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PRELIMINARY REPORT ON THE SOUTHWEST QUARTER OF CLERICY TOWNSHIP, ROUYN-NORANDA COUNTY

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PRELIMINARY REPORT

ON THE

SOUTHWEST QUARTER OF CLÉRICY TOWNSHIP

ROUYN-NORANDA COUNTY

BY

WILLIAM A. HOGG



QUEBEC

1963

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INTRODUCTION

The southwest quarter of Cléricy township comprises a 25-square-mile area located 8 miles northeast of the cities of Rouyn-Noranda and 30 miles east of the Quebec-Ontario interprovincial boundary. It is bounded by latitudes $48^{\circ}17'13''$ and $48^{\circ}21'38''$ and by longitudes $78^{\circ}45'36''$ and $78^{\circ}52'$.

The geological mapping of the southwest quarter of Cléricy township was undertaken during the summer and fall of 1960 on the scale of one inch to 1,000 feet.

Kinojévis river flows south, adjacent to the west boundary line, and crosses in and out of the map-area in range III. Cléricy lake lies just beyond the east border in ranges I and II. Both Kinojévis river and Cléricy lake are navigable by boat.

Another means of access is provided by a secondary gravel and colonization road for a distance of 24 miles from Rouyn-Noranda. The Taschereau-Noranda branch of the Canadian National Railways passes through the village of Cléricy, which is located on the central west boundary of the township.

Topography and Drainage

The area is one of generally low relief but it contains a few isolated hills made up of sheared and folded volcanic rocks and a variety of intrusive rocks. Most of the small streams flow northward into the Kinojévis river, which is itself a southward flowing sluggish river, with an average width of 200 feet and a gradient of less than one foot per mile.

GENERAL GEOLOGY

The rocks underlying the southwest quarter of Cléricy township consist of a succession of volcanic formations and younger intrusive rocks of various types along with minor sedimentary strata consisting of tuffs and slates. They are all Precambrian in age.

The volcanic rocks include andesites, basalts, dacites, rhyolites and related pyroclastic rocks. Both the Cléricy volcanic and sedimentary rocks have been compressed by flexure folding into northwest-trending belts containing a number of anticlinal and synclinal structures in which parts are overturned towards the northwest.

Intrusive rocks of various composition and age invade the volcanic formations. They consist of granite, granodiorite, diorite, gabbro, pyroxenite and diabase. The late-Precambrian north-easterly trending diabase finds its maximum development in the south-east part of the map-area.

Table of Formations

Quaternary	Recent and Pleistocene	Clay, silt, sand, gravel, boulders, loam
Late-Precambrian	Intrusive rocks	Diabase
Early-Precambrian	Intrusive rocks	Pyroxenite, gabbro, diabase Granite, aelite, granodiorite Diorite
	Volcanic and sedimentary rocks	Slate, tuff Basalt, andesite, dacite, rhyolite

Volcanic and Sedimentary Rocks

Volcanic rocks underlie over 85 per cent of the total map-area. They can be separated into two series: 1) a thick series of intermediate to basic rocks of a volcanic sequence made up of basalt, andesite and dacite and having a maximum development in a northwesterly trending belt across the central part of the map, and

b) a series of parallel, more acidic flows consisting mainly of rhyolite and rhyolite breccias.

Basalts

The basaltic rocks crop out in two areas, the larger being in the northern part of lots 4 to 8, range IV, and the other consisting of groups of small outcrops located close to the northeast-trending diabase dyke of ranges II and III.

Although varying in grain size and texture from one exposure to another, the basalt of the area is quite readily recognized by its dark, almost bluish black colour, its dense, basic appearance and the absence of free quartz. The grain size of the thicker flows varies from that of a fine-grained lava to that of a coarse rock having the appearance of a diabase or gabbro.

Some of the flows contain ellipsoidal structures whereas others are quite massive. The size of the pillows was seen to vary from some 6 feet across in range IV to three inches in width on lot 23, range II.

Some of the flows are made up entirely of pillow structures and, where outcrops are abundant, they can be traced for considerable lengths along their strike. Variolites and amygdules also occur in some individual flows.

Andesite

Andesite is an abundant volcanic rock and commonly occurs along synclinal fold axes. The rock grades in places into dacite by an increase in silica content whereas, in other areas, it may pass into a more basic variety with a decrease in silica. The fresh andesite is green to dark green in colour and its weathered surface, commonly one-eighth of an inch in thickness, takes on a rough dull red to rusty brown colour.

Massive, pillowed and brecciated varieties of the rock are present in the area. Pillows vary in size and degree of deformation and have been used to determine the top of the flows although, in many cases, they are not sufficiently preserved or were not fully developed originally. Ropy and scoriaceous andesites also occur, but rarely.

Variolites, amygdules and phenocrysts are found in some flows. The phenocrysts, which consist of feldspar, are deformed and have the shape of lenticles that show up remarkably well on the weathered surface.

Dacite

The rocks mapped as dacite are pale grey-green to light green in colour. It is a lighter, more siliceous and harder rock than the andesite but the two types of rock contain similar textures

and structures. There are, however, considerable variations in both grain size and colour in the dacite, and some of the rocks classed as dacite might have been designated rhyodacite.

Rhyolite

Rhyolite flows and rhyolite breccias are most abundantly exposed as bands averaging 1,000 to 2,000 feet wide in the southwest corner of the map-area and in range V, as well as in the northern part of range IV.

The freshly broken rhyolites are commonly hard and brittle and may be very fine grained or porphyritic. Spherules and scoriaceous material are present in places. Some varieties are pale green and sugar-appearing on a fresh surface but most have a white-weathering surface varying in thickness from one-sixteenth to one-quarter of an inch. The sericitized facies have a greasy, yellowish green surface. The fine varieties contain no visible fragments, but in many of the flows, embayed or rounded quartz crystals are ubiquitous features. The porphyritic facies are commonly referred to as "rhyolites with quartz eyes".

A dyke of rhyolite cuts across lot 10 on the line between ranges III and IV. Parts of the rock are much sericitized and have a pale yellow-green colour and a greasy surface. Others are of various shades of dull green on freshly-broken surfaces and have a fine granular weathered surface that is white and siliceous.

Flow bands from less than one-sixteenth of an inch up to one inch in thickness were observed. Most commonly the flows are made up of thin, alternating dark and light layers that are contorted and discontinuous. They are best observed on the weathered surface where the colour contrasts between the bands of different composition are accentuated.

Pillows are rarely found in rhyolite but a number were observed in the rhyolite flow that outcrops south of the Harvie Adit No. 2.

Tuffs and Slates

Tuffs with interbedded slates are found near the centre of lots 27 and 28 in range V. They are represented by a thickness of nearly 600 feet on the outcrop.

Bedding in the tuffs is not visible and is presumably obscured by a regional shearing; however, their tuffaceous nature is recognized on the weathered surface by the porous character of the rock.

The slates are characterized by a peculiar metallic ring when hit with a hammer. Bedding planes are still clearly visible in the rock and have contrasting different attitudes with the slaty cleavage.

Intrusive Rocks

General

The different types of intrusive rocks exposed in the map-area are found mainly as sills, dykes or as irregular bodies. The field classification established a variety of compositions ranging from gabbro and pyroxenite to diorite, granodiorite and granite.

The largest area of intrusive rock is the concordant mass of granite, granodiorite and diorite located in the western part of the area. It is tentatively considered to be a composite sill resulting from two and possibly more injections of magma of different compositions. The spatial distribution of the sill, considered as a unit indicates that it has been intruded around the southeast nose of the Harvie syncline and that the two granite arms are connected at depth.

The composite sill is about 5 miles in total length and has an average width of 4,000 feet. Its eastern border is occupied by a granite phase, which varies in width from 4,000 feet in the southeast portion to 1,500 feet at the northwest near Savard lake. The rock has a fresh appearance and is accompanied by small dykes and aphyres that intrude the volcanic rocks to the east.

A granodiorite zone occurs to the west and in contact with the granite at two localities. These contacts are gradational but definitely separate rocks of different composition. Inclusions of volcanic fragments occur in both the granite and granodiorite.

Next to the granodiorite towards the west is a diorite band averaging 2,000 feet in width. It may be possible that both the granodiorite and diorite belong to the same phase of intrusion but evidence of this has not been found.

Along the west border of this composite sill is a more basic rock classed as gabbro. Many of the rock exposures are highly sheared and, where the rock borders the diorite to the east, a mixing may have taken place. No contact was observed but, as seen on some outcrops, these two rock types appear to grade imperceptibly one into the other.

Granite

The granite is a medium-grained salmon pink rock made up almost exclusively of pink potash feldspar and as much as 40 per cent quartz, the mafic mineral content being variable.

The outcrops of this rock found near its eastern boundary in range II are in part very fine grained and siliceous and may have cooled rapidly. Some have the appearance of a rhyolite.

Granodiorite

The granodiorite appears to be a distinct rock type,

although the distinction is based on field observation. It has a high quartz content but in contrast to the granite has an excess of plagioclase feldspar over the potash feldspar and higher content of ferromagnesian mineral than the granite. It is intermediate in composition between the granite and diorite. The rock is medium grained and has a dark greenish grey colour.

Diorite

The diorite of the Clérice composite sill varies from a medium- to a coarse-grained rock and at many localities consists of about equal amounts of plagioclase and hornblende. Thus, the rock shows a relatively uniform distribution of the mineral grains. The colour is a pale grey to greenish grey with a slightly lighter-coloured surface of weathering. Some parts of the diorite contain more basic minerals and are consequently darker in colour.

Gabbro

The gabbro is coarse to medium grained and has a dark green to black colour, considerably darker than the diorite.

The absence of sharp contact between the gabbro and diorite and the gradation between these two rocks found in individual outcrops suggest that it could be a differentiate from the diorite magma.

Diabase

A gabbroic or diabasic dyke, averaging 350 feet wide, can be traced from the southern part of lot 10, range I, to the eastern boundary of the area in lot 31, range III. Smaller offshoots from the main dyke are 100 feet or less in width. Another small one is present in lot 4, range V. Ophitic texture is not observed everywhere in the dyke. The diabase has chilled border zones and the size of its grains increases towards the centre of the dyke. Reddish brown spots are locally scattered through the dull grey and rough weathered surface.

Pyroxenite

This rock occurs as a north-trending dyke in lot 24 of ranges III and IV. The fresh rock has a bluish grey colour and is coarse to medium grained. It is made up almost entirely of pyroxene and the weathered portion consists of a brown to reddish brown skin one-quarter of an inch thick.

Recent and Pleistocene

Large portions of low ground in the area are covered by lacustrine clays, silt and sand. No large deposits of sand and gravel were found other than two small known deposits located in the north part of lots 10 and 16 in range III. The sand and gravel here is utilized to maintain the colonization road along the north boundary of

Glacial striae trend predominantly between south and
S.10°E.

STRUCTURAL GEOLOGY

Folding

The volcanic rocks have been folded into north- to north-westerly-trending anticlinal and synclinal structures. Top determinations, made largely from observations of pillow structures and flow contacts, have indicated the position of axial trace of each structure. The Cléricy syncline is mentioned by Ambrose* (1941) and its centre is described as being "occupied by rhyolites that have shattered, or in places are sheared, in zones near and parallel to the synclinal axis". At Cléricy the axis of the fold, which is "curving somewhat more to the south, can be located approximately as far as lot 27, rge. III, Cléricy tp." The central rhyolite "strip narrows to about 2,000 feet just east of Cléricy, widens again irregularly, and terminates bluntly in lots 18 and 19, rge. IV, Cléricy tp."

The Harvie syncline also mentioned by Ambrose is described as well-pillowed andesite and dacite "folded in a small, tight syncline whose axis strikes north 25 degrees west across lots 8 to 10 range IV".

The work completed in southwest Cléricy gives lithological support to this hypothesis and, in addition, the extension of the Cléricy syncline is found to occur as far as the east border of the map-sheet, in the centre of range II.

The anticlinal structure between the two synclines, although not clearly recognized, is believed to be in part overturned and faulted along its axis. This same fault can be traced northward into Dufresnoy township, where the extension of the Cléricy syncline was recognized by Dugas (1959)**. The tightly-folded volcanic rocks of the Harvie syncline are thus flanked on the west by an orogenic granite intrusive and on the east by a strike fault.

The pattern of formations in lots 18 and 19, range IV, indicates that the Cléricy syncline is plunging to the northwest.

The Lake Imau anticline and syncline are located in the northeast corner of the map-area, in range V. The tuff band exposed on the flank between the two structures is underlain by a pillowed dacite that contains rusty zones.

* Ambrose, J.W. (1941) - Cléricy and La Pause Map-Areas, Quebec: Geol. Surv. Can., Mem. 233, pp. 31, 36 and 38.

** Dugas, Jean (1959) - Descriptive Notes to Accompany the Geological Compilation on the Northeast Quarter of Dufresnoy Township: Que. Dept. Mines, S-47, 1959.

Faulting

The recognition of faults in the area is masked by a general widespread shearing in a northeasterly to easterly direction but several prominent zones that may lie along faults have been recognized.

The strike fault located between the Cléricy and Harvie synclines occurs in a topographical depression. A part of this zone is occupied by rhyolites broken and sheared parallel to the strike and showing, to the west, zones of strong shearing and sulphide mineralization. This northwesterly trending fault may be younger than the regional shearing normal to it.

A northeasterly trending fault, which extends from Savard lake to lot 16, range V, is marked by a fault scarp in lots 8 and 9 of range IV. A geophysical survey indicates that it passes through the granite. It is possible that the faults striking in this general direction are more recent than the folding and granitic intrusion.

ECONOMIC GEOLOGY

Although the map-area has no producing mines within its limits, it has been the scene of considerable exploration work since 1925. The area is of interest since it lies along the same volcanic belt in which a body of massive sulphides was outlined by Moberly Copper Ltd. in 1955-56. This body of three million tons contains an average of 0.69 per cent copper, 2.18 per cent zinc, 37.4 per cent sulphur and 0.052 ounce of gold and 0.62 ounce of silver per ton.

Much geological work, trenching, diamond drilling and various kinds of geophysical surveys have been conducted on different properties by former and present owners.

Lots 26 to 28, Range V

In 1956, Broulan Reef Mines Limited undertook a diamond drill program jointly with Cleranda Copper Mines Limited in lots 26 to 28, range V. Drill core sections up to 45 feet in length contained an average of 20 per cent pyrrhotite without copper values.

Lots 11 to 14, Range I

Normiska Mining and Exploration Limited holds a group of 4 claims covering parts of lots 11 to 14, range I.

Irregular lenses of quartz contain erratic gold values. The occurrence was explored in 1935 by O'Brien Gold Mines Limited with trenches and 12 diamond-drill holes for a total footage of 3,129 feet. In 1937, LeRoy Mines Ltd. sank a 3-compartment shaft to a depth of 265 feet and crosscut on the 125- and 250-foot levels. During 1947, Claremont Mines Limited drilled 11 diamond-drill holes with a total length of 3,063 feet adjacent to the shaft area.

Sampling by O'Brien Gold Mines Ltd. indicated a deposit of 160 tons per vertical foot with a cut grade of 0.16 ounce of gold per ton.

Diamond drill intersections gave values up to 1.60 ounces of gold per ton.

Lots 19 to 22, Ranges IV and V

Cleranda Copper Mines Limited lately held the north halves of lots 19 to 22 in range IV and the south halves of the same lots in range V. Part of this property was formerly held by the Primrose Exploration Company Limited. Development work consisted of trenching and driving an adit on reported gold-bearing quartz veins. The only recorded assay on a single sample gave no gold and 0.020 ounce of silver per ton.

Lot 2, Range V

In 1928, Windfall Rouyn Mining Company Ltd. sank a small prospect shaft to a depth of 60 feet in a mineralized pillowed andesite. The same company performed 8,000 feet of diamond drilling.

Pyrite, pyrrhotite and chalcopyrite occur on the shaft dump and adjacent rock trenches contain pyrite and pyrrhotite that stain the rocks rusty-brown.

Three shallow diamond-drill holes were put down by R. Rotondo in 1954. The cores contained some pyrite with scattered chalcopyrite. In 1955-56 The Coniagas Mines Limited completed 6 diamond-drill holes in the shaft area, making a total of 3,800 feet. An intersection near the shaft assayed 1.42 per cent copper, 6.22 per cent zinc and 0.02 ounce of gold per ton for a core length of 3.2 feet.

Lots 3 to 12, Ranges IV and V

The lots 3 to 10 in ranges IV and V have been partly held by various companies since 1925.

Harvie No. 1 Shaft

The exploration of this ground began when Archean Mines Development Co. Ltd. put down a shaft to a vertical depth of 130 feet, in the central part of lot 9, range IV. Two levels were made; on the 50-foot level there was 145 feet of drifting and crosscutting performed and on the 125-foot level, 755 feet of drifting and crosscutting. In addition to trenching there were 11 diamond-drill holes performed from underground and 8 from the surface.

Harvie No. 2 Adit

An adit was cut prior to 1925 in the northern part of lot 4, range IV, and consisted of 810 feet of drifting and 81 feet

of crosscutting with a diamond-drill hole extending 29 feet from the end of the adit.

Harvie No. 3 Shaft

An inclined shaft was sunk in the northern part of lot 9, range IV, to a depth of 105 feet and 10 diamond-drill holes were put down adjacent to the shaft before suspension of work in 1928. The shaft was sunk in one of two quartz veins. The veins carry chalcopyrite, pyrrhotite and pyrite in a quartz gangue. The second vein was intersected in a drill hole 60 feet north of the shaft at a depth of 127 feet; this hole intersected 17 inches of chalcopyrite. In addition to the chalcopyrite, pyrrhotite, pyrite and quartz association as veins, there are pillow lavas in which the almost complete replacement of a pillow by chalcopyrite has been observed. From the shaft dump, samples of chalcopyrite assay 8.16 per cent copper with only a trace of gold.

Harvie No. 4 Shaft

Harvie Mining Company sank a 2-compartment shaft in the southern part of lot 6, range V. The shaft was sunk to a vertical depth of 110 feet and 285 feet of drifting and crosscutting were performed. Two diamond drill holes were put down northwest of the shaft. Gold assays were obtained in a silicified shear containing seams of sphalerite and chalcopyrite.

Exploration work was undertaken by various companies in this area. Beattie Gold Mines (Que) Ltd. in 1939-41 completed 1,513 feet of diamond drilling in three holes, located in the south part of lots 10 and 11, range V, and Cross Fault Gold Mines Ltd. in 1946 put down six diamond-drill holes totalling 1,830 feet in lots 8 to 12, range V. The holes cut small amounts of sphalerite and chalcopyrite but there were no intersections of commercial importance. In 1948, the No. 4 shaft was dewatered by Cross Fault Gold Mines Ltd. and the underground workings were examined. A small ore-shoot 70 feet long and 5 feet wide contained 9.64 per cent copper, 1.95 per cent zinc, 0.156 ounce of gold and 0.353 ounce of silver per ton.

In 1954, Odyne Exploration and Development Ltée drilled three diamond-drill holes totalling 362 feet in the north part of lot 5, range IV, and Rowan Consolidated Mines Ltd. combined with Harrison Minerals Ltd. put down two diamond-drill holes for a total footage of 1,341 feet in 1956 near the same area. The holes cut small amounts of pyrite and pyrrhotite and rare chalcopyrite.

During 1955-56, Mallen Red Lake Gold Mines Ltd. performed some 3,000 feet of diamond drilling in lots 7 to 10 in range IV. A total of 1,136 feet of diamond drilling was located near the Harvie No. 1 shaft. Small amounts of sphalerite, pyrite and chalcopyrite were cut but were not of economic value.

In 1956, New Delhi Mines Ltd. completed 5,606 feet of diamond drilling in 8 holes. Five of these holes were adjacent to

the No. 4 shaft.

The core consisted of andesite mineralized with pyrite, pyrrhotite, sphalerite and chalcopyrite of no economic value. C.T. Bischoff conducted a diamond-drill program on lot 10, range V, in 1960. Three diamond-drill holes, with a total length of 1,319 feet, failed to cut economic minerals.