carried out.

Duverny Township

Beauchemin Properties

Ref.: Que. Bur. Mines - P.R. No. 116, p. 75; P.R. No. 150, pp. 27, 28.

John R. Beauchemin presently owns two groups of claims including the former holdings of Duverny Consolidated Gold Mines Incorporated and Silverny Gold Mines Ltd. The properties include lots 8 to 11 and the north halves of lots 7 and 12 to 16, range VI, the north halves of lots 16 to 19, range VII, and the south halves of lots 16 to 19, range VIII.

The first exploratory work on the properties was done during the years 1936 to 1938 and the subsequent owners have re-examined the old workings and have explored the remainder of the property. Later trenching in the west central part of lot 10, range VI, has revealed quartz seams and veinlets ranging from 1/2 inch to 3 inches thick which form a stockwork in sheared, blocky rusty-weathering, highly ankeritized volcanic rock. The shearing, which trends N.75°E., disrupts the continuity of the veins. In some pockets of quartz there are spectacular occurrences of gold, in part associated with galena, sphalerite and pyrite. In the northwest quarter of the lot several quartz veins are exposed in a north-facing cliff. The veins strike N.75°E. and dip 10° to 25° southeast. The largest has a thickness of 6 inches and is exposed for a length of 300 feet. Grab samples of the quartz assayed 0.10 to 0.45 ounce of gold per ton. The pyritized and carbonatized wall rock is apparently barren.

A large amount of trenching and stripping was done in the northern property in 1937-1938 mostly in the northernmost part of lots 18 and 19, range VII, and the southern parts of the same lots in range VIII. Quartz veins up to 4 feet thick are visible in the trenches. The wall rock, which is highly carbonatized, is intermediate between diorite and quartz diabase.

In 1946, a geophysical survey was completed on the property and 3,087 feet of diamond drilling in 7 holes was completed in lots 18 and 19, range VIII.

Dennison Denny directed the exploration in 1946.

Bouvier Property

Ref.: Que. Dept. Mines - P.R. No. 205, Pt. II, PP. 17-19.

C. Bouvier owns the mining rights on lot 15 and the north half of lot 20, range IV, and on the south halves of lots 15 to 20, range V, Duverny township. West Duverny Gold Mines Ltd. and Newport Mines Ltd. are also former holders of the ground.

The property was explored in 1937 and 1938 by means of diamond drilling, trenches, test pits and a geophysical survey. During the 1946 season the company undertook a drilling campaign in lots 15, 16, 18 and 20, range V.

A northerly-trending quartz vein and some blebs of quartz are exposed in trenches on the 19-20 lot line. This vein was explored by 7 short diamond-drill holes spaced at 50-foot intervals. One foot of core

from one of the intersections is reported to have assayed 2.51 ounces of gold per ton. Altogether, 10,000 feet of drilling was completed on the property.

L. Almond and J. Cohen directed the drilling in 1946.

Carrière-Monpas Property

Ref.: Que. Bur. Mines - P.R. No. 135, p. 37.

E. Carrière and L.A. Monpas jointly hold the mining rights on lots 27 to 30, range V, Duverny township. The ground was formerly owned by Duver Creek Gold Mines Ltd. and Kiska Gold Mines Ltd.

The main mineralization is in lot 30. Here tension fractures, filled with mineralized milky quartz, strike N.10°E. to N.25°E. and dip irregularly. A vein having an average thickness of 6 inches is exposed for a length of 100 feet in a trench 2,000 feet south of the range line. Two parallel veins of a similar type are exposed in trenches 1,600 feet farther south. Slightly east of the centre line of the lot, at a point 2,300 feet south of the range line, test pits have exposed a stockwork-like system of veins and veinlets of milky quartz containing minor pyrite and sparse chalcopyrite and sphalerite. All of the veins occur within an albite granodiorite stock.

In 1946, thirteen diamond-drill holes having a combined length of 4,960 feet were drilled in lot 30 by Kiska Gold Mines Ltd. The drilling explored the vicinity of the two main prospects. Hole No. 9, under the south prospect, traversed two mineralized zones having tenors of 0.145 ounce of gold per ton over a width of 9 inches and 0.225 ounce per ton over a width of 6 inches.

L. Almond and J. Cohen directed the exploration in 1946.

Claverny Gold Mines Ltd.

Ref.: Que. Bur. Mines - Min. Ind. 1937, p. 97; 1938, p. 72; 1939, p. 71, 72; 1946, pp. 80, 81; P.R. No. 135 p. 35; No. 161, p. 16.

This property comprises lots 22 and 23 and the south half of lot 24, range V, and lots 22 to 25 and the north halves of lots 26 and 27, range VI. This company also held for a time the north halves of lots 25 and 26 of range V.

During the years 1937 to 1940 a large amount of trenching and stripping was done, 6,025 feet of diamond drilling was completed in 13 holes and 2 shafts were sunk. No. 1 shaft, inclined at 65° northeast, was sunk along the dip of the d'Amour vein to an inclined depth of 216 feet. At the 91-foot and 184-foot horizons respectively, 85 feet and 100 feet of lateral work have been done. No. 2 shaft was sunk vertically on the No. 1 or Discovery vein to a depth of 62 feet and some lateral work was done on the 52-foot level. From July to September, 1939, a 50-ton mill was in operation. During that period, 692 tons of ore was treated, producing 13 tons of concentrate which contained 162.5 ounces of gold.

In the fall of 1945, 5,000 feet of diamond drilling was done to explore the extension of the Fontana-Marcotte shear in lot 22, range V.

In the spring of 1946 an adit, started at the base of the hill due north of No. 2 shaft, was driven 90 feet in a southerly direction toward No. 2 shaft.

The country rock in the No. 2 shaft area is a highly carbonatized and silicified granodiorite cut by numerous veins and veinlets of quartz. Sparse pyrite, galena and sphalerite are found in the quartz, and pyrite is common in the host rock. Narrow chloritic slips were found to have a high gold tenor over narrow widths. A series of quartz veins is exposed between two shear zones, the northernmost being 50 feet north of the shaft and the southernmost, 125 feet south of the shaft. The limited amount of exploratory work done indicates a grade of 0.11 ounce of gold per ton across the zone between the two shears. The largest vein of the series, vein No. 1, strikes north and dips vertically. It has an average thickness of 10 inches over an exposed length on surface of 80 feet. The dimensions in the underground workings are about the same. A sample taken across the 10-inch width of this vein at the surface in the vicinity of the No. 2 shaft assayed 0.485 ounce of gold per ton.

Mill tests of the granodiorite from the adit indicated an erratic distribution of gold along highly silicified, pyritized and chloritized slip planes. The average tenor of this rock was 0.04 ounce of gold per ton. However, assays of selected material ranged as high as 1.14 ounce per ton.

During 1946, V. Yensen, foreman, and T. Goedeke, resident engineer, were in charge of the work. The property has been inactive since the fall of 1946.

Consolidated Monpas Mines Ltd.

The Consolidated Monpas property comprises lots 29 to 31 and the north halves of lots 32 to 37, range III, and the south halves of lots 32 to 37, range IV.

In 1946 and 1947 a magnetometer and a geological survey of the property were carried out, and 6,000 cubic feet of trenching and 5,356 feet of diamond drilling were completed in the northern parts of lots 33 and 34, range III. In 1951 an additional 29 diamond-drill holes aggregating 18,000 feet were drilled. Some interesting silver, copper and zinc mineralization was intersected in small lenses in chloritic tuff.

I. Christopher directed the drilling with S.E. Malouf as consultant.

Dolsan Mines Ltd.

Ref.: Que. Dept. Mines - P.R. No. 190, Pt. I, pp. 47, 48.

This company, formerly Soma Duverny Gold Mines Ltd., holds lots 44 to 51, range VIII.

During the period 1942 to 1948, Soma Duverny was actively engaged in exploration, particularly on lots 47 to 50. The work consisted of stripping, trenching, digging test pits and diamond drilling. During this period, geological and geophysical surveys of the property were made.

In lot 49, 1,600 feet north of the range line, two quartz veins 4 to 10 inches thick, with sparse pyrite along their walls, have been traced for 150 feet. Narrow lenses of pink and white carbonate with minor sulphides are exposed 225 feet to the south. At a point 400 feet north of the range line two strong parallel shear zones have been uncovered for a length of 350 feet. These zones are 2 feet wide and are separated by 8 to 10 feet of partially schisted rock. They strike N.80°W. and dip vertically. Quartz veinlets up to 3 inches thick, with rare sulphides, occur in the shear zones.

Trenches in the northern parts of lots 47 and 48 expose an irregular zone of carbonatization cut by small quartz veins and stringers. The wall rock is a highly altered and pyritized amphibolitic gabbro. A similar zone in an identical host rock outcrops in the immediate vicinity of the 48-49 lot post. In both instances the carbonatization appears to follow the schistosity in the plane of the regional trend, N.70°W. The quartz veins and stringers have two preferred orientations; one is parallel

to the schistosity and the other is in a northerly direction. Dips of the veins are variable. These zones have been explored along a length of 1,000 feet by 14 diamond-drill holes totalling over 3,000 feet.

On lot 50, 25 feet south of the range line, an easterly-trending quartz vein and a parallel silicified zone are exposed along a length of 250 feet in a series of trenches. The vein varies in thickness from a mere stringer to over 40 inches. It dips 40° to the north. A spectacular occurrence of visible gold was found in this vein. During the summer of 1948, an agreement was reached with the owners of the Bacola property to the north to explore this vein by diamond drilling. Twelve holes with an aggregate length of 3,503 feet were spaced along a length of 650 feet. In hole No. 9, a 1.8-foot intersection at a depth of 131 feet assayed 0.30 ounce of gold per ton. In hole No. 10, two intersections of 3.4 feet and 11.0 feet at depths of 322 feet and 361 feet assayed 0.60 ounce and 0.73 ounce respectively.

A quartz vein striking $N.15^{\circ}W.$ and dipping steeply southwest is exposed in the northeast corner of lot 49, 120 feet south of the range line. This vein varies in thickness from 6 inches to over 3 feet. The north half consists of a series of parallel veins, each 4 to 8 inches in width. Mineralization is sparse. A northwesterly-trending quartz vein dipping to the southwest at 48° is exposed in the northwest corner of lot 50. The vein is 6 to 12 inches wide and is exposed for a length of 100 feet. Mineralization consists of sparse grains of pyrite and chalcopyrite and a few needles of tourmaline.

P. Decarie was in charge of the property.

Dorvue Gold Mines Ltd.

This company holds lots 3 to 5 and 9 to 15, range IX.

During the years 1936 to 1939, considerable surface trenching and diamond drilling, under the direction of E. Bruet, was completed in highly-carbonatized volcanic rocks in lots 11, 12 and 13. In lot 13 two horizontal quartz veins 8 to 18 inches thick, with visible gold, are exposed in a trench 600 feet east and 270 feet north of the northwest corner of lot 10, range VIII. In another trench, 900 feet farther northeast, other horizontal quartz veins and associated sulphides were noted. In lot 11, 1,400 feet north of this occurrence of quartz and sulphides, a quartz vein is exposed in a trench for a length of 200 feet. It strikes $N.65^{\circ}E.$ and dips 10° to 25° southeast. These mineral occurrences have been further explored by 9 diamond-drill holes.

In the summer of 1946, O'Brien Gold Mines Ltd. undertook exploration work on the property to test the continuation of the Duvay shear. This structure trends en echelon northwesterly across the property.

Nine large cross trenches explored the shear along a strike length of 2,200 feet. In the trenches a series of thin, vertical to steeply dipping quartz veins which strike north to N.45°W. combines with a secondary horizontal vein system to form a stockwork-like structure. Some of the vertical stringers of quartz contain visible gold. The shear zone was explored at depth by 6 diamond-drill holes. Some good intersections were obtained, but the overall results were inconclusive.

J.V. Mills and H. Munroe of the O'Brien staff directed the field work.

The present company was incorporated in 1947. In conjunction with Duvay Gold Mines Ltd., it sunk a 2-compartment shaft in lot 13, range IX (see p. 60). On the 100-foot level, a crosscut was driven north 200 feet to explore reported gold mineralization in previous drilling.

The work was discontinued early in 1948.

Dumont Nickel Corporation

Ref.: Que. Dept. Mines - Min. Ind. 1945, p. 133; P.R. No. 443, p. 13.

The property of Dumont Nickel Corporation covers lots 11 to 18, range I, Duvernoy township. These lots were formerly part of the Wendell Gold Mines Ltd. and Wendell Mineral Products Ltd. property.

There are two types of sulphide deposits on this property. Disseminated chalcopyrite, pyrrhotite and pentlandite are found as possible magmatic segregation minerals associated with gabbro plugs. These sulphides are present along the south or bottom edge of the gabbroic bodies. Pyrite and pyrrhotite are also found along pillow selvages in dacitic lavas and as disseminations in tuffaceous sedimentary rocks in some of the tuff-agglomerate bands in the north half of the property.

In 1945 and 1946, Wendell Gold Mines carried out a magnetometer survey and drilled 8 holes on this part of the company's property. Four of these were put down to test a copper-nickel occurrence along the east edge of lot 13, range I, 2,000 feet north of its southern limit. Another hole was collared near the south end of lot 13 and three more holes were drilled 1,500 feet south of the range line in lot 13. All the holes cut dacitic lavas and a sheared band of tuff and agglomerate containing

graphite and disseminated pyrite and pyrrhotite.

In 1955, Wendell Mineral Products drilled at least 7 holes on the same nickel-copper occurrence in lot 13. There appears to be no available data on the results of this work.

In 1959, Dumont Nickel Corporation acquired the property. A magnetometer survey was done over part of the claims and 9 holes were drilled for a total of 4,097 feet. Six of these were put down to study further the nickel-copper mineralization in lot 13, range I. The holes indicated the gabbro plug to be 200 to 300 feet in diameter and the sulphides, which consist of disseminated pyrrhotite, chalcopyrite and pentlandite, are located in a vertical pipe-like body at the base or south edge of the gabbro. This body has a width of 10 to 20 feet and extends to a depth of about 400 feet. Its tenor in metal averages roughly one per cent combined copper-nickel, a third of which is nickel.

The other three holes, which were drilled in the north part of lots 15 and 16, range I, cut pillowed dacitic lavas containing pyrite and pyrrhotite mineralization in the pillow selvages.

The Wendell Gold Mines work was carried out under the direction of T. Koulomzine. J.D. McCannell supervised the Wendell Mineral Products programme and George Dumont, that of Dumont Nickel Corporation.

Duvex Oils and Mines Ltd.

Ref.: Que. Dept. Mines - Min. Ind. 1946, p. 81; 1947, p. 66; P.R. No. 190, Pt. I, pp. 45, 46.

This company, successor to Duvay Gold Mines Ltd., holds the mining rights on lots 11 and 12, range VII, lots A, 1 to 7 and lot 10 and the north half of lot 11, range VIII, and the west half of lot 2, range IX.

The main mineralized zone is in the north end of lots 10 and 11, range VIII. It consists of a shear up to 40 feet in width trending west to N.60°W. which is exposed in a series of trenches. Numerous north-erly-trending veins and veinlets of quartz with steep dips occur in the shear zone. A secondary series of horizontal veinlets is also visible. The vertical veins contain sparse chalcopyrite, pyrite and sphalerite mineralization and, in numerous places, visible gold. The horizontal veinlets contain in general only unimportant gold mineralization.

Duvay Gold Mines completed, in 1945 and 1946, a geophysical

survey of the property and 20,000 feet of diamond drilling, mostly in the extreme northern parts of lots 10 and 11. Spectacular but erratic gold mineralization was encountered in the shear zone.

During the summer of 1946, a bulk channel sample weighing 40 tons was taken across approximately 40 feet of the main mineralized zone near the centre line of lot 10, 200 feet south of the range line. The sample was tested at the sampling plant of the Quebec Department of Mines at Val d'Or. It assayed 0.207 ounce of gold per ton.

Following this test, Duvay, in conjunction with Dorvue Mines Ltd., sank a two-compartment shaft in lot 13, range IX (see p. 58).

A total of 493 feet of crosscutting, 381 feet of drifting and 52 feet of raising was completed. The gold was found to be localized in thin stringers and the tenor was not sufficiently high to allow mining of the whole zone or selective mining of the small veins. Operations were suspended in February 1948 and the property has been inactive since that date.

D. Endler was resident engineer and J. Cohen consulting engineer during the period 1946 to 1948.

Eastmac Mines Ltd.

Ref.: Que. Bur. Mines - Ann. Rept. 1935, Pt. A, p. 63; Ann. Rept. 1936, Pt. A, p. 80; P.R. No. 116, pp. 75, 76.

This property included the former holdings of La Compagnie Minière Franco-Canadienne and of Seaforth Mines Ltd. It covered the north halves of lots 4 to 7, range II, and lots 3 to 8, range III.

During the years 1935 and 1936, La Compagnie Minière Franco-Canadienne completed 3,000 feet of diamond drilling and sank an inclined shaft to a depth of 120 feet.

In lots 5 and 6, range III, 2,000 feet north of the range line, several large test pits and cross trenches have been dug adjacent to the lot line exposing, over a length of 100 feet, an albite porphyry dyke which cuts the granite. The dyke contains blebs and veins of quartz in a complex fracture system. Sparse pyrite, chalcopyrite, galena and sphalerite are associated with the quartz. Grab samples of the quartz material assayed as high as 0.30 ounce of gold per ton, and a sample of the porphyry assayed 0.08 ounce of gold per ton.

On lot 3, range III, the porphyry dyke referred to above is exposed in cross trenches in the shaft area over a length of 300 feet. Quartz-filled tension fractures normal to the strike of the dyke extend into the granitic country rock for distances up to 80 feet. Within the dyke the veins, mainly parallel to the dyke, reach in thickness up to 5 feet. Samples of the quartz were found to be barren of mineralization.

During 1945 and 1946, Seaforth Mines Ltd., under the direction of S.E. Malouf, re-examined the old workings and did approximately 2,500 feet of additional diamond drilling.

The property is at present inactive.

Fontana Mines (1945) Ltd.

Ref.: Que. Bur. Mines - Ann. Rept. 1936, Pt. A, p. 79; Min. Ind. 1937, p. 97; P.R. No. 116, p. 75; P.R. No. 135, pp. 34, 35; P.R. No. 161, p. 16.

Que. Dept. Mines - Min. Ind. 1945, p. 133.

This property consists of 20 claims in one group comprising the north halves of lots 12 to 21, range V, and the south halves of lots 12 to 21, range VI.

During the years 1936 to 1939, extensive trenching and diamond drilling were done on the property and a shaft was sunk in the north end of lot 20, range V.

The main structural feature is the Fontana-Marcotte shear zone, which has been traced for over 6,000 feet on the property. It strikes N.55°W. and dips vertically. In 1945-46, the company did extensive stripping and trenching and over 40,000 feet of diamond drilling to explore this shear zone. A number of quartz veins have been exposed, some as much as 300 feet from the shear. The veins strike N.15°E. to N.25°E. and have steep dips. They range in thickness from 2 to 18 inches and are sparsely mineralized with sulphides, mainly pyrite and chalcopyrite.

In the west half of the property several quartz veins, particularly the Laddie and the Bunkhouse, fill northerly-trending tension fractures on the south side of the shear. The largest vein, the Bunkhouse, strikes N.20°E. and is nearly vertical. Over the exposed length of more than 800 feet it ranges in thickness from a few inches to over 5 feet. The average thickness is 26 inches. The mineralization consists of sparse pyrite and finely divided native gold, which is visible in numerous places. A bulk

sample of approximately 60 tons, representing the whole exposed length of the vein, assayed slightly more than 0.22 ounce of gold per ton.

J.E. Gill and S.E. Malouf directed the exploration in 1945 and 1946. The property has been inactive since the fall of 1946.

Mallich Quebec Gold Mines Ltd.

Ref.: Que. Dept. Mines - P.R. No. 205, Pt. II, pp. 16, 17.

This company holds lot 15, the south halves of lots 11 to 14 and the north halves of lots 16 and 17, range VIII.

The main mineralization is in lot 12 and is very similar to the mineralization on the adjoining Duvex property (p. 59). Small quartz stringers adjacent to the Duvay shear zone contain visible gold.

During 1946, the company completed approximately 8,000 feet of diamond drilling to explore the shear zone in lots 12 and 15. Some sulphide replacement was intersected, but the gold tenor was low.

The property has been inactive since 1946.

New Goldvue Mines Ltd.

Ref.: Que. Bur. Mines - Ann. Rept. 1936, Pt. A, p. 79; Min. Ind. 1937, p. 97; P.R. No. 116, p. 75; P.R. No. 135, pp. 36, 37.

Que. Dept. Mines - Min. Ind. 1945, pp. 132, 133; 1946, pp. 81, 82; 1947, p. 66; 1948, p. 61; 1949, p. 74; 1950, p. 64; 1951, p. 72.

This company was known formerly as Goldvue Mines Ltd. and prior to this as Central Duvernay Gold Mines Ltd. The property comprises lots 26 to 35 and the north halves of lots 21 to 25, range VII, lots 20 to 27, the north halves of lots 18 and 19 and the south halves of lots 28 to 35, range VIII, and lots 24 to 27, range IX.

A considerable amount of stripping, trenching and diamond drilling was done on the property in 1936, 1937, 1945 and 1946. A 3-compartment shaft, collared in lot 28, range VII, in 1946, was sunk to a depth of 1,250 feet and lateral exploratory work was done on the 190-, 350-, 500-, 650-, 775- and 1,250-foot levels.

The main geological feature of the property is a 1,000-foot-wide diorite dyke or sill striking east-west in volcanic rocks. Within the dyke, a number of roughly north-south fractures, dipping vertically, are quartz filled. These fractures branch off a series of east-west fault zones which dip north. There is much carbonatization of the diorite around the veins and native gold is erratically distributed in some quartz veins.

The most extensive development work was carried out on the 350-, 650- and the 775-foot levels. Five parallel quartz veins were explored in which irregular occurrences of gold were present. The best results were obtained on the 350-foot level where a bulk sample taken from the back of the drift on the "D" vein averaged 0.22 ounce of gold per ton for a length of 530 feet. Only a limited amount of work was carried out on the 500- and 1,250-foot levels. Operations ceased on the property in 1953.

C. Eggert, J. Thoday and B. Marcotte were at different times resident engineers at the property. Julius M. Cohen was consulting engineer.

Southvue Mines Ltd.

This company holds lots 31 to 36, range VI.

During the period 1947 to 1949, a considerable amount of stripping, trenching and diamond drilling was completed on the property.

On lot 32, a narrow shear zone which trends east and dips vertically is exposed for a length of 300 feet. In the eastern part of the stripped area, several pits expose a zone of pyrite-chalcopyrite replacement in sheared flow breccia. The zone ranges in width from a few feet to over 12 feet along an exposed length of 175 feet. Short diamond-drill holes were drilled to explore this zone at a shallow depth.

A geophysical survey of the entire property was made early in 1949. This was followed by 3,000 feet of diamond drilling, to test an anomaly outlined by the geophysical survey. No significant mineralization was encountered.

In 1951, approximately 5,000 feet of drilling was completed. One intersection in hole S-7 assayed 1.22 per cent copper, 0.40 ounce of silver per ton and 0.005 ounce of gold per ton over a length of 18 feet. In 1956, an electromagnetic survey was also carried out on the property.

G. Dumont was consulting engineer in charge of the drilling.

La Morandière Township

Trinity Chibougamau Mines Ltd.

This company, successor to Trinity Copper Mines Ltd. and North Trinity Mining Corporation, holds lots 8 to 10, range IX, lots 1 to 13, range X, and 7 claims in Castagnier lake numbered C.46882, claims 2 and 3, C.50146, claims 1 and 2, and C.82201, claims 2 to 4, in La Morandière township, and also lots 60 to 62, range X, Duverny township.

From 1951 to 1957, a considerable amount of exploration and development was carried out on the property and especially in lot 4 of range X, La Morandière township. A chalcopyrite-sphalerite occurrence along the shore of Castagnier lake on that lot was extensively stripped, systematically drilled and explored underground. The base-metal minerals occur with pyrite in discontinuous lens-shaped zones in siliceous and chloritic pyroclastic rocks. The zones trend to the northwest, dip 70° to 75° to the southwest and plunge to the southeast.

After a magnetometer survey of the property, 43 diamond-drill holes totalling 28,466 feet were put down followed by the sinking of a 3-compartment shaft to a depth of 430 feet. Over 1,200 feet of drifting and crosscutting were also carried out on the 300- and 400-foot levels, and 10,873 feet of underground drilling was done. At the time of interruption of the underground operations, the company had estimated to have outlined a deposit containing 147,000 tons of material grading 1.18 per cent copper and 0.74 per cent zinc to a depth of 450 feet.

On a point in Castagnier lake, 650 feet due west of the copper showing, several rock trenches have exposed narrow fractures containing a little sphalerite, chalcopyrite, cobaltite, pyrite and pyrrhotite. Selected samples from these fractures contain nickel with assays as high as 1.7 per cent.

The northeast part of the property is underlain by silty slates, greywacke, conglomerate and chert-magnetite iron formation. This band of iron formation was indicated under the lake by a magnetometer survey. It was tested by three drill holes. The magnetite is found as a very fine mixture in multicoloured chert. One core length of 220 feet contained 124 feet of material averaging 24.1 per cent iron.

The exploration work was directed by George Dumont.

Landrienne Township

Asbestos

Glossy, olive-green, cross-fibre, chrysotile asbestos occurs in the peridotite in Landrienne township. The veinlets vary in width from mere fractures to 1 1/2 inches across. The fibres, although slightly brittle, fluff readily.

The veinlets of asbestos are short and discontinuous. They form a criss-cross pattern which suggests several ages of origin. The most apparent structural controls are the rudely octagonal cooling joints and tensional openings adjacent to shear zones.

Some diamond drilling was done in 1947 by the Johnson's Company Ltd. in lots 3 and 4, range X, and in 1950 by Bell Asbestos Mines Ltd. in lots 27 and 28, range IX.

BIBLIOGRAPHY

1. WILSON, W.J. - On Explorations along the Proposed Line of the Transcontinental Railway from Lake Abitibi, Eastward; Geol. Surv. Can., Sum. Rept. 1906, pp. 119-123.
2. WILSON, W.J. - Geological Reconnaissance along the Line of the National Transcontinental Railway in Western Quebec; Geol. Surv. Can., Mem. 4 (1910).
3. WEEKS, L.J. - Amos Sheet, Abitibi County, Quebec; Geol. Surv. Can., Map 327A (1935).
4. WEEKS, L.J. - Duvernay (East Half), Abitibi County, Quebec; Geol. Surv. Can., Map 529A.
5. WEEKS, L.J. - Duvernay (West Half), Abitibi County, Quebec; Geol. Surv. Can., Map 530A.
6. JAMES, W.F. and MAWDSLEY, J.B. - La Motte and Fournière Map-Areas, Abitibi County, Quebec; Geol. Surv. Can., Sum. Rept. 1925, Pt. C., pp. 52-77.

7. JAMES, W.F. and MAWDSLEY, J.B. - Fiedmont and Dubuisson Map-Areas, Abitibi County, Quebec; Geol. Surv. Can., Sum. Rept. 1926, Pt. C., pp. 56-72.
8. COOKE, H.C., JAMES, W.F. and MAWDSLEY, J.B. - Geology and Ore Deposits of Rouyn-Harricanaw Region, Quebec; Geol. Surv. Can., Mem. 166 (1931).
9. NORMAN, G.W.H. - La Motte Map-Area, Abitibi County, Quebec; Geol. Surv. Can., Paper 44-9 (1944).
10. TREMBLAY, L.P. - Lacorne Map-Area, Abitibi County, Quebec; Geol. Surv. Can., Paper 46-13 (1946).
11. TREMBLAY, L.P. - Lacorne Map-Area, Abitibi County, Quebec; Geol. Surv. Can., Paper 47-8 (1947).
12. TREMBLAY, L.P. - Barraute, Abitibi County, Quebec; Geol. Surv. Can., Paper 47-9 (1947).
13. TREMBLAY, L.P. - Fiedmont Map-Area, Abitibi County, Quebec; Geol. Surv. Can., Mem. 253 (1950).
14. FAESSLER, C. - Geological Exploration along the Laflamme River, Abitibi County; Que. Bur. Mines, Ann. Rept. 1934, Pt. C., pp. 35-44.
15. LONGLEY, W.W. - Castagnier Map-Area, Abitibi-East County; Que. Dept. Mines, Geol. Rept. 26 (1946).
16. DRESSER, J.A. and DENIS, T.C. - Geology of Quebec, Vol. 2; Que. Dept. Mines, Geol. Rept. 20 (1944).
17. GUNNING, H.C. and AMBROSE, J.W. - The Temiskaming-Keewatin Problem in the Rouyn-Harricanaw Region, North-Western Quebec; Roy. Soc. Can., Trans., Vol. 33, Sec. IV, pp. 1949 (1939).
18. NORMAN, G.W.H. - The Cadillac Synclinal Belt of North-Western Quebec; Roy. Soc. Can., Trans., Vol. 36, Sec. IV, p. 89 (1942).
19. WILSON, M.E. - The Keewatin Lavas of the Noranda District, Quebec, Toronto Univ. Studies, No. 41, pp. 75-82 (1938).
20. DALY, R.A. - Igneous Rocks and Their Origin, McGraw-Hill Book Co. (1914).
21. GUSSOW, W.C. - Petrogeny of the Major Acid Intrusives of the Rouyn-Bell River Area of North-Western Quebec; Roy. Soc. Can., Trans., Vol. 31, Sec. IV, pp. 129-161 (1937).

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