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GEOLOGY OF NORTH HALF OF CLERICY TOWNSHIP

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PRELIMINARY REPORT

GEOLOGY

of

NORTH HALF

of

CLERICY TOWNSHIP

by

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GEOLOGY of THE NORTH HALF of CLERICY TOWNSHIP

INTRODUCTION: The map area covers 48 square miles, includes the intersection of longitude $78^{\circ}45'W$ and latitude $48^{\circ}26'N$, and lies 10 miles NE of the town of Noranda. The mapping was done from 1967 to 1970. An important previous report covering this area is G.S.C. Memoir 223 by J.W. Ambrose mapping from 1937 to 1939. Other references to the area are made in annual reports and other publications of the Geological Survey of Canada and the Quebec Department of Natural Resources.

The writer was assisted in the mapping of the area by the following geologists; in 1967, L. Lavarello and S. Palladino; in 1968, S.K. Mahajan.

GENERAL GEOLOGY: The three stratigraphic groups of earlier workers - Malartic, Kewagama, and Blake River - are retained, as is the major fold pattern of a northwesterly plunging anticline occupying most of the area with a parallel synclinal axis in the extreme southwest corner of the area. The north limb of the principal anticline is defined by a rock succession similar to that of the south limb and inadequate top determinations, much obscured by intrusive rocks.

The Malartic group is tentatively sub-divided into upper and lower units. There is some evidence of angular unconformity between the Malartic and Kewagama groups.

The Kewagama group is shown to be more structurally complex than previously demonstrated within this area. North facing top determinations are not uncommon, and some of the indicated folding must be interpreted as involving the Blake River group in the south limb of the principal anticline. The existence of a major dextral offset of the north limb has been advanced by earlier workers to explain the apparent distribution of sedimentary rocks. The present mapping indicates that the sedimentary rocks of the north limb may continue to the northwest as en echelon horizons. This is supported by evidence of interdigitating in the south limb of the Kewagama and Blake River groups.

The Blake River group on both limbs of the anticline has similar volcanic lithologies. The distribution of ultramafic 'sills' apparently discordant to and widespread in the north limb of this anticline, is a feature that suggests a structure more complex than the simple plunging anticline, that is the distribution of these rocks is discordant whereas the individual bodies appear concordant or almost so.

Three directions of fissility related to faulting, in their apparent order of decreasing importance, are: a northwesterly striking direction, principally exposed in the south limb of the Malartic group and corresponding with and involving the most southerly horizons of 'conformable' ultramafic rocks; a north-northwesterly direction; and a northeasterly direction. The portions of the Kinojevis river running south are possibly related to faulting.

The Clericy syenite and pyroxenite stocks are lithologically and structurally complex. Granodioritic smaller stocks are important in the northeast corner of the area and as 'sills' in the Malartic group. Porphyroid granodioritic minor intrusions are abundant in the Malartic group and appear to decrease in number upward in the stratigraphic sequence. Later diabase is widespread. Some Phanerozoic ultramafic rocks may be present.

The host rocks for the Moberun deposit, located $1\frac{1}{2}$ miles west of the area, pass through the southwest corner of the area with notable pyrite and minor chalcopyrite mineralization. The lower felsic member of the Malartic group appears to have received little attention by exploration companies. Nickel to 0.2% and chrome to 0.3% are characteristic of the ultramafic zones in and north of the Malartic group. Zones of these rocks altered to carbonate-quartz vein rocks have been prospected for gold, with values in drill holes to 0.4 oz/ton over 5 feet. Minor chalcopyrite has been found in some of the stocks.

Fifty-nine rocks analyses are included and are commented on briefly. The field names mafic flows, dacite, rhyolite, granodiorite and so on are retained in the report even where the analyses indicate a more precise or a different name.

Stream sediment samples were taken for analysis for Cu, Pb, Zn, Ni, Mo.

MALARTIC GROUP: This group has been divided into four formations. Separating lower and upper mafic volcanic units is a felsic pyroclastic unit (Ruisseau Dunn pyroclastics) consisting of fine to coarse felsic to mixed breccias and tuffs. The better exposures are along Dunn creek and in contact with the diabase dike in RIX lots 54 and 55. The area ascribed on the map to this unit is in accord with government aeromagnetic map 21G. The larger portion of this formation is a feldspathic tuff, commonly thinly bedded, sericitized and zoisitized. Analyses R13-68-1 and R20-69-9 are of tuff and matrix of breccia respectively.

The lower mafic unit is based on an outcrop of fissile pillow lava in RVII, lot 57 and on aeromagnetic map 21G.

The upper mafic unit includes by far the larger number of outcrops in the Malartic group, and is best exposed in Range VII, lots 49 to 56. Flows and pyroclastics are about equally represented. Two types of pyroclastics were distinguished; one a tuff, fissile, apparently chloritic and questionably bedded, the other with this tuff as a matrix but with massive, oval blocks somewhat paler than the tuff and elongated to one foot in length in the direction of the fissility of the matrix. Rocks labelled sedimentary on the map, lot line 49/50 and lot 46, RVIII, across a width of 600 feet, and lot line 47/48 range IX, are finely bedded dark ? tuffs with disseminated magnetite and some pebble-size fragments and feldspathic horizons locally. The mafic flows of this unit are frequently pillowed, the pillows being monotonously uniform, and locally banded or amygdular or with coarse ? varioles. Analyses R20-69-8 and R20-69-7 are of these flows in an outcrop cut by several narrow metagabbro

dikes, and of a carbonatized flow respectively.

Topographically low zones of shearing with linear intrusions break the upper mafic formation into parallel ridges, best expressed southeast of the Kinojevis river. Each of these zones has widths to 1,000 feet but they pinch and swell. The SW zone, widest at the river, pinches down to 100 feet at the east end of lot 52, range VII, and lies at the SW edge of the Malartic group. The NE zone, less well exposed, runs from the west end of lot 50 range VIII to the east end of lot 57 and beyond to the NW and SE. The central zone appears to be several zones en echelon striking more south of SE and merging to the SE with the SW zone. The attitude of fissility in the SW zone and in shears in the adjacent rocks is generally more easterly striking than the zone. Most of the intrusions present in all the zones share their fissility or are cut by a stockwork of quartz veinlets. Ultramafic to porphyroid granodioritic intrusions lace the zones in apparently numerous separate sills of individual widths to 200 feet. Carbonatization, chloritization, steatitization, pyritization, and quartz with or without tourmaline are common, the carbonatization extending frequently for a few feet into the rocks adjacent to the zones. A narrow zone of ENE fissility marked by quartz veins and talc extends from the east end of lot 52, range VII, just west of the road and extends at least 2,000 feet ENE with possibly dextral movement. Attention is drawn to a broader zone of ENE fissility that follows the low ground ENE from the west end of lot 54, range VII and also suggesting dextral movement. The west end of this zone appears to cut off the SW and central zones of shearing and intrusion as well as the principal linear intrusion of granodiorite on the ridge between these two zones, this intrusion apparently cutting across the volcanic rocks to end on the road between lots 52 and 55. Analysis R20-69-14 is of this porphyroid granodiorite dike.

The contacts of three other porphyroid granodiorite sills or dikes are shown to the northeast of the above. The first two are similar to the first, but locally laced with quartz veinlets and more pyritiferous. The third is characterized by to 20% crystals of quartz and feldspar to 6 m.m. in a finer matrix, and was traced from the east end of lot 55, range VII, to lot 52, range VIII.

Analysis R20-69-15 is of a feldspar quartz porphyroid sill, 20 feet thick with local green mica to 2%, as typical of the numerous granodioritic sills in the SW and other shear zones. Analysis R20-69-16 is from a nearby 20 foot sill of aphanitic, rusty, carbonated rock, pyritic, with some green biotite and chloritic inclusions that goes to the north to a biotite rock, a lamprophyre, with 30% rusty carbonate disseminated throughout. Analysis R20-69-6 is of a weakly carbonated, feldspar porphyroid, 20 foot dike in the central zone of shearing.

Analysis R20-69-17 is of a talc - chlorite sill, at least 150 feet thick, on the east shore of the Kinojevis river, lot 49, in the SW shear zone.

The upper felsic unit of the Malartic group is tentatively proposed to draw attention to an horizon along the SW limit of the Malartic group and adjacent to the Kewagama group. Massive, non-bedded, fine-grained and feldspathic, generally less than 50 feet thick, the unit was traced from range VIII lot 37 to range VII lot 59. It is separated from the upper mafic unit by the SW zone of shearing and linear intrusions. The texture is not clearly clastic though suggested in thin section and banding is apparent only to the northwest. The massive nature suggests an intrusion. At one point it is cut by a biotite lamprophyre. Analysis R20-69-5 is of the east end of the unit. The values compare closely with those for analyses R13-68-1 and R20-69-9 of the finer grained horizons in the lower felsic unit. They also compare closely with the values

for analysis R20-69-14 of the main porphyroid linear intrusion which could be projected southeast into this felsic unit. The elongated and possibly discordant felsic intrusive in lots 28 and 29 near the Kewagama - Malartic contact, but apparently from drilling within the Kewagama group, also has a chemistry (analysis RL3-68-37) similar to the above, but notably richer in both Fe and MgO. Texturally the two are similar, but this latter rock is coarser.

Evidence within the Malartic group of a major anticline plunging northwesterly consists principally of the rock type distribution, top determinations along the south limb, and local lineations. The few top determinations made on the proposed north limb are based on too few pillows in each case to be convincing. The contact relations with the Kewagama group to the north and south are uncertain, but to the SE the groups appear non-conformable. In this respect it is to be noted that the tentatively proposed upper felsic unit appears more conformable to the Kewagama group than to the upper mafic unit of the Malartic group.

The broad zones of fissility and the similarity of the rocks in the two principal intervening ridges raise the possibility of repetition by faulting within the group.

West of lot 41 exposure is poor but the few outcrops present are of mafic volcanic rocks (analysis R20-69-25) similar to those described to the east. An east northeast shearing, minor, is shown at several points on the map. The west facing pillows, lot 36 range IX, in the 'hook' of the diabase dike are interpreted as part of the nose of the west plunging major anticline disturbed by a NW dextral fault. The contortions of the diabase dike SW of this point, the carbonated quart-veined area just to the west, lots 32 and 33, and an intersection of 160 feet of "graywacke entirely of chlorite" in a drill hole lot 29 range IX are the only indications for extending to the northwest the shear zones

found southeast of the Kinojevis river.

Economic mineralization sought has been gold principally, and 0.4 oz Au over 5 feet on the Victoria showing, lot 32 range IX is the best value reported. Similar rocks, altered ultramafics and pillow lava, occur widely and have been widely trenched. These carbonated, quartz-veined areas must be more or less continuous beneath the overburden. The lower felsic unit, outcropping over a small area only, should be considered as a base metal possibility although highly siliceous volcanic rocks were not found. Only scattered grains of chalcopyrite were seen in outcrop.

KEWAGAMA GROUP: From outcrop distribution the Kewagama group appears to consist of a plunging fold of sedimentary rocks in which the thick (12,000 feet apparent) southern limb encloses a wedge of pillow lava and mixed volcanic breccia toward the southwest corner, and in which the north limb has a maximum possible thickness of 2,500 feet that thins westward to be cut off near lot 34 or 35.

South Limb: This consists principally of graywacke and slate. Quartz is common in the graywacke but less abundant than plagioclase, and grain size may reach 2 to 3 mm. Beds are less than an inch to 20 feet thick, either for slate or graywacke, but graywacke beds are normally about ten times thicker than the slate and under a foot in thickness. Graded bedding is invariably present unless obliterated by shearing or metamorphism. In 25 outcrop areas where tops were determinable, tops were north and south in 9 and only south in 16. The areas of tops facing in both directions have been indicated on the map by fold axes to draw attention to the possible complex structure in this south limb. The axis in range I lot 42 represents top determinations south of the area in lots 45 and 46, along the road. While minor slumping may be the cause of some reversals, as at the rapids at Montbrun where fold axes are not shown,

larger folds are indicated by the structures in lots 10 and 28 range VIII, and particularly by the tops north in pillow lavas, lots 22 and 26 range VI, associated with the north facing sedimentary rocks immediately to the north. None of the determinations contradict a synclinal fold between the wedge of volcanic rocks within the Kewagama group to the west and the Blake River group to the south. However the evidence to date is too slight to affirm the existence of this fold. In the logs of all 12 drill holes into the sedimentary rocks no top determinations are recorded. Isolated volcanic rocks, andesitic, are recorded in two holes, range VIII lot 23, and range VI, lot 43, both in areas of top reversals and variable strikes.

Analysis R20-69-4 is of a graywacke specimen.

Conglomerate in the south limb outcrops in range VII on both sides of the road between lots 53 and 54 and to the east as far as lot 58 R VI, overlying the upper felsic unit of the Malartic group. Near the road the pebbles and blocks, elongated to 4 by 1 inches are gray to green flow rocks, pale, feldspathic, a few granitic, and a few quartz pebbles. As will be seen below this is similar to the conglomerate in the north limb. To the east the pebbles are smaller and some black chert pebbles are present. To the north, in the road-cut between lots 50 and 57 a lamprophyre sill 3 feet wide in andesite flows carries rounded inclusions to 4 inches of felsic porphyry and fine to coarse grained mafic rocks in a matrix with 10% biotite and resembles a conglomerate. Lithic fragments were occasionally seen in the graywacke, mostly of feldspathic lavas; in lot 42, R VI, they were of hornblende porphyry.

In lot 60, range VI, conglomerate consisting of pebbles to 4 inches of dacitic and mafic, medium grain rocks forms the north limit of the outcrops, but is some 1,500 feet south of the outcrop of the east limit of lot 58, indicating a cross-folding or faulting. Narrow, northwesterly trending shears occur

here in lots 56 to 59 and rapid changes in attitudes about the diabase dike to the south also indicate folding. Small drag folds plunge westerly at 40° . To the north the upper felsic unit thickens to an apparent thickness of 400 feet and swings north easterly and then south easterly with to the east mafic tuffs having two ages of fissility and some drag folding, again plunging 40° west. The bands of pillow lavas to the NW appear to be cut off by the Kewagama group and the upper felsic unit of the Malartic group at this point. This suggests that the upper felsic unit is more aptly thought of as a basal unit of the Kewagama, but for the overlying conglomerate.

North Limb: In this limb the graywacke-slate sequence becomes thinner, finer-grained, and without visible quartz, while conglomerate becomes more abundant and coarser. To the east the conglomerate is located centrally in the limb as two horizons 125 and 20 feet thick. Conglomerate exposed near lake Caste appears to be at the south limit of the limb and appears again near the west contact of the diabase dike range 9, lot 35. The fault through lake Caste offsetting the north limb is largely based on the outcrop of strongly metamorphosed conglomerate on the east shore of the lake and a small outcrop, questionable as an outcrop because of its size, of similar metaconglomerate centrally in lot 43, range VIII. The thin, 10 feet, conglomerate in lot 35, range IX, consists of largely volcanic pebbles; hornblende porphyry, trachytic, and feldspar porphyritic being common. This bed is cut off to the southwest by a porphyritic granodiorite with a swarm of andesitic inclusions. The conglomerate east of the Kinojevis river contains numerous slate and graywacke beds. Pebbles and blocks are mainly aphanitic feldspathic flow rocks with less distinct but apparently equally common mafic, aphanitic rocks. Also common are medium grain feldspar - hornblende rocks. Less common are quartz - rich medium grain igneous

rocks. A few quartz pebbles are present.

Small amounts of andesite appear to be present near the south limit of the north limb and outcrops east and west of the river suggest an interdigitating of mafic volcanic and the sedimentary rocks. Thin beds of chert associated with felsic tuff are present at the north end of lots 42 and 43 range IX, at or near the top of the sequence, and may best be seen in shallow rock cuts on the road. Four top determinations were made, three of which face north and one, near the south limit of the sequence just east of the river, is reported to face south.

The westward extension of the north limb remains uncertain. Perhaps it continues west through the region of the small granodiorite porphyry stock in range X, lots 29 and 30, after a dextral displacement across the fault zone indicated by the outcrops in lot 31, range X and the drill holes near range line IX/X, lots 32 and 33. More fine-grained sedimentary rocks occur to the north in lot 36, as will be described with the north limb of the Blake River group, suggesting a process of wedging out into and interdigitating with the volcanic rocks.

Volcanic Rocks: These outcrop as a wedge 3,000 feet wide on the west boundary of the township, range VIII and IX, thinning to 1,200 feet to the east in lot 21 range 7. The outcrops are of mafic flows, pillow lavas, mixed breccia, and aquagene mafic breccia with some thin (inches) cherty beds, pyritic, as in range VIII, lot 13. These flows are amphibolitized and near the biotite pyroxenite are pyroxene bearing (one thin section). At each end of the south edge of the outcrop area, lot 1 and lot 19, occur large outcrops of mixed volcanic breccia and tuff. That in lot 1 is interbedded with small (1 foot), thin-rimmed, pillows, rounded, medium green, fractured and zoisitized. Analysis number R13-68-38 is of this lava. The tuff is pale brown weathering, medium to dark green,

that in thin section is mainly zoisitized and sericitized feldspar with to 30% anhedral to acicular amphibole, a few zoned plagioclase fragments, feldspathic flow fragments, pyrrhotite, pyrite, and black metallics to 5% and nil quartz. Analysis number R13-68-39 is of this tuff. At the north edge of the outcrop the tuff is very fine-grained, probably graphitic, and has graded bedding.

The agglomerate, a mixed breccia, has to 30% blocks, 2 inches to 1 foot, angular to rounded, in a matrix similar to the tuff but coarser. A common fragment is of feldspar porphyry with to 40% medium grained equant phenocrysts in a dark, hard matrix. White weathering rhyolite and amygdular rhyolite blocks are present, as are black, cherty pebbles. The tuff, in thin beds (1 inch) across widths to 10 feet, goes irregularly to non-bedded breccia beds along strike.

This lot 1 outcrop is summarized from north to south as 300 feet of pyroclastics, going to 300 feet of pillow lava, some amygdular, going to 130 feet of pyroclastics with ? some pillow lava, going to 120 feet of massive, to feldspar porphyritic and pillow lava with a thin layer of tuff. A sulphide showing outcrops 20 feet east of the township line, 120 feet south of range line VIII/IX. The zone, 3 feet wide, is in the breccia and follows a shear at the breccia-pillow contact. Massive pyrite with minor sphalerite occurs in shears to 1 inch wide. The zone is offset by dextral faults and probably continues westward in a drift-filled depression. The showing has been trenched and drilled. A hole collared about 600 feet S of the outcrop and drilled NNE cut volcanic breccia and graphitic tuff with 10 feet of massive sulphides.

The outcrop in lot 19, range VII consists of a 400 foot section of volcanic breccia, mixed breccia, and tuff, with blocks to 8 inches and a few cherty beds to 1 inch in the tuff. The fragments are similar to those in lot 1, with some quartz fragments and blocks of hornblende porphyry. At the south

end of the outcrop a flat lens of fine-grained pyrrhotite, one by two inches, was noted, and in thin-section two fragment - like pieces of pyrrhotite were seen. SW of this outcrop, on the south shore of the Kirojovic, two small clay-covered outcrops in lot 17 consist of rounded to angular pebbles and blocks, most being medium gray, aphanitic with a few feldspar phenocrysts and amygdalae. Some blocks of pale gray, hard porphyry have to 2% white feldspar to 3 m.m. These outcrops (if they are not glacial erratics) may indicate that they are the south limb of the syncline indicated by top determinations to the SE and the persistence of slate and graywacke to the NE, or they may indicate that the volcanic breccia is continuous from lot 19 SW to lot 17 and that the graywacke and slate to the NE is discontinuously interbedded with the volcanic rocks. That this point represents the nose of a plunging fold is difficult to visualize. Finally a drill hole in range VI, lot 27 cut rocks described as graywacke, 56 and 71 feet, and argillite, 23 feet, interbedded with mafic flows. Tops unfortunately are not reported if present.

Other occurrences of volcanic flows elsewhere in the Kewagama sedimentary rocks were mentioned in the description of these rocks.

Metamorphism in a small area at each end of the Kewagama group appears to have produced staurolite or andalusite in the slates, since retrograded to white mica and chlorite. These are in range X, lots 59, west end, and range VIII, lot 1, exposed in the gravel pit, the latter probably caused by the Clarley gneiss stock although secondary biotite was present in thin sections of graywacke from outcrops close to the gneiss, and the former by the small granulite stocks or capolas to the north.

The economic interest of the Kewagama group has been slight, other than that of the volcanic unit. Two drill holes have intersected graphite. Graphite was found in outcrop in the volcanic unit and on the ridge in lots 10 and 11, just south of the range line VIII/IX. Minor chalcopyrite was found in

the metagabbro in lot 42, range VI.

Pyrite is common as an accessory mineral in the graywacke. Carbonatization and shearing of the south limb is particularly pronounced in a zone 1,000 - 2,000 feet thick along the lower contact, to the extent of obliterating graded bedding except to the northwest, where the contact may be farther north of the outcrops.

Minor intrusive rocks consist principally of numerous feldspar - quartz porphyry dikes and sills to the SE, a coarse melasyenite in the south end of lot 41, range VI, the metagabbro in lot 42, range VI and numerous later diabase dikes. The only ultramafic rock found was a 1 foot wide dike, ? olivine rich, on the south shore of the Kinojevis river, lot 40, range VI.

BLAKE RIVER GROUP: Rocks of this group appear to be represented in both limbs of the major anticline and are probably characteristic enough to be at least as strong a support for the existence of this anticline as are the Kewagama sedimentary rocks. They also supply additional top determinations that support this structure with one important exception. The rocks of the south limb are described as a lower mafic unit and an upper mixed unit of mafic and felsic volcanic rocks. Very minor non-volcanic sedimentary rocks outcrop in the north limb and have been described in a drill hole in the south limb. The possibility of the interdigitating of the north limb with the Kewagama group is also suggested for the south limb by the wedge of volcanic rocks described with the Kewagama group. This interpretation must be weighed against the apparent synclinal fold at the Blake River - Kewagama contact, but one interpretation does not exclude the other. The abundant outcrops of ultramafic sills, now altered to carbonate - quartz - fuchsite, in the north limb have no counterpart in the south limb and are the single factor that most complicates the comparison of these two limbs.

Evidence from within the lower mafic unit suggests an anticlinal fold south of and opposite the synclinal fold in the Kewagama group, and this anticlinal axis is tentatively indicated on the map.

South Limb: The lower mafic unit of the Blake River group is characterized by coarsely (2") variolitic, pillowed flows, lots 11, 13, 20, 24, R VII and 25, 27, 32, R VI; coarsely (1") feldspar porphyritic mafic flows, lots 9, 11, 23, R VII and 20, 24 R VI, probably pillowed; and more commonly non-pillowed and pillowed flows and mafic volcanic breccia. The varioles weather pale green and aphanitic, but slightly weathered broken surfaces have a radiating silky lustre. The coarse feldspar phenocrysts may occur as white-weathering, rounded, glomeruloporphyritic masses or isolated squarish single crystals. They are scattered over an apparent stratigraphic thickness of about 1,200 feet and together with the coarse varioles form a persistent horizon along the north edge of the Blake River group. Variolites are reported from a colonisation hole in lot 2 R VIII (and that rather mysterious hole in lot 23 range VIII). The coarse varioles alone have a wider distribution to the SE where they occur along the road from lot 27 to 32, and define for this discussion the SW limit of the lower mafic group as a line trending WNW from the south end of lot 26 or 27 along the top of the south west slope of the ridge here. These two occurrences of variolites also support an anticlinal structure, in this instance plunging SE, as they trend across the unit (particularly if they are the same horizon), the pillows in lot 32 is complex as the variolitic pillows, non-fissile, occupy a thin band along the east side of the outcrop area and appear to strike 140° , whereas the west $2/3$ of the outcrop area is occupied by mafic, apparently chloritized, fissile flows, pillowed flows, and volcanic breccia that strike 80° ; this suggesting a non-conformity more than the nose of a plunging anticline.

Analysis R20-69-1 is of a pillow lava with fine to medium (3 m.m.) varioles. Volcanic breccias in this unit appear to be aquagene or pillow breccias to the SE with increasing amounts of tuff to the NW where outcrops indicate about equal amounts of pyroclastics and flows, and drill holes about 1/3 pyroclastics and 2/3 flows. To the NW fissility and chloritization make the original nature of the pyroclastics uncertain. SE of where the pyroclastic portion of the volcanic unit in the Kewagama group approaches the Blake River group in lot 17 the breccias at several points resemble altered mixed breccias, lot 17, 600 and 1,300 feet south of the river. At the north limit of outcrop in lot 25, R VI a narrow (10') bed of mixed breccia contains medium gray, hard, feldspar porphyry blocks to 8 inches, and amygdular (to 20% to 4 m.m.) pale gray hard blocks that appear similar to blocks in the Kewagama pyroclastic unit. This bed lies between mafic flows and most of the fragments are less than 2 inches and of mafic flows. A probable outcrop of graywacke occurs 100 feet to the NE. For the record two areas of doubtful tops facing north, determinations from pillows, are in R VI, lots 22 and 24, 1,200 feet south of and near the range line respectively. These are south of the two areas of accepted determinations of tops to the north in pillow lava.

Intrusives in outcrops of the lower mafic unit consist of metagabbroic sills, metadiabase and unaltered diabase dikes, one of the altered diabase dikes, south end of lot 19 R VII, carrying feldspar phenocrysts to 1 inch, and unusually abundant black metallics with pyrrhotite. Quartz veins were rare.

The absence of porphyroide granodiorite minor sills is striking in comparison with the SE portion of the Kewagama sedimentary rocks and Malartic group, though this feature is not shared altogether with the north limb of the Blake River group, where the granodiorite stocks are important. The wedge of volcanic rocks 'within' the Kewagama group also lacks these minor sills.

Metallic mineralization in outcrop was limited to minor chalcopryrite. Locally carbonatization, chloritization, epidotization and shearing are strong. The ridge in the southern parts of lots 8 to 12, R VII is particularly fissile and altered. Here a chloritic locally pyritized mafic flow goes to the NW to a slaty rock with quartz-carbonate veins to 6 inches and a fissile chloritic rock with closely spaced calcite rich shears. Nearty to the south are rusty weathering, carbonatized and silicified small outcrops, with to the south a larger outcrops of a pinkish to dark breccia, silicified or zoisitized. To the SE along the SW slope of the ridge small outcrops of mafic flows are cut by numerous pyritic epidote veinlets.

The logs for seven exploration drill holes and five water wells indicate minor chalcopryrite, sphalerite, and graphite to 11 feet. The hole cutting graywacke in lot 26 centrally, also reported 0.10% zinc over 2.7 feet in quartz porphyry.

The transition from the lower mafic group to the upper part of the Blake River group is thought to occur on the SW slope extending WNW from the south end of lot 24, R VI, and can be traced NW to the north end of lot 13 R VI. At the top of the slope dark, pillowed amygdular, epidotized, and possibly variolitic lavas face S. Near the foot of the slope the lavas and volcanic breccias are much paler and commonly amygdular. Pillows are uncommon. Some mixed breccia is present at the SE end, and a probable flow or pillow breccia in lot 21 consists of a 40 foot wide band of pale green, soft to moderately hard, aphanitic rock with some amygdules that is bounded to east and west by similar rock with or without amygdules as elongated, irregular, subangular hard bodies to several feet long, in a matrix that is locally amygdular, the amygdules being less abundant but coarser, and weathers to a rugose surface in distinction to the smooth weathering 'fragments'. There is some sorting of the 'fragments'

by size into bands to tens of feet wide. Analysis R20-69-3 is of one of these fragments, and R13-68-3 is of pillow lava 300 feet to the south. Quartz veins are common in these paler lavas. At two points, lots 13 and 17, 'rhyolitic' porphyries, feldspar and quartz, were found, the feldspar porphyry (analysis R13-68-13 shows it to be an intermediate rock) being very similar to fragments in the mixed breccia at the north end of lot 25. These two porphyries may be sills or flows and may be a single body, but both are bordered by an ophitic gabbro or porphyroblastic metagabbro that in the occurrence to the east is chilled against the rhyolite.

The upper mixed unit (mixed is used as in mixed breccia to signal the presence of sharply contrasting siliceous rhyolites and andesitic rocks) consists of frequent alterations of rhyolitic and mafic volcanic rocks and is shown on the map as a single syncline, Clericy syncline, with a north limb some 4,000 feet wide and a south limb about 2,000 feet wide. This lop-sided structure is based on a 3,000 feet wide band within the north limb of S facing tops. The unit is lithologically non-symmetric as well, the amount of rhyolite being greater in the south limb. The north facing tops occur in variolitic pillow lava at and west of the bridge at Clericy village, no top determinations being found within the south limb of the upper mixed unit. These mafic lavas are tentatively considered as part of the lower mafic unit described above.

The rocks described above as transitional to the lower mafic unit are separated from the main body of the upper mixed unit by a valley without outcrop 1,200 feet wide that widens to over 4,000 feet wide to the northwest. The remainder of the upper mixed unit outcrops therefore as a relatively narrow band (less than 3,000 feet wide) from lot 1 to 20. The strike of fissility and bedding indicates a trend slightly south of east to almost SE and the synclinal

axis is given the more southerly trend. The trend to the west, at the contact with the lower mafic unit in the south end of lots 3 and 4, is more irregular but averages ESE. The band of outcrops consists of four en echelon ridges trending south of east. The rock types in each of these ridges are summarized below, from east to west.

The ridge from lot 13 to 20 consists of important amounts of 'dacitic', feldspathic rhyolitic, and siliceous rhyolitic rocks. In the dacite, pillows, to 8 feet, and amygdules are common; breccia is not, but ribbon breccia, amygdular, occurs. The most continuous exposure of rhyolite is in lot 18 along the NE slope for 800 feet; a hard, pale to medium gray, weathering hard to moderately hard and white rock with to 20% phenocrysts to 2 m.m., clumped, mainly plagioclase, and probable amygdules to 1 m.m. A softer, variably fissile feldspathic rhyolite with quartz veinlets is also present. Some quartz porphyry is present. Elsewhere the rhyolite appears to cut across dacitic and fissile, feldspathic rocks. In lot 13 these complex relationships are well exposed, with in addition some felsic tuff and coarse 'spherules' present. The abundance of quartz veins here suggests that silicification may be important. In lot 17 a quartz body 6 by 20 feet has been trenched. Several outcrops of mafic lava occur along the outer flanks of the ridge. On the ridge fissility is only locally prominent.

The ridge from lots 10 to 13 consists of 'dacitic' pillow lava and breccia cut by dioritic dikes. Rhyolite was found only in the eastern end. Fissility is minor. A thickness of 500 feet of dacite flows is exposed, mostly richly amygdular, the amygdules weathering in relief and in part pyritic. Some of the pillows contain breccia. Clumped fine phenocrysts of plagioclase occur, to 5%. A bed of breccia is exposed over a width of 100 feet at the south edge of the ridge, and overlies the above flows. The fragments, to 1 foot, are mostly

rounded and richly amygdular, to 50%, to 4 m.m., resembling the dacitic pillows. Some amygdules straddle the fragment - fragmental matrix contact, indicating for some a solid filling before brecciation. The matrix is pale to rusty. The diorite cuts flows and breccias and where fine to aphanitic resembles the dacite. All contacts found strike northerly. Amygdules are present at both contacts in one 30 foot wide dike. The main mass of diorite straddles the lot line 10/11 over an area 300 by 400 feet of discontinuous outcrop. Locally the granularity is to 3 mm with 40% stubby, dark amphibole and some banding striking northerly. The northeast edge is amygdular and pyritic. Texture is granitic to porphyritic. Secondary amphibole and zoisitization are common, as for the dacitic rocks. Analysis R13-68-31 is of the amygdular pillowed 'dacite'. Analysis R13-68-27 is of medium grained diorite.

The rhyolite at the opposite (east) end of the ridge is 30 feet thick, hard, medium gray, weathering hard and white with scattered plagioclase phenocrysts and to 40% polycrystalline clusters of quartz in thin-section. This rhyolite is in contact, strike 130°, with pillowed dacite to the south, and in contact, strike 115°, with felsic pyroclastics to the north; it narrows rapidly to the east and west and merges with the pyroclastics to the east. The pyroclastics, ? tuff, have an unusual wood-grain texture, apparently resulting from chaotic brecciation and crumpling, particularly evident off the ends of thin rhyolite bands. Coarser fragments are present, as are feldspar laths to 1 mm. The foliae consist of 1 to 5 mm bands of varying width and grain size in shades of green. Analysis R13-68-28 and R13-68-29 are of a cherty, gray rhyolite band 20 feet thick and its enclosing wood-grain tuff respectively. These values compare closely with analysis R13-68-7 for the presumed lowest rhyolite horizon in the north limb of the Blake River group, and with some of the analyses from the south limb of the Clericy syncline. Less than 100 feet to the south a rhyolite

sill several feet wide in dacite has chilled borders, peters out to the west on the top of the hill, appears unaffected by fissility in the host rock, and strikes 125°. These rhyolites are correlated with dark rhyolites outcropping to the SE on the road in lot 15. Some of the pillows west of here on the ridge contain blocks resembling quartz porphyry rhyolite as well as less definite felsic material. Epidote-quartz spheres to 4 inches were also noted.

The ridge in lots 8 to 10 consists principally of mixed volcanic breccia and rhyolitic to mafic flows with some gabbro. A mixed breccia bed has a thickness of at least 500 feet, well exposed on lot line 8/9. Bedding was not seen, but some sorting by size is present. The fragments are aphanitic, non-porphyrific, in part amygdular, angular to rounded, felsic to fine-grained mafic. The rock weathers pale. The dark matrix may appear clastic or massive. A few fragments to 4 mm of fine-grained pyrite were noted. Analysis R13-68-20 is of a lapilli tuff portion of this outcrop. To the SW of this band is an outcrop that appears to consist of amygdular andesite with rhyolitic blocks several feet wide. To the northeast between drill holes A-3 and A-4 the outcrop consists of soft felsic ovals in a very soft mafic matrix. On the hill top in lot 9, at the west end of the larger outcrop is a rhyolitic mass to 15 feet long, irregular, in a soft, chloritic host. Chloritization and carbonatization are prevalent on this ridge, in contrast to the two ridges to the east, and the resulting rocks more difficult to describe briefly. Contacts are also difficult to plot. Analysis R20-69-2 is of an outcrop on the south slope of the ridge and intended to sample the mafic, softer matrix. It illustrates that mafic cannot be correlated with basic in these pyroclastics. In lot 9 some 1,100 feet north of the road is an outcrop of carbonated metagabbro, brecciated metagabbro, and andesite, with some pyrite - quartz vein mineralization at the contact. To the east in lot 15 on the road dark rhyolite and rhyolite breccia occur in outcrop

and a drill hole. These occurrences are thought of as the easterly extension of the rhyolites exposed on the ridge in lot 13 although the strikes of contacts and pillows in lot 12 suggest that they could be the extension of the dark rhyolites in lots 9-10.

The ridge in lots 1 to 7 extends through the village of Clericy and is wider than the ridges described above. Feldspathic to rhyolitic pyroclastics make up most of the outcrops and will be described in some detail as they locally carry abundant pyrite and minor chalcopyrite. They are limited to the east by pillowed andesite, but also include ill-defined horizons of mafic flows. Correlation of the pyroclastic rocks is made difficult by pronounced fissility, sericitization, and chloritization. The largest area where textures are better preserved is in lots 4 to 7, and particularly lots 5 to 7, on and near the top of the ridge south of the river within 1,000 feet of the road. On wet outcrops and in sawn specimens lapilli tuffs and coarser pyroclastics are readily made out. Some intrusive rhyolite may be present. Quartz phenocrysts to 10%, commonly less than 1 mm but to 3 mm, subhedral, in a light gray to yellowish green, semi-translucent matrix, and an oval-mesh fissility caused by undulating and intersecting zones of fissility several inches apart characterize the more massive outcrops. The fissile zones carry cube pyrite and weather out more readily to accentuate the oval structure. Analysis RL3-68-18 is of the non-fissile portion of this rock. In thin section quartz and white mica were identified, the quartz phenocrysts frequently with secondary rims of quartz projecting into the matrix, and some micro-veinlets of quartz are present. The more obviously pyroclastic rocks weather uniformly white but on an unweathered surface irregular fragments to 1 foot long, medium green to gray lie in a light greenish matrix. Both fragments and matrix are quartz porphyritic. Analysis RL3-68-23 is of a sample with fragments to 1 cm. Quartz veins are rare in these outcrops. In thin section the fragments are chloritic and coarser grained than the matrix. Some

feldspar phenocrysts are present. In outcrop, locally, fragments may be fissile in a massive matrix. A second area of well preserved textures follows the NE slope from 400 feet north of the river, lot 4, to 1,400 feet north of the river, lot 3. Analysis R13-68-30 is of a quartz porphyry, massive, that is fissile at its northern contact with fissile, non-porphyrific, felsic pyroclastic, and is cut by 6 inch quartz veins flat to northerly striking. In thin section the matrix is mainly feldspar with abundant white mica, and scattered carbonate, cube pyrite and chlorite. Some graphic quartz feldspar nodules are present. In the coarser pyroclastics banded fragments were noted. The outcrops in lot 3 contain coarse breccia, non-porphyrific. Mixed breccia, difficult to make out in outcrop, occurs and is suggestive of the mixed breccia on the lot line 8/9, with which it is correlated on the map.

Alteration and shearing has obscured original textures in the remaining outcrops. Two horizons of chloritization and pyritization are described. The first over 200 feet in width extends eastward from the lot line 2/3 in Clericy village to the river at lot line 3/4 where it outcrops on both sides of the river and continues east along the north base of the ridge to lot 6. In the outcrops on the river bank the rocks are dark, in part appear fragmental, in part suggest quartz-feldspar porphyry. In thin section various textures are present, but the principal minerals are altered plagioclase, chlorite, sericite, and quartz. Analysis R13-68-25 consists in thin section of a matrix of to 30% chlorite as a network and in patches with sericite surrounding abundant ovals of polycrystalline, sutured quartz with central blebs of chlorite. Altered diabase with coarse feldspar, northerly striking, and andesitic dikes rich in carbonate and chlorite are present in this outcrop. To the west the amount of pyrite increases as nodules to 5% to 3 inches of pyrite - quartz - carbonate and as lenses of to 50% pyrite in fissile zones to 10 feet wide averaging 10-20%

pyrite. Some veinlets of chlorite, 1 cm wide, are present in outcrops without pyrite. In Clericy village dark green apparently tuffaceous rocks carry 3% pyrite in rectangular aggregates to 8 mm of fine cube pyrite. Analysis RL3-68-24 is of this rock. In thin section the textures are similar to those to the east, but the chlorite is brownish, apparently made up of a pale green chlorite and a brown, micaceous mineral. Eastward from the shore outcrops the width of the zone in outcrop increases to 500 feet, and in general lack the dark colour though pyrite to 2% is general.

The second pyritic horizon described is very short in outcrop. The east end is a small outcrop on lot line 3/4, 400 feet south of the river, with 50% cube pyrite with chlorite, sericite, and quartz cut by quartz veinlets. The west end is on the north shore of the river just east of the bridge. This horizon lies close to the underlying mafic flows, to the south, which in part, lot line 3/4, are rich in pyrite.

These areas of felsic volcanic rocks are sectioned from north to south over a horizontal distance of 1800 feet by holes C-3 and C-7 collared on the north shore of the river. Their maximum vertical depth below the collar is 700 feet. The rock types are those in outcrop and the pyrite rich zones are better defined. Minor chalcopyrite and some graphite are mentioned.

In the north half of lots 1 and 2 occur scattered outcrops of quartz porphyry and pyroclastic rhyolites. On lot line 1/2 trenching has exposed cube and massive pyrite to 10% across one foot. Analysis RL3-68-32 is of the fissile quartz porphyry in the rock cut on the road, a soft, medium green to black rock with 5% quartz phenocrysts.

Mafic volcanic rocks in lots 1 to 7 occur as scattered outcrops within the areas of felsic rocks, and as the band of pillow lava over 1,000 feet thick that limits the felsic rocks to the southwest. At the bridge on the south shore,

the pillows are chloritic and zoisitized with to 10% carbonate, but have complex rims and inter-pillow structures well preserved. Three zones may be distinguished in the rims - an outer 2 inches, that is pale green weathering, has varioles less than 2 mm; a central zone 1 inch thick, dark green weathering with to 50% varioles, and apophyses that extend into the outer zone to give the outer zone a blocky, brecciated appearance; an inner zone 1 inch thick, pale weathering, with to 75% varioles somewhat coarser than in the other zones, and gradational to the central zone and to the medium green weathering centre of the pillow. Local amygdules to 2 mm and pyrite cubes to 1% are present. The inter-pillow zone is 1 to 2 inches wide, delicately banded to contorted and brecciated, pale to dark green, with white quartz at three pillow junctions. Analysis R13-68-17 is of a chip sample from pillow centres. Farther west pillows are to 10 feet long and the rocks are more carbonated and epidotized. To the east these mafic flows leave the area in lot 6. Their contact with the felsic pyroclastics is nowhere exposed, but on and near lot line 3/4 variations in the strike of the contact are apparent and pyritization of the mafic flows is more intense. A grid pattern of quartz and pale minerals with a 1 to 2 inch mesh weathers in relief. Analysis R13-68-19 is of a chip sample from these pyritized outcrops on the lot line. Analysis R13-68-21 is of a less altered outcrop 250 feet south of R13-68-19. In the larger outcrop of mafic flows in the south end of lot 4 a body of massive rhyolite 4 feet across appears to be an inclusion while in the small outcrop to the SW some intrusive quartz porphyry is present. In the south end of lot 5 some fissile felsic rocks have mafic flows to the east and west. Within the area of felsic pyroclastics two areas of mafic flows crop out. Both of these are less than 300 feet thick and their strike is easterly. That in lot 4 1,100 feet north of the range line appears to be a tear-shaped amygdular mafic

body that tails out less than 1,000 feet to the west near the river bank and to the east is cut off by a carbonated metagabbro lens. No pillows were seen. Amygdules are larger and more abundant to the south. A mesh of quartz veinlets and scattered pyrite - rich patches to 4 inches across are prominent. Minor chalcopyrite is present in a trenched quartz - pyrite vein. Analysis R13-68-22 is of the amygdular rock. As with the preceding two analyses, CaO and Na₂O are low. To the southwest felsic quartz porphyry is present as a large inclusion and to the northeast a contact with fissile felsic volcanic rock is exposed. The contact relations of the carbonated metagabbro and its felsic pyroclastic host are complex, the host crushed and rich in white quartz stringers.

Analysis R13-68-26 is of an amygdular mafic outcrop near the north end of lot line 2/3. Some felsic breccia, rather indistinct, is present at the north end of this outcrop which is correlated with the mafic flows in the south end of lots 11 and 12 (Analysis R13-68-31).

The location of the synclinal axis between the south facing flows in the south ends of lots 11 to 15 and the north facing flows in lot 2 is arbitrarily put just to the northeast of the mixed breccia horizon already described. This puts this mixed breccia in a higher stratigraphic position than rocks NE or SW of it and suggests that the minor lenses of mafic volcanic flows SW of the axis are related to the more important mafic extrusions NE of the axis that are cut by feeder dikes. It may also be of interpretive significance for the mixed breccias found along the SW contact of the Kewagama and Blake River groups and in the upper portion of the important wedge of volcanic rocks within the SW part of the Kewagama group. That is to say these breccias may belong to the same upper horizon or horizons.

North Limb: The rocks of this limb resemble those of the south limb in that they consist of a succession of alternating mafic pillow lava and pyroclastics, and rhyolite flows, possible dikes, and mixed breccia. These extend in outcrop from lot 31 to just east of the Kinojevis river, range X. They differ from the south limb in that the flows and horizons appear to be thinner and to alternate more frequently, while only two top determinations were possible so that the fold structure is less certain. They are also intruded by several small stocks of intermediate to basic rocks (particularly to the east) and by narrow sills or dikes of ultramafic rocks (particularly to the west) that have been extensively carbonatized. These altered ultramafic rocks are similar to those in the Malartic group. Finally the presence of horizons of fine-grained, finely-bedded sedimentary rocks raises questions about the relations within the north limb of the Kewagama and Blake River groups.

Pillow lava is best displayed from lots 50 to 54, west of the river. Coarse varioles are present in lot 49 about 1,500 feet north of the range line. Analyses R13-68-5, R13-68-41 and R20-69-19 are of these mafic flows. No mafic breccias were recognized east of lot 38; those in lots 31 to 38 are associated with mixed breccias.

Rhyolite and feldspathic rhyolite flows outcrop in the north part of lots 37 and 38 and in lots 46 to 51. These may be essentially one horizon, but if so they are offset by faulting or by intrusions. The band shown in lots 50 and 51 appears to have a maximum width of 900 feet and a minimum length of 5,000 feet; but the outcrop in lot 49 is possibly an erratic. At its widest part this band is largely coarsely pyroclastic. Some quartz porphyry is present. Analyses R13-68-7 and R20-69-18 are of the rhyolite flows. Approximately a half of the outcrop sampled for R20-69-18 is of a feldspathic rhyolite with to 2% pyrite that is in irregular contact with the more siliceous

rhyolite of the sample. The extent to which silicification has affected these rhyolites near the altered ultramafic rocks locally rich in vein quartz is a question. Some quartz veinlets cut the rhyolite, but not the sample analysed.

The mixed breccia, resembling mud-flows, was recognized only to the west, lots 31 to 38, scattered across a width of over 2,000 feet. Blocks of rhyolite to 4 feet wide were seen. Some black chert clasts and narrow graphitic chert horizons are present. Analysis R13-68-12 is of a four foot wide band of black chert with graphite. Analysis R13-68-13 is of a quartz porphyry 'sill' some 10 feet north of this graphitic band, the sill appearing to terminate to the west opposite the folded graphitic band. Also associated with these pyroclastics are narrow beds of slate and cherty sedimentary rocks, in lot 36 some 1,800 feet north of the range line, that are similar to rocks in the north limb of the Kewagama group. Thicker horizons of these sedimentary rocks were found directly to the north, on the ridge just north of the township boundary. In a mixed breccia outcrop 1,100 feet south of the north boundary of lot 38 two blocks to 3 feet of talcose ultramafic rocks were found. The blocks have veinlets of white calcite at their contacts. Analysis R20-69-21 is of one of these blocks.

There are at least three horizons of altered ultramafic rocks present as 'sills'. They are completely carbonatized and silicified with locally abundant 'fuchsite'. The widest in outcrop is 200 feet across. East of Caste lake they are amphibolitized and serpentized. The outcrop in the east end of lot 55 may be a very large erratic. Analyses R13-68-11 and R13-68-14 are of the carbonatized ultramafics. R20-69-20 is of similar rock 250 feet north of the township boundary in lot 36. Analyses R20-69-23 and R20-69-24 are of carbonated and non-carbonated ultramafic rocks to the southwest in the Malartic group,

on and near the Victoria Gold occurrence. The specimen for R20-69-24 contains 80% serpentine and is at the contact of a diabase dike. Serpentine or amphibole plus serpentine rather than the carbonate alteration seem to be characteristic of these rocks at diabase contacts. Mafic volcanic rocks associated with these altered ultramafics are locally strongly carbonatized and silicified. Analysis R20-69-22 is of such a carbonatized mafic flow. The ultramafic blocks mentioned in the previous paragraph occur in an outcrop that probably has a 'sill' of carbonatized ultramafic nearly to the south or to the north or both. However the blocks are talcose and in this do not resemble the 'sills'. Nor do they weather rusty. The form of the ultramafic horizons was not determined, but they appear conformable to the volcanic rocks. Several points with stratigraphic implications should be made in regard to these rocks. First they were not found in the south limb of the Blake River group. Second they are very similar in both their carbonatized and amphibolitized facies to the ultramafics of the Malartic group. Third, there is an abundance of these rocks in the area where the identity of the Malartic, Kewagama, and Blake River groups of the north limb becomes confused, that is in ranges IX and X, lots 27 to 38. Fourth, none of these 'conformable' ultramafic rocks were found in the Kewagama group, north or south limb. The ultramafic rocks present within the granodiorite stock, lots 58 and 59, range X appear to be inclusions in the stock. The occurrence at the north contact of the diabase dike may have a northerly strike. The 'outcrop' in the east end of lot 55, range 10 may be a large erratic.

Outcrops of Blake River and Kewagama group rocks approach closely on the east shore of Caste lake and in lot 36, but at both places their relationships are disturbed by multiple intrusions. Structures within the Blake River group are also disturbed by numerous intrusions. An east-west trend with

steep dips and tops facing north is the principal structure recognizable. A wide north northwest shear zone appears to cross lots 30 and 31. A narrow dextral fault with a more northerly strike offsets volcanic rocks on the west shore of the Kinojevis river, lot 51.

INTRUSIVE ROCKS: The conformable and almost conformable intrusive rocks have been described with their enclosing rocks. This section describes the Clericy Syenite - Pyroxenite stock, the small stocks intrusive into principally the Blake River rocks of the north limb, certain even smaller intrusive bodies of particular interest, and the later diabase dikes.

Clericy Syenite - Pyroxenite Stock: A coarse-grained syenite-melasyenite, frequently banded, underlies 1 1/2 square miles in the northwest corner of Clericy township and continues to the northwest to underlie an additional 1 1/2 square miles. South of its southeast corner it is intrusive into an elongated body of pyroxenite that is mineralogically similar to the syenite and believed to be a related intrusion.

The bands in the syenite-melasyenite, one half to ten feet thick, formed by variations in granularity or in the proportion of femic minerals, are common and trend 110° to 150° with frequent convolutions. The femic minerals, chiefly a clino-pyroxene, may be 60% of the band, more commonly 20 to 40%, but syenite exceeds by far the mela-syenite. K-feldspar, commonly microperthite with some microcline, is present to 80-90 per cent, frequently as crystals to 2 cm long, tabular, and often in parallel orientation. Matrix feldspar averages 2 mm and is more quant. Quartz is present to 1%. The clinopyroxene is thought to be an augite. It is similar to the clino-pyroxene of the pyroxenite megascopically, and in 2V, optic sign, and extinction angle. An analysis (R13-68-40) of the pyroxenite, 80% pyroxene with 5% biotite and 5% K-feldspar, gave 0.83% Na_2O , 2.06% K_2O , 18.40% CaO .

In the syenite rosettes to 6 cm of pyroxene radiating in from the rim to a feldspar rich centre and other larger oval structures of zoned and aligned pyroxene-feldspar occur. Inclusions of volcanic and sedimentary rocks are present, as are inclusions of all facies of the intrusion, that is syenite, melasyenite, pyroxenite, and biotite pyroxenite. The biotite pyroxenite was seen in outcrop only as a fine-grained inclusion, with 40% pearly gray mica, in lot 7, R IX, 1,150 feet south of the road; but has been described in drill logs of holes 7,000 feet to the south. Intrusive relationships at band contacts of syenite-melasyenite and diking by coarse syenite were seen.

A fine-grained granitic facies with 15% quartz, to 1 mm, ragged, in a finer matrix of microcline - albite with 5% pyroxene and spotted with rose patches to 4 mm, apparently hematite dust, occurs as dikes; and in part as masses to 200 feet across apparently gradational to the syenite. It was not seen cut by syenite.

The pyroxenite body is outlined by an anomaly with values to 3,500 gammas on aeromagnetic map 21G and has been investigated by at least 17 drill holes. It consists in outcrop of melasyenite and pyroxenite that locally are banded, but are characterized by abundant syenite dikes to several feet in width, without chilled edges and commonly trending north. It is separated from the syenite-melasyenite to the north by a valley 1,400 feet wide. Along the north slope of this valley a gabbro dike, with low dips south and chilled against the syenite, was found at two points. The width of this dike is not known. It does not resemble the metagabbro dikes and sills seen in the area, but has the textural variability that may be seen in the younger diorite of the Noranda area (G.S.C. Memoir 315). In thin section two amphiboles are present.

The mineralogy of the pyroxenite - melasyenite in outcrop is clinopyroxene to 80%; microperthite, 5 to 30%; biotite, to 5%; apatite, to 5%;

magnetite, 2-5%; sphene, 1%. The fine, brilliant, black biotite gives the hand specimen the lustre of an amphibolite. The contact with mafic volcanic rocks was seen at two points, and adjacent to narrow dikes of pyroxenite is gradational over a width to one foot with some pyroxene in the metavolcanic rock. Syenite dikes cut both. In places the melasyenite associated with the pyroxenite appears to be the result of K-feldspathization of the pyroxenite. In the mafic volcanic rocks near the contact with the pyroxenite, lot 4, 20 feet south of range line VIII/IX, is a calcite dike, 2 feet thick, exposed for 5 to 10 feet, striking north of west in a depression that extends for 200 feet. Both walls contain breccia of syenite and mafic flows in calcite. Near the north end of the possible extension of the vein along the depression a veinlet of similar calcite occurs in the pyroxenite.

Analyses R13-68-16 and R13-68-40 are of the syenite and pyroxenite respectively.

Drill holes by Clericy Syndicate and Strategic Metals Ltd. into the magnetic anomaly in lots 4 to 7, ranges VII and VIII cut a north striking body of pyroxene - biotite rock 1,700 feet wide and over 4,000 feet long. The percents of biotite and pyroxene are not given. Magnetite occurs as disseminated grains and in two holes as three 'high magnetite' bands to 20 feet wide across 110 feet. Near the south end of the body two holes cut two feet of 0.23% copper and two feet of 0.10% copper. Minor chalcopyrite was seen in other holes. Three specimens of drill core of the Clericy Syndicate in the collection of the DNR at Rouyn were examined in thin section.

1) Hole 1 at 203 feet, described as graywacke, consists of 33% pale biotite, 33% sericitized 'feldspar', and 20% plagioclase, and appears to be an altered sedimentary rock texturally.

2) Hole 2 at 289 feet, labeled ultrabasic ("biotite type intrusive" in log), consists of 60% amphibole, 30% colourless pyroxene, and 10% biotite.

3) Hole 3 at 709 feet, described as amphibolite, consists of 30% clinopyroxene, 30% plagioclase, and 25% brown biotite and secondary green mica. The pyroxene and brown biotite are phenocrysts in a matrix of plagioclase and green mica.

It is noted that the pyroxene in these cores does not have the green colour of the pyroxene in outcrops of the syenite - pyroxenite complex. Apatite is more abundant in the outcrop specimens. Syenite and/or 'granite' dikes are present to the extreme south limit of the body.

Holes drilled by Gaitwin Exploration Ltd. in lot 2, range IX cut frequent sections of 'amphibolitized diorite' alternating with syenite and andesite. Two specimens for thin section were selected from a pile of this core (on low rise near the collar of hole #3). They consist of clinopyroxene, colourless to pale green (30%), biotite (30%), and to 50% altered plagioclase. A few grains of isotropic, colourless, ? garnet occur in one thin section.

No 'later diabase' was found cutting the syenite - pyroxenite complex, so their relative ages are not known.

Small Stocks of Range X, East Half: Analyses R13-68-8, 9, 10, and 35 are of granitic to feldspar porphyroid rocks, fine to medium grain, referred to as granodiorite to albitite. Quartz veinlets are common. The outcrops from just west of Matissard lake to the east end of lot 59 are thought to be of cupolas of a single body at depth. For 2,000 feet east of Matissard lake inclusions of mafic volcanic rocks are abundant, and near the road in lot 53 some disseminated chalcopyrite occurs in trenches in a large outcrop of granodiorite, amphibolite

with some garnet, intrusive rhyolite, and quartz-feldspar pegmatite.

Analysis R13-68-15 is of a dark red, fine-grained, syenitic-appearing rock with amphibolitic inclusions. The analysis is similar to R13-68-6 of a distinctive intermediate sill of intrusive breccia occurring along the scarp on range line IX/X just east of Caste lake, in drill hole number 2 of Noranda Exploration, lot 49 range IX, and just east of the Kinojevis river, lot 50, range IX.

Analysis R13-68-4 is of the hornblendite in lots 47 and 48. This rock is very uniform in outcrop, fine to medium grain, massive.

Minor Ultramafic Rocks: In lot 55, range VII, 1,500 feet east of the road a northerly striking 1 to 2 foot wide dike cuts pillow lava. Two hundred and fifty feet to the south similar rock is exposed over an area 10 by 10 feet with several textural variations. In hand specimen the rock has a porous crust 1 cm thick, micaceous, about a dark gray fine-grained rock with nodules to 2 cm, some of which contain smaller nodules, ? phenocrysts in part. A thin section was made of a specimen with nodules (black) less than 3 mm wide, to 30%. They consist of talc, carbonate and magnetite in a matrix of pale brown mica (30%) and carbonate (20%). Scattered perovskite to 0.4 mm in the matrix is clad in a black metallic mineral to 0.08 mm thick. Some of the larger nodules have a rim of carbonate one grain thick. Minor pyrite is present. Fine-grained minor chalcopyrite can be seen in hand specimen.

The host rocks are not carbonatized and the abundant carbonate is believed to relate this rock to the carbonatites. K.L. Currie of the G.S.C. suggests in a personal communication that this may be a monchiquite and possibly related to the upper Ottawa valley lamprophyres of Cambrian and Jurassic ages.

A 1 foot dike, also northerly striking, described as lamprophyre, with to 10% biotite and some nodules of altered ? olivine to 1 inch, but without matrix carbonate outcrops in lot 40, range VI, on the shore of the Kinojevis river.

Later Diabase: This term is used for those widespread gabbro dikes that cut all the major rocks of the area (except ? the syenite-pyroxenite), have a texture that varies from diabasic in the finer grained parts to gabbroic with coarsening granularity, and have only minor alteration of the principal minerals.

The principal dike, an olivine gabbro, is possibly continuous across the area. It may follow the course of the Kinojevis river at the west end of lots 50 to 52, but its location south of Montbrun village is uncertain. It is accompanied by epidote stringers and red (? dusty hematite) alteration of feldspar minerals in the host rocks for several 10's of feet. This is well developed in the west end of lot 51, range VIII where felsic tuff has the appearance of epidotized syenite. The dominance of amphibole rather than serpentine or talc in the ultramafic sills adjacent to the major dikes may be another alteration effect of the later diabase.

The large dike in lots 32 to 36, ranges VIII to X appears to reflect the shear and fold structures of its host rocks. The north end may be following a northeasterly striking fault, while the complex diking in range IX is believed related to northwesterly and north-northwesterly shear zones and accompanying or earlier folding.

Several occurrences were found of similar gabbro dikes but with feldspar crystals to 1 inch in a fine to medium matrix. One of these is cut by the principal diabase dike.

Altered gabbro dikes that may be of the same age or ages as the later

diabase were found. One is at the head of the rapids near Clericy village, a second in the south end of lot 19, range VII, a third in lot 26, range VII, south of the river, and a fourth in the north end of lot 38 range X.

ECONOMIC GEOLOGY: Comments on economic geology have been incorporated within the preceding descriptions, generally at the end of each section. The following is a summary of documents in the files of the Quebec Department of Natural resources. Drill logs for colonisation water-well holes have not been included, but their location and rock types are indicated on the map. In lot 48, R X, 1,500 feet south of the township line, a four foot block of magnetite iron formation was noted.

The Coniagas Mines Ltd. R VI, L.1-7, south 1/2

- MRN Report; J.E. Gilbert; 1952; Sozio Property: South shore of Kinojevis river, L 1 and 2; sheared zone 3 feet wide, 300 feet long, with pyrite - sphalerite stringers; assays to 0.63% Zinc across 3 feet.

- Report; L.S. Trenholme; 1955; Rotondo Copper Prospect; Geological mapping, magnetometer survey, diamond drilling.

South of the river, a quartz vein, shown as 190 feet long and to 3 feet wide occurs in south end of lot 6, range VI, striking north (not found in drilling holes C-14 and C-16). The geology is shown as diorite andesite, dacite, and rhyolite with sheared agglomerate. The magnetic relief is low.

- MRN Report; J. Dugas; 1956; Coniagas Mines Ltd. Claims.

- E.M. Survey Report; The Coniagas Mines Property, R.D. Hutchison; 1956; recommends re-checking in R VI, lot 4 and 5, S half. No significant anomalies north of the Kinojevis river.

- DDH. Logs; The Coniagas Mines Property; L. Trenholme; 1955-56; Holes C-3, C-7, C-9, C-11, C-14, C-16, C-17, C-19, C-20.

C-3: Brg S25W; Dip 50° to 20°; length 1,163 ft.; felsic tuffs, agglomerate, and flows; at 940 to 1,129, pyrite 5 to 20% in dark tuff, some graphite, assay of 0.10% Cu over two 5' lengths (mafic flows outcropping on S shore not intersected).

C-7: Brg N; dit 30° to 23°; length 1,000'; felsic tuff, agglomerate and flows, diorite, quartz-carbonate vein 2 1/2 @ 490 feet; at 63 to 105 feet agglomerate with 12% pyrite, assaying 0.10% Cu and 0.35% Ag. for 5.0 feet length assayed.

C-9: Brg N; dip 45 to 30°; length 511 feet; felsic flows, agglomerate, tuff; in part pyrite common, very minor chalcopyrite.

C-11: Brg N; dip 45 to 32°; length 442 feet; felsic tuff and flows, dark talcose tuff; in part to 2% pyrite.

C-14: Brg N 45°E; dip 55° to 28°; length 735 feet; quartz - feldspar porphyry (141'), felsic flows, and tuff; diorite shears at 382.5 to 384.0 and 465.0 to 656.0 feet, the latter with several diorite dikes and pyrite rich zones.

C-16: Brg. E; dip 50° to 43°; length 252 feet; felsic flows, agglomerate; quartz - feldspar porphyry (123').

C-17: Brg N; dip 45° to 32°; length 357 feet; felsic flows, tuffs; diorite; shear zone at 38 to 77 feet and 126 to 151 feet, rather minor pyrite.

C-19: Brg S 43°E; dip 45°; length 575 feet; felsic flows and tuff and agglomerate; pyrite minor to 8% over 20 feet, few grains of chalcopyrite.

C-20: Brg S 40°W; dip 45° to 35°; length 455 feet; felsic tuff and flows, pods and bands of pyrite, few specks of chalcopyrite.

- DDH. Logs; A. Sozio; 1960; holes 1 and 2; dip 90°; length 150 feet; pyrite and very minor chalcopyrite. R VI, L 3, in town.

- DDH Logs; M. Kremko; Sozio Property; Water wells; 1966; three holes northeast of railway overpass, R VI, L2.

Hole 1-66; dip 90°; length 147.7 feet; overburden 22 feet; intermediate lava., pyrite and pyrrhotite, minor quartz veins, moderate shearing.

Hole 2-66; dip 45°; Brg. ? 75°; intermediate to acid volcanics, sheared, pyrite and pyrrhotite.

Hole 3-66; dip 45°; Brg. 250°; intermediate to acid volcanics, sheared; pyrite and pyrrhotite

Mabell Mines Ltd. R VI, L 7-15, north 1/2.

A one page report dated 1929 describes trenching. Some disseminated chalcopyrite was found at a rhyolite - diorite contact. This appears to be the mineralization presently described under Blake River Group at the north end of lots 13 and 14. No map is available.

- QBM, 1929, Pt A, p 126.

Arawak Mines Ltd. R VI, L 8-11.

Four holes were drilled in 1968 on these lots and their location is shown on the present map.

Kontiki Lead and Zinc Mines Ltd. R VI, L 26-37.

- MRN Report; J. Dugas; 1956; electromagnetic survey and four drill holes totalling 1,740 feet. No values of economic importance. Hole # 4 appears from the log to be in R VII, lot 28, just south of the river

- DDH. Logs; Holes 156-1 to 156-4; 1956.

156-1; Brg. S; dip 50°; length 427.5 feet; overburden 53.0 feet; several intersections of sedimentary rocks and dacitic to mafic volcanic

flows and fragmentals; sheared diorite; pyrite minor to moderate; minor pyrrhotite, chalcopyrite, graphite; some faulting. Assay of 0.10% Zn @ 215. to 217.7 feet, in quartz porphyry.

156-3; Brg. S; dip 50°; length 358.0 feet; overburden 128 feet; sedimentary rocks with quartz porphyry and quartz diorite; minor pyrite and very minor chalcopyrite.

156-4; Brg. S; dip 50°; length 352.0 feet; overburden 125 feet; sedimentary rocks, minor pyrite, very minor chalcopyrite and sphalerite. (location ?, from coordinates)

Zulapa Mining Corporation Ltd. R VI, L 14-19; R VII, L 8-19; R VIII, L 3-16; R IX, L 4-11.

- Report; P.E. Dumont; 1961; Zulapa Mining Corporation Ltd; no record of any work done.

Maralgo Mines Ltd. R VII, L 22-29; R VIII L 34-41.

- Report; EM survey; F.T. Clifton; 1956; ten zones of poor to moderate conductivity, apparently all caused by near surface flat-lying conductors.

- Drill logs; Hole 1, 4 and 5; E.L. McVeigh and D. Duff; 1956.

#1; R VII, L 22; Brg S; dip 50°; length 450 feet; 125 feet casing; graywacke, slightly graphitic for 3 feet, minor slate., minor pyrite and very minor chalcopyrite.

#4; R VIII, L 34; Brg. N; dip 50°; length 650 feet; casing 98 feet; slate and graywacke, feldspar porphyry dyke, some carbonated sections, some graphite, some pyrite.

#5; R VIII, L 38; Brg. S; dip 45°; length 652 feet; casing 74 feet; slate and graywacke, several zones to 10 feet of brecciated graywacke cemented with quartz - calcite, 7 feet of gray quartz with minor pyrite, feldspar

porphyry dike, pink dike with mica.

Canadian Explorers Ltd. R IX, L 3-6, south 1/2; R VIII, L 1-9; R VII,
L 1-9, north half.

- MRN; Report; W.G. Robinson; 1951; ground magnetometer work checking an airborne survey anomaly indicated an anomaly, with maximum reading to 5,000 gammas, in lots 6, 7, and 8 of ranges VII and VIII. 10 holes were drilled to test magnetic highs. A fine to medium grained basic intrusive with biotite was outlined in lots 6,7, and 8, S half, range VIII, and northern 700 feet of lots 6 and 7 range VII. The north contact was not drilled. Two holes in the basic intrusive cut chalcopyrite; two feet of 0.23 % copper, and two feet of 0.10% copper, holes #5 and #6 respectively.

- Summary Report; Clericy Syndicate; K.G. Honeyman; 1951; regional strike said to be altered to E-W and northeast according to magnetometer survey; some fault displacement also indicated; summary description of rock types intersected and their location, including mineralization of minor chalcopyrite and gold. An 8 inch section of massive pyrrhotite, minor chalcopyrite, hole #6.

- DDH. Logs; Holes 1 to 10; K.G. Honeyman; 1951; map, 200 feet:1 inch; horizontal projection of holes plotted with magnetometer anomaly. (Plotted on present map with rock types indicated).

The % of biotite is not stated in these descriptions, a large percentage of biotite and pyroxene is said to be present in the biotite rock. A bluish feldspar and bluish quartz are also mentioned in some sections.

Strategic Metals (H. Silver Property) R VIII, L 5-7.

- MRN; Report; J.E. Gilbert; 1955; summarizes history of prospecting since release of Aeromagnetic map 21G in 1950. Strategic Metals drilled in early

1954 holes SM-1 to SM-4 to test the magnetic anomaly.

- Report; H. Silver Properties; K.G. Honeyman; January 1954; mentions dip needle and magnetometer surveys in north half of lot 7; strong anomaly 100 by 500 feet on the east boundary of the ultramafic complex said to be to 15,000 gammas, 3,600 feet north of the range line. It was here that hole SM-4 was later drilled. Maps of magnetometer work filed with Silver Option, Dufresnoy Twp.

- DDH. Logs: Holes SM-1 to SM-4; A.C. Lee; 1954; and logs of holes SM-1 and SM-2 by ? J.E. Gilbert; 1954.

SM-1: Brg. E; dip 45° ; length 645 feet; overburden 109 feet all on ultramafic, medium grain, numerous syenite dikes.

SM-2: Brg. E; dip 45° ; length 359 feet; overburden 42 feet; ultramafic, fine to medium grain, frequent bands and clusters of magnetite.

SM-3: Brg E; dip 45° to 42° ; length 437 feet; overburden 68 feet; ultramafic, fine grained; minor chalcopyrite.

SM-4: Brg. W; dip 70° to 63° ; length 626 feet; overburden 47 feet; ultramafic fine grained, high magnetite over three 20 foot lengths @ 105 to 215 feet. (100 - 200 feet vertically).

Gaitwin Exploration Ltd. R VIII and IX, L 1-3.

- Report; J. Dugas; 1956; two holes drilled in 1955, before Gaitwin acquired property. Complete EM and partial mag. were done.

- Report; D.J. Salt; 1956; EM survey. recommends further detailed geophysics and more drilling.

- DDH. Logs; holes 3 to 10; H.G. Sherwood; 1955; Index plan, 400 feet:1 inch., to conductors, drill holes, and co-ordinate system. Sections, 50 feet:1 inch, for all 8 holes.

Holes 2, 3, 4, 5, 6 and 7 are in Clericy Twp. Number 2 is in the north part of lot 1, range VIII. Remainder in S part of L 2, R IX.

DDH. #2; Brg N 12°30'E; dip 35°; length 336 feet.; the section shows a 10 feet intersection of massive sulphides at 265 to 275 feet in 'graphitic tuff' going at 285 feet to 'breccia'.

DDH. #3; Brg 38' e; Dip 60-53°; length 600' casing 14'; frequent alterations of amphibolitized diorite, syenite porphyry, andesite, and porphyritic diorite. Some granitic rock.

DDH. #4; dip 90-83°; length 787 feet; casing 45'; ? quartz-diorite; feldspar porphyry diorite; andesite; numerous narrow syenite porphyry dikes.

DDH. #5; dip 90°-86°; length 255 feet; casing 32 feet; amphibolitized diorite; feldspar porphyry diorite; syenite porphyry dikes; minor granitic dikes.

DDH. #6; dip 45°; Brg E; length 452 feet; casing 47 feet; dacite; chloritized gabbro; numerous syenite porphyry dikes; dikes; feldspar porphyry diorite; andesite.

DDH. #7; dip 45°; Brg N 22'W; length 480 feet; casing 37 feet; feldspar porphyry diorite; andesite.

15 assays were made for copper, the best result being 0.09% Cu.

Silver Option. R VIII, L 1-8; R IX, L 1-5, south 1/2.

- Geology Map; showing geology, magnetic contours; drill holes; traced in 1955; Clericy Syndicate Strategic Metals and Gaitwin hole locations in Ranges VIII and IX.

- DDH. Logs; hole S-1 to S-3; Noranda Exploration Ltd; 1967; E.A. Gallo; with geological map, 200 feet:1 inch feet

S-1; Brg N 40°E; dip 45°; length 115 feet; no overburden, dacite breccia (tuff) with coarser fragments; dacite; section, 8', of pyrite and pyrrhotite to 5% in the tuff, assayed 0.04% Cu, trace of gold.

S-2; Brg. N40E; dip 45°; length 115 feet; as for S-1, less sulphides.

Lexindin Gold Mines Ltd. R VIII, IX; L 4-11.

- Geological Report; Lexindin Gold Mines Ltd; H.G. Sherwood; 1956; a geological map drawn at 400 feet to the inch gives an interpretation of surface outcrops and the Canadian Explorers drill holes that lie within the property, and four holes SM-1 to SM-4 of Strategic Metals 1954. The rocks are described in the report in a similar manner to K.G. Honeyman's summary report but the feldspar in the ultramafic rock is called nephe-line.

- Electromagnetic Survey; Lexindin Gold Mines Ltd.; R.D. Hutchison; 1956.

The survey was done later than the above geological study. Apparently no ground magnetometer survey was done in range IX. A conductor in the north half of lots 7 to 11, range VIII, appears to lie, between the drill holes SM-1 to SM-4 lots 5 to 7, range VIII and small outcrops of mafic flows and breccia in lots 12 to 15 of range VIII. Two other anomalies are of interest. Three holes are recommended for these anomalies, R VII, lot 9, 2,400 feet north of the road, and lot 4, 600 feet N of the road, both Brg N E; and R IX, lot 4, 1,600 feet north of the range line Brg S. No logs are available for these holes, if drilled.

Rio Canadian Exploration Ltd. R VI, L 1-6, north 1/2 and L 19-25; R VII, L 1-21; R IX, L 38-43, north 1/2; R X, L 38-43, south 1/2.

- Geological Map; Blocks K, Q, C, and R; C.W. Pegg; Aug. 1956; 400 feet:1 inch;

Covers range V, lots 3 to 18; range VI, lots 3 to 25; range VII, lots 3 to 21.

Shows holes CS 6, 7, 8 and 9; K 1, 2 and 3;

G-3, 7, 9, 11, 14, 16; Ci, 2, 3, 4; PSC 1, 2 within the present area.

Block K - range VII, lots 3 to 15
" VI, lots 3 to 9, 1/2N; and 10 to 15
" R - range VII, lots 16 to 21
" Q - range VI, lots 8 to 9, 1/2S
" C - range VI, lots 16 to 25

in this area.

- Report; EM and Gravity; Rio Canadian Expl. Ltd.; J.B. Boniwell; feb. 1956; done over K, Q, and C blocks in whole or part; three major conducting zone and one minor zone; check work in progress. To do magnetic work on several positive gravity anomalies. Three plates accompany the report.

- Report; EM, Mag, Gravity, DDH. K-1; Rio Canadian Expl. Ltd.; C.W. Pegg; previous to above report, hole drilled Nov. 1955; surveys were to test airborne EM; found strong conductor, very minor magnetic values, gravity values suggesting a bedrock dome beneath the clay. Drill hole cut several bands of graphite.

Three plates with the report (attached).

- Report; EM; Mag, Gravity; Rio Canadian Exploration Ltd., H.A. Winkler; Sept. 1956. R VII, L 16-21

Poor conductors.

Three plates.

- Report; EM, Gravity, Mag; Rio Canadian Exploration Ltd.; H.A. Winkler; Oct. 1956 Gravity high over ultramafic body drilled by Clericy Synd. Ultramafic probably at depth, for 1,000 feet south of Clericy Syndicate limits; from gravity results.

- DDH. Logs; Rio Canadian Exploration; Holes K-1, K-2, K-3; C-1, C-2, C-3, C-4, PSC-1, PSC-2; 1955-56.

K-1; Brg S16°S; dip 50°; length 303.5 feet; overburden 56 feet; andesite and dacite breccia, tuff, graphite at 194.8 to 200.2 (1-2% sulphides), at 205.4 to 216.3, (minor pyrite and pyrrhotite), and at 228.0 - 229.8; 243.5 - 247.0. Very minor chalcopyrite.

K-2; Brg S 27W; dip 50° to 39°; length 547 feet; overburden 150 feet, dacite, epidotized andesite, ? diabase (35').

K-3; Brg S; dip 50°; length 470 feet; overburden 124.0 feet, dacite tuff, to 5% pyrite over several widths of 10 feet.

C-1; Brg N 27'E; dip 45°; length 181', all in overburden.

C-2; Brg S 27W; dip 52°; length 343; overburden 0', dacite, lamprophyre, rhyolite, breccia (? fault, 11'), mafic tuff, some graphite.

C-3; Brg N 27E; dip 52°; length 325 feet; overburden 64 feet; mafic tuff, andesite, dacite tuff, diabase (47 feet).

C-4; Brg S 27"; dip 50°; length 351 feet; overburden 69 feet; dacite, dark tuff, quartz vein, 1'.

PSC #1; 553°W; dip - 46°; length 54'; rhyolite, 5% pyrite, Au - tr, Ag - 0.08 oz.; R VI, L 20 centrally.

PSC #2: N 35°E, dip 9°; length 58'; dacite, minor pyrite; chlorite patches; R VI, L 20 centrally.

- Report; J.B. Boniwell; Geophysics and geology; 1956; EM, Mag, gravity, R IX, 1/2 N; R X 1/2 S, L 38-43. (Block J)

2 plans, 400':1".

- Geological Map; E. Gaucher; 1956; 400':1". DDH J2 and J1 plotted.

- DDH. Logs; J-1 and J-2; H.S. Lazenby and C.W. Pegg; 1956.

J-1: strike 10°; dip - 50°; length 380'; overburden 232.5'; serpentine ?, to end.

J-2: strike N; dip 50°; length 321'; overburden 37 feet; andesitic rocks with minor granitic intrusions, quartz porphyry (2').

Drill sections.

Dobieco Mines Ltd. R IX, L 15-29; R X, L 8-34.

- Report; Airborne EM and Mag; for Dobieco Mines Ltd.; A.R. Rattew; March 1966; two plates.

ALBA EXPLORATION LTD. R IX, L 23-30; R X, L 22-23; L 24, north 1/2.

- MRN; report; J. Dugas; 1957; 1 page.

Mag and EM followed by three drill holes. No mineralization of economic importance.

- Report; Geo-Magnetic Survey; Alba Exploration Ltd.; S.L. Spafford; May 1956; 1 plate, 300':1".

Shows sedimentary rock - volcanic contact. This does not agree with the outcrop evidence. The linear magnetic highs are more likely caused by thin ultramafic sills or possibly diabase.

- Report; EM. Survey; Alba Explorations Ltd.; R.D. Hutchison; Sept. 1956.

Four minor conductors.

Says that mag. work locates principally the fault (Porcupine - Destor), NE part of R - IX group. Some evidence that the sediment - volcanic boundary is 1/2 mile SW of position in Geo-Mag. report. Also anomalous magnetic values near the SE corner of the group, near ? intrusive.

- DDH. Logs; Alba Explorations Ltd.; 1956; Holes 1, 2, and 3. E.E. Campbell.

Hole AB 1; Brg S; dip 50°; length 507 feet; casing 56 feet; 'graywacke' entirely of chlorite, 160 feet; pale green, more siliceous, 168 feet; more massive graywacke, 45 feet; porphyry 47 feet; graywacke, fine banding to massive, 33 feet.

Hole #AB 2: Brg N; dip 50°; length 188 feet; all in overburden.

Hole #AB 3: Brg N45°E; dip 50°; length 491 feet; casing 83 feet; chlorite schist, dark green to black, lesser gray-green; mica lamprophyre, 2 feet; feldspar porphyry 429 - 431 and 433 - 470.

RICHBURN MINES (prior name of Victoria Copper) R IX, L 31-36; R X, L 32-36.

- Report; R.H. Taschereau; 1929; Star Gold Mines Ltd. (Richmond Gp) In 1928 3 ddh, 278'. In 1929, 2 ddh, 537', third started. Assay of Au 0.072 oz and Ag 0.72 oz.

Two sketch plans of trenching.

- QBM; Mining Operations; 1925; p 137 Richburn Mining Co. Ltd. took over these claims (Richmond - Burnett gp) in 1926.

- QBM; Mining Operations; 1929; p 128 ? 5,000' of drilling in 1929. Geology described.

- GSC; Summary Rept. 1924, pt c, p 123.

- GSC; Mem. 233, 1941, p 55.

No work since 1929. Optioned to Star Gold Mines Ltd. in 1929. 3 ages of quartz.

VICTORIA COPPER ZINC MINES LTD. (GOLD PROPERTY). R IX, L 31-36; R X, L 32-36.

- MRN; report; J.E. Gilbert; 1952:

Formerly Leitch Claims and then Leric Mines, Ltd. was owner. Total of 13 holes, only very low Au.

South half schistose, carbonated, bleached pillow andesite. North half green, carbonate-rich, altered andesite and abundant granite. N-S diabase. Scattered pyrite, minor chalcopryrite and abundant milky quartz stringers. Minor tourmaline.

- Report; Victoria Copper Zinc Mines Ltd; D.M. Giachino; April 1952.

History from 1926.

Zone 20' x 100', centre lot 32, range IX north side of a hill, E-W shear. Values for 4 holes, 21 assays, range from 63¢ to \$8.40, 12 values being under \$2.00, \$3.00 greater than \$4.00.

Hole #16, 0.26 oz Au/5'.

- Report; D.W. Cameron; 1 page; no date, ? after 1941 (Clericy Sheet referred to); Richmond Property:

Possibly the carbonated zone in lots 31 and 32, on hill, Range X but probably R IX L 32-33. Said to be two zones, carbonated, 200 feet wide and 150 feet apart, with 8' wide shear on north side of north zone. Fourteen DDH's reported. Values to \$3.00 in gold, no locations.

(See Taschereau rept., 1929, above, Star Gold Richburn).

- DDH. Logs: Leric Mines Ltd.; Holes 1, 2, 3, with assays; D.M. Giachino; 1947. Near range line IX/X, L 32, 33 (The reason for drilling these holes is not given, all intersected important widths of talc - carbonate- quartz rock).

#1; Brg S 30°W; dip 42 to 29°; length 512 feet; casing 7.5 feet; andesite; feldspar porphyry; talc and chlorite rock, non schistose; basic dike.

Assays - nil Au.

#2; Brg N; dip 41°; length 522 feet; casing 9 feet; carbonatized andesite, numerous quartz stringers to 6 inches, felsite dike; andesite; chlorite carbonate schist; talcose - chlorite rock; basic dike; dacite; very minor chalcopryrite at 502.4 Assays - nil Au.

#3; Brg S; dip 40°; length 407 feet; casing 8 feet; carbonatized andesite; white quartz vein, 16 feet; green carbonate rock; talcose greenstone; felsite; basic dike; lamprophyre,; green carbonate rock with to 80% white quartz makes up about half the core.

Assays - nil for gold.

Location on geology plan, Leitch claims 400':1".

- DDH. Logs; Leric Mines Ltd.; Holes 4 to 7; D.M. Giachino; 1949.; Location of holes on geology plan, Leitch claims, 400':1"; R IX, L 32 centrally.

#4; Brg N; dip ?; length 200 feet; casing 2 feet; dull green carbonate, 10% white quartz stringers; andesite; andesite and quartz - carbonate; white to black quartz vein, 17 feet, with tourmaline, some pyrite and chalcopyrite; assays Au 0.238 oz over 2 feet; 0.40/5' and 0.056/2' in andesite and bleached andesite with quartz veinlets.

#5; Brg N; dip 40°; length 205 feet; casing 2.8 feet; green carbonate with 10% quartz stringers; white to black quartz, 7.4 feet, some chalcopyrite; andesite and bleached andesite; syenite porphyry dike, 2.4'; assays 0.050 oz Au/5'; 0.042/5' in carbonatized andesite.

#6; Brg N; dip ? ; length 199 feet; casing 5 feet; dull green carbonate with 10% quartz stringers; white quartz veins, 5.6', 10', 15', with some carbonate; andesite; chlorite - carbonate schist with hematite over 1 foot; talc - chlorite with quartz - carbonate veinlets; assays 0.24 oz Au/ 1.2'; with adjacent .019/2.4 and .018/3.1'; and 0.114/2' in quartz vein with cube pyrite.

#7; Brg S; dip 30°; length 200 feet; casing 5 feet; green carbonate with to 50% quartz stringers; bleached andesite with white quartz; assays 0.150 oz Au/5' with 7 adjacent assays 0.018 to 0.82 over total of 33 feet.

- DDH. Logs; Victoria Copper Zinc Mines Ltd; Holes C-16 to C-21; J.R. Larivière; 1952; location on plan, 50':1"., and on plan and sections with Leric Mine holes at 20':1". R IX, L 32 centrally.

C-16; Brg S; dip 54°; length 219.5 feet; casing 10 feet; carbonate rock; bleached andesite; quartz and tourmaline, 3', 10'; porphyry 20'; assays

0.26 oz Au 5' in bleached andesite. (Casing still in place).

C-17; Brg 165°; dip 54°; length 200 feet; casing 10 feet; diorite; carbonate rock; bleached andesite; assays - nil gold. (to 0.07 oz Au).

C-18; Brg S; dip 54°; length 144.5 feet; casing 15 feet; diorite carbonate rock; andesite, bleached; milky quartz 12.5, stopped in quartz; assays - nil to 0.05 oz Au.

C-19; Brg S; dip 54°; length 25 feet; casing 15 feet; andesite; carbonate rock; porphyry, stopped in porphyry; assay - nil Au.

C-20; Brg S; dip 54°; length 172.5 feet; casing 10 feet; diorite; andesite; bleached andesite; quartz stringers and tourmaline; quartz, 5.5 feet, hole stopped in quartz; assays - from 64.4 to 125 feet, \$0.35 to \$3.50 / 5' lengths.

C-21; Brg S; dip 54°; length 325 feet; casing 20 feet; andesite; carbonate rock, quartz veins with tourmaline; bleached andesite; assays - to \$2.20. Maximum vertical depth of these holes 250 feet (C-21).

- Plan; Gold Star; 100':1".; 1935 shows 7 drill hole locations, and surface geology. Is same showing drilled by Victoria Copper. Some of the holes appear on plan of Leitch Claims, above. We do not have logs. Two were drilled between C-19 and C-16, and in same direction, three were drilled to NE of quartz vein at the east end.

- Plan; North Clericy Group, 1":10 chains; no date.

Is geology of R IX N and R X lots 29 to 41.

- Plan; Leitch Claims; 400':1".; signed by WS Robinson, 1947.

Geology and some ddh locations, R IX and X, L 27 to 37.

NORANDA EXPLORATION LTD. L 49 R IX.

- Drill logs; W.A. Hogg; 1968; location on magnetometer map.

- DDH. #68-1; length 293 feet; dip 50°; brg 180°; casing 10 feet; andesite; strongly sheared, ? brecciated, rhyolite tuff, graphite and pyrite (7').

DDH. #68-2; length 369 feet; dip 50°; brg 180°; casing 26 feet; andesite tuff, graphite plus pyrite (8 feet), andesite, talcose andesite, felsite, syenite, feldspar porphyry.

MONT BRUN CLAIMS. R VI, L 48; north 1/2 L 54-61.

- Report; by S.H. Ross; geology; 1938.

- Q.B.M. PR #135, 1939, p 26, 27 Sketch plan, 500':1". S.H. Ross reports Au values 300 feet W and 175 feet N of lot post 51-52, Range VII.

- Geol. Surv. Can. Summ. Rpt. 1923, Pt C pp 101-102 (description of varicoles).

- G.S.C. Mem 233; 1941; p 47.

- QBM PR. 135, 1939, pp 26, 27.

ALDU MINES LTD. R IX, L 50-55.

- Diamond drill Logs; Holes #4 and #8; D.M. Giachino; May - July, 1947; no location map.

DDH. #4; length 434 feet; dip 42°; brg S; overburden 0'; alternating andesite and feldspar porphyry going at 301 feet to alternating graywacke (gray, soft, fine-grained, vague bedding) and feldspar porphyry. Lot 53, R IX; 11 assays all nil (? Au).

DDH. #8; L 55, R IX; length 316'; dip 46° (37 @ 316') brg N 23°E; overburden 0'; rhyolite tuff to 225', rhyolite pyroclastic breccia to 316'. No assays made. Tied in to hole #7 on Tobruc property which hole is not located clearly (about 3/10 mile west of N/S "Range line", on north boundary of lot 48, on outcrop of diabase), 454' N 10°W from this hole, on outcrop of rhyolite tuff 5' from NW contact of diabase dike.

TOBRUC CLERICY MINES LTD. R VIII, L 48; L 49 east 1/2.

- Diamond Drill Logs; Hole 5, 6, and 7; D.M. Giachino; 1947; no location map.

DDH. #5; L 48, R VIII; length 575'; dip 45°, 24° @ 575'; brg S 20°W; rhyolite pyroclastic breccia alternating with quartz - feldspar porphyry, minor andesite and lampropyre dyke. Nine assays (? Au), all nil.

DDH. #6; L 49, R VIII; length 702'; dip 42°, 25° at 702'; brg N 20°E.; to 249 alternating rhyolite pyroclastic breccia and quartz - feldspar porphyry; to 702 alternating andesite and quartz - feldspar porphyry. Four assays (? Au), all nil.

DDH. #7; L 48, R VIII; length 700'; dip 34°, 24° @ 700'; brg S 15°W overburden 0'; rhyolite tuff, some granite and basic dike; hole collared in diabase for 8'; 8 assays (? Au), all nil. Location not clear, said to be on diabase outcrop on lot line, but diabase outcrops about 300 feet to the north at this point. (See Aldu hole #8).

DEAN - McDERMOTT CLAIMS (PASQUALE ROTONDO) - LUSKO. R VIII, L 44-47, east half; L 49, 50, 51 W half.

- Preliminary Report 150; S.H. Ross; Q.D.N.R; page 17. Principal work done on east half of lot 44, range VIII, apparently on the west shore of the bay here, and 175 feet north of the lot line. Variolitic pillow lava is the main rock type. Carbonatized zone to 15 feet wide, scattered pyrite grains and minor chalcopyrite. Several trenches and four diamond drill holes in 1938. Gold values to \$3.92 per ton.

- Summary Rept., 1924, Part C; G.S.C. W.F. James and J.B. Mawdsley; p 123.

Mention of syenite on west (? east) bank of Kinojevis river near Dunne creek; in contact with Keewatin tuffs. At south contact pyrite bands to 6 inches wide, trenched, no assay results reported. Mention is made of a gold bearing gossan

on the west bank of the Kinojevis river one half mile above the mouth of Dunne creek. (May be McDairmid showing to south, see below). A sample by the present author of pyrite veinlets in trenches at the west end of lot line 49/50 range VIII gave 0.02 oz of Au per ton on assay.

- Mining Operations, 1925; QBM; p 137-139. Apparently the same area described by S.H. Ross, above.

- Report; Lusko Property; W.G. Robinson; 1950; with map. The same area described by Ross, above, lots 45 and 46, R VIII, between the river and the road parallel to the river. Gold present in a felsite dike with a zone of pyritic quartz veins, lot 45. In lot 46 basic tuffs with pyritic quartz veins are reported as gold bearing.

KINOJEVIS RIVER MINES LTD. R VIII, L 44-46, 49-51.

Probably the McDermott claims, R VIII both sides of river. In 1945 trenching was reported done by Kinojevis River Mines, northeast bank of the bay. (L 46).

McDAIRMID SHOWING.

- Memoir 233; G.S.C.; 1941; p 51; lot 44, range VII, (Probably R VIII), on the west bank of Kinojevis river. An adit into a zone of quartz-carbonate in greenstone schist. Gold, molybdenite, pyrite, and fuchsite are reported. The adit ends in massive to sheared andesite.

LAMAQUE MINING CO. LTD. R VI, L 39-41, south 1/2; L 42-44, west 1/2.

- Report; Geology and Magnetometer survey; W.H. Laughlin, 1954; R VI, 1/2S, L 39-41 and 1/2W, L 42-44. The magnetometer readings in the south part of lot 41 said to suggest that the diabase dike may be 500' wide here, but dike of variable magnetism.

R IX, L 39 Drill Hole: Casing present. No data available.

THE MAP: Abundant symbols with numerous suffixes and prefixes are used on the map to describe rock types, alteration, mineralization, textures, and structures. These symbols are placed as near as possible to the intended outcrop or outcrops, but the fact that the particular outcrop intended is not always clear is thought to be of less importance than the supplying of this information for anyone interested in an outcrop area. On the other hand only a few trenching locations are indicated on the map, the reason being that all areas of gossan, rust stain, or quartz veinlets have been trenched to some degree. The rock and group contacts and fold axes were drawn without reference to these features on adjacent map sheets. The author lacked the time to examine adequately in the field the problems involved, in particular those raised by the map sheets of the south half of Clericy township where polyphase folding appears to have acted in a manner more complex than suggested by the plunging principal folds, though somewhat uncertain, of the present sheet. Non-conformity must also be considered in a synthesis of these two areas, that is ranges V and VI over their western portions. The only direct field evidence for this was the relationships described for the SE corner of lot 32, range VI.

ANALYSES CHIMIQUES

ANALYSES MINÉRALES

N°	NAMES	LOT	OXYDES / OXIDES										OLIGO-ÉLÉMENTS / TRACE ELEMENTS										TYPES DE ROCHE ROCK TYPES		
			SiO ₂	Al ₂ O ₃	Fe	MgO	CaO	Na ₂ O	K ₂ O	TiO ₂	CO ₂	TOTAL	Cu	Zn	Pb	Ni	Cr	Mn	Sr	Mo	U	V		Ag	Pt
GROUPE DE MALARTIC													MALARTIC GROUP												
R13-68-1	IX	55.W	68.13	15.24	2.62	1.38	2.27	4.78	2.52	0.17	-	98.23	61	17	5	14	50	-	10	4	-	30	-	<0.02	Tuf dacitique / Dacitic tuff
R20-69-37	IX	29.S	66.32	14.25	2.87	1.83	2.43	5.85	0.71	0.30	-	95.79	42	37	10	29	30	-	15	-	-	30	-	-	Dacite / Dacite
R20-69-5	VII	54.R	66.85	15.15	1.71	0.82	2.88	4.55	1.70	0.13	-	94.32	20	47	19	29	20	-	-	-	-	27	0.9	-	Dacite / Dacite
R20-69-6	VII	54.W	63.00	15.70	2.22	1.00	3.63	6.10	2.02	0.32	2.95	97.89	13	35	20	17	20	-	-	-	-	50	0.8	-	Tonalite / Tonalite
R20-69-7	VII	55.W	62.76	12.70	6.51	7.04	9.39	2.28	1.46	0.25	12.50	97.68	65	60	121	97	115	2	5	-	-	175	0.9	-	Basalte / Basalt
R20-69-8	VII	55.W	50.20	14.35	6.96	7.07	6.96	11.65	1.55	0.07	0.40	95.20	66	64	19	130	105	-	5	-	-	210	0.7	-	Andésite / Andesite
R20-69-9	VII	50.R	63.60	16.85	2.44	1.82	2.70	4.95	1.30	0.15	-	94.85	15	93	18	26	33	-	1	-	-	20	-	-	Tuf dacitique / Dacitic tuff
R20-69-14	VII	51.R	65.00	14.77	1.84	1.42	3.47	4.33	1.74	0.09	-	93.45	26	54	14	33	30	-	-	-	-	20	0.6	-	Tonalite / Tonalite
R20-69-15	VII	51.R	57.60	16.10	1.54	8.36	2.25	6.08	2.44	0.06	1.67	96.76	9	61	21	21	40	-	5	-	-	10	0.6	-	Porphyre / Porphyry
R20-69-16	VII	51.R	56.50	12.45	4.91	6.80	5.45	4.55	2.80	0.44	-	95.00	84	65	26	95	120	-	5	-	3	115	1.2	-	"Filon couche" / "Sill"
R20-69-17	VII	49.R	39.40	6.10	7.29	20.40	7.01	0.20	0.07	0.13	-	83.72	94	47	39	1080	2300	-	5	-	-	98	1.3	-	Malc et chlorite/Talc-chlorite
R20-69-23	IX	32.S	32.60	5.65	7.14	18.50	5.25	0.07	0.88	0.23	-	73.38	64	53	16	1080	2700	-	5	-	-	79	2.2	-	
R20-69-24	IX	34.S	40.70	7.50	8.91	22.70	7.75	0.06	0.07	0.32	-	91.63	50	61	22	1250	3100	-	5	-	-	150	1.6	<0.03	
R20-69-25	IX	33.W	52.05	14.25	7.12	6.96	10.81	3.12	0.25	0.49	-	98.10	91	69	25	150	132	-	5	-	-	260	0.6	<0.02	Basalte / Basalt
GROUPE DE KEWAGAMA													KEWAGAMA GROUP												
R20-69-4	VII	42.W	64.14	16.40	3.27	2.63	2.66	5.50	0.68	0.61	-	97.29	18	64	20	54	62	-	-	-	-	57	0.8	<0.02	Gneissite / Gneissite
R13-68-38	VIII	1.W	50.82	17.28	7.84	4.70	11.10	3.10	0.54	0.74	-	99.48	138	37	10	151	500	-	15	-	-	270	0.4	-	Basalte / Basalt
R13-68-39	IX	1.S	55.60	17.39	6.97	2.78	7.87	2.68	1.46	0.97	-	98.71	91	34	5	26	50	-	15	-	-	140	0.7	-	Tuf andésitique/Andesite tuff
GROUPE DE BLAKE													BLAKE GROUP												
R13-68-3	VI	21.S	55.29	16.90	5.89	5.15	8.33	3.59	0.10	0.64	-	98.41	62	53	12	64	140	-	15	7	-	200	-	-	Andésite / Andesite
R13-68-5	X	50.W	57.45	15.50	6.02	5.17	8.05	0.68	0.65	0.67	-	96.77	80	68	15	250	860	-	10	1	-	250	0.5	-	Andésite / Andesite
R13-68-7	X	51.W	74.88	11.39	2.18	0.32	2.55	3.09	1.92	0.19	-	97.45	14	55	13	48	70	-	20	3	-	30	-	-	Rhyolite / Rhyolite
R13-68-11	X	56.S	30.85	1.49	4.70	25.85	1.85	0.03	0.73	0.06	-	67.57	21	93	13	1170	3900	-	15	4	-	40	1.2	-	Roche ultra-basique / Ultra-basaltic rock
R13-68-12	X	37.W	85.20	3.18	4.40	0.20	0.26	0.04	1.14	0.05	-	96.36	63	25	15	26	70	-	10	6	-	20	-	-	Chert noir / Black chert
R13-68-13	X	37.W	74.53	9.63	1.70	1.62	1.42	1.56	2.08	0.07	-	96.20	27	24	5	18	60	-	10	2	-	10	0.5	-	Rhyolite / Rhyolite
R13-68-14	X	41.S	36.44	4.65	6.09	13.23	9.55	0.98	1.00	0.22	-	74.88	43	26	5	625	1000	-	20	-	-	110	1.0	-	Roche ultra-basique / Ultra-basaltic rock
R13-68-17	VI	2.S	56.55	12.93	8.72	4.40	3.86	3.55	0.05	1.70	-	95.50	34	78	10	12	20	-	15	-	-	400	1.0	-	Andésite / Andesite
R13-68-18	VI	4.S	83.64	8.28	2.26	0.63	0.21	0.09	2.38	0.07	-	98.53	64	11	10	9	30	-	5	-	-	10	0.5	-	Rhyolite fragmentaire / Fragmental rhyolite
R13-68-19	VI	3.S	57.38	12.09	13.14	4.91	0.34	0.03	0.37	1.74	-	95.63	49	61	10	15	20	-	20	2	-	480	1.2	-	Méta-andésite/Meta-andesite
R13-68-20	VI	8.S	71.49	11.80	4.39	0.95	1.60	3.98	1.20	0.33	-	97.62	32	36	20	12	20	-	10	2	-	10	-	-	Tuf rhyolitique/Rhyolite tuff
R13-68-21	VI	5.S	59.87	11.01	10.40	6.80	2.25	1.38	0.40	1.61	-	93.16	13	55	10	13	20	-	15	-	-	410	1.2	-	Coulée basique / Basalt flow
R13-68-22	VI	4.S	51.16	14.89	12.81	6.95	0.35	0.05	0.76	1.77	-	94.23	7	32	10	18	30	-	20	-	-	420	1.2	-	Coulée basique / Basalt flow
R13-68-23	VI	6.S	80.17	9.64	2.61	1.28	0.15	2.12	1.44	0.08	-	98.61	42	15	15	10	70	-	10	-	-	10	0.3	-	Tuf rhyolitique/Rhyolite tuff
R13-68-24	VI	2.S	72.92	11.14	5.38	2.71	0.10	0.13	1.96	0.35	-	96.99	165	22	10	9	10	-	10	-	-	20	0.5	-	Tuf rhyolitique/Rhyolite tuff
R13-68-25	VI	4.S	72.25	11.77	5.31	2.97	0.17	0.51	1.84	0.30	-	97.39	17	45	10	10	10	-	10	2	-	20	1.0	-	Tuf rhyolitique/Rhyolite tuff
R13-68-26	VI	3.W	54.13	17.82	5.71	4.46	6.03	4.00	0.80	0.82	-	96.22	30	38	10	76	20	-	10	-	-	180	0.7	-	Andésite / Andesite
R13-68-27	VI	10.S	52.01	16.01	8.08	5.84	7.78	4.28	0.41	0.85	-	98.72	63	37	15	51	50	-	20	-	-	160	0.5	-	Diorite / Diorite
R13-68-28	VI	13.S	77.32	10.68	2.15	0.13	0.82	3.88	2.93	0.18	-	98.99	61	20	10	16	30	-	10	1	-	10	-	-	Rhyolite / Rhyolite
R13-68-29	VI	13.S	75.57	10.74	2.55	0.29	2.40	2.32	2.09	0.18	-	97.23	27	37	5	12	50	-	10	0.5	-	10	0.3	-	Rhyolite fragmentaire / Fragmental rhyolite
R13-68-30	VI	4	74.58	10.97	4.11	0.45	1.47	3.88	0.59	0.18	-	97.99	90	25	10	13	20	-	10	0.5	-	10	0.4	-	Porphyre / Porphyry
R13-68-31	VI	12.S	56.82	15.70	4.59	4.28	7.44	4.58	0.32	0.82	-	99.37	101	32	10	87	70	-	20	2	-	160	0.5	-	Andésite / Andesite
R13-68-32	VI	1.W	76.83	10.49	4.45	1.76	0.28	0.11	2.02	0.12	-	97.97	20	22	5	10	10	-	10	2	-	10	0.5	-	Rhyolite / Rhyolite
R13-68-36	VI	13.W	61.21	14.86	5.75	1.21	4.19	6.25	0.38	0.70	-	97.01	580	104	15	17	20	-	10	-	-	30	0.3	-	Porphyre / Porphyry
R13-68-41	X	53.E	49.88	15.95	9.03	4.88	12.48	2.68	0.38	0.68	-	99.83	100	12	10	80	400	-	10	-	-	290	0.5	-	Basalte / Basalt
R20-69-1	VI	25.W	52.00	13.00	7.87	6.17	8.88	2.20	0.13	0.95	-	94.57	120	72	15	62	78	-	5	-	-	280	0.4	-	Basalte / Basalt
R20-69-2	VI	9.S	70.70	11.80	3.77	1.44	1.82	3.68	1.31	0.30	-	95.43	5	75	13	17	25	-	2	-	-	20	1.0	-	Rhyodacite fragmentaire/Fragmental rhyodacite
R20-69-3	VI	21.S	55.60	15.40	5.52	4.76	9.29	1.80	0.08	0.51	-	97.32	71	44	16	59	81	-	-	-	-	125	0.6	-	Andésite fragmentaire/Fragmental andesite
R20-69-18	X	37.W	81.55	3.00	1.78	0.45	0.74	4.02	8.43	0.37	-	99.41	26	19	11	20	91	-	2	-	-	1.0	-	Rhyolite / Rhyolite	
R20-69-19	X	37.W	47.50	14.80	9.07	5.77	5.69	3.43	0.58	0.99	-	91.72	52	98	20	85	52	-	5	-	-	220	-	-	Basalte / Basalt
R20-69-20	I*	36.S	35.35	6.80	5.88	17.20	4.48	0.60	1.98	0.11	23.49	98.41	69	27	14	1000	2100	-	5	-	-	90	0.8	-	Roche ultra-basique / Ultra-basaltic rock
R20-69-21	X	38.W	46.95	4.43	6.02	19.90	7.59	0.03	1.04	0.03	6.09	94.66	34	84	21	2070	2000	-	54	-	-	0.03	0.8	-	Roche ultra-basique / Ultra-basaltic rock
R20-69-22	X	38.W	50.80	14.35	3.63	2.88																			