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# GEOLOGICAL REPORT ON PORTION OF PROPERTY OF TRIBAG MINING CO. LIMITED, BATCHAWANA AREA, SAULT STE.MARIE MINING DIVISION, ONTARIO.

## PROPERTY, LOCATION, ACCESS

The property consists of, according to information supplied to the writer, 135 unpatented mining claims in a rectangular block, totalling approximately 5,400 acres. The claims are in the east central portion of Township 28, Range X111, and the west central part of Township 27, Range X111, of the District of Algoma.

The claims are listed as:

SSM 35127 to 35133 inclusive,
SSM 35135 to 35143 inclusive
SSM 35168 and 35169,
SSM 61111 to 61141 inclusive,
SSM 62168,
SSM 62183 to 62212 inclusive,
SSM 63112 to 63125 inclusive,
SSM 63397 to 63399 inclusive,
SSM 63417 and 63418
SSM 63425 to 63428 inclusive
SSM 63642 to 63659 inclusive,
SSM 63716 to 63729 inclusive.

The claim group lies some 16 miles by road north and somewhat east of Batchawana Bay, which is, in turn, 40 miles north of Sault Ste. Marie on Trans Canada Highway #17. The road to the property is a lumber road, which leaves the Highway a quarter-mile north of Batchawana Bay and follows the valley up the Batchawana River, turning inland to cross the mapped area of the property in the west central part of Township 27, Range X111. At one time, this was the main wagon road to the depot of Batchawana on the Algoma Central Hudson Bay Railroad. In recent years, it has been improved in this southern section for truck haulage of timber.

The tent camp is located on a small unnamed lake some 8300 feet, in a west-south-west direction by base line, from the truck road. A tractor road, somewhat less than two miles in length, connects the road and camp.

## GEOLOGICAL MAPS

The geological mapping was carried out at the same time as magnetometer and self-potential surveying, and while diamond drilling was in progress. It is hoped that the geological picture, enhanced by the geophysical evidence, will delineate additional areas for testing by drilling, and shed light on the structural traps, or controls, with which the copper and molybdenum mineralizations are associated.

Although the writer has some knowledge of the geophysical anomalies and trends which are emerging as a result of the other surveys, and saw some of the drill core at various times, time has not allowed a comprehensive study of all evidence prior to this report. Thus, this should be considered a preliminary geological report based essentially on the outcrop evidence as disclosed by the surface mapping.

The accompanying coloured geological maps show the exposures of the various rocks in deep colours, with lighter shades to denote the probable type of rock underlying the overburdened areas, as deduced from the trends and small-scale structures found in studying the outcrops.

In an area of shallow overburden such as this, no geological map is ever final, as additional exposures of rock are found, or made, which clarify, or change, the picture locally. The writer believes, however, that at least 90% of the rock exposures within the area were observed and recorded, and the general geology as depicted on the maps will not be changed to any marked extent by future observations. On the other hand, there are many key areas where detailed study and, possibly, stripping, is warranted to clarify rock relationships and structures, which at the moment are not clear.

## MAPPING DETAILS

Some 230,700 feet, or 43.7 miles, of picket lines, and 51,000 feet, or 9.7 miles, of base and tie lines, have been traversed by the writer with all observed exposures and the general topography tied into the 100 ft. chainage pickets. Some 15,500 feet of additional picket and tie lines in the eastern section, and 9,500 feet in the western section, have been cut in preparation for additional mapping when, and if, needed.

The mapping results are shown at a scale of 1"-200', on sheets capable of illustrating an area 9,000' by 7,000'. The actual detail mapping covers a length of just under 3 miles with widths up to 1 mile, and two sets of three sheets: 0-0, 0-1W, and 0-1E are used. On one set, the rock outcrops, geological interpretation of faults and contacts, roads, lakes, swamps and streams are shown. This set is coloured to emphasize the geological units. The other set illustrates the very rugged topography in the form of "sprayed" pseudo-contours, based on the writer's eye observations while traversing. It must be stressed that these are not true elevation contours, but it is believed they show the shapes and relative steepness of the hills effectively. In this hilly country, these pseudo-contours have, approximately, a 15 to 20 foot elevation interval. This topographic set of three sheets is on overlay transparencies, to be used with the geological maps when needed.

Mapping was carried out between July 17 and September 3, 1962, entailing 42 8-hr. man-days of traversing, not counting days lost due to rain. Draughting, carried out in the evenings and on rainy days, and between September 4 - 16, 1962, amounted to the equivalent of 33 8-hr. man-days. Writing, typing, and colouring prints entailed 12 8-hr. man-days. There is, therefore, a total of 87 days involved in the work covered by this report.

## ROCK TYPES

E. S. Moore has described the rocks of the Batchawana belt in two reports:

"Mississagi Reserve and Goulais River Iron Ranges" - Ontario Department of Mines, Vol. XXXIV, Part IV, 1925.

"Batchawana Area" - Ontario Department of Mines, Vol. XXXV, Part II, 1926.

He gives the following age relationships:

Quaternary: Recent: Gravel and sand along lake shores and streams.

Pleistocene: Drift and stratified gravel, sand and clay deposited in post-glacial lakes.

Precambrian: Upper Keweenawan: conglomerate, sandstone, concretionary shale and marl.

Middle Keweenawan: conglomerate, sandstone, interbedded with amygdaloidal basalt and felsite. Dykes of olivine diabase and quartz porphyry cut these.

Lower Keweenawan: diabase - porphyritic and non-porphyritic, quartzose and quartzless, in dykes and bosses.

Algoman: Granite and granite gneiss.

Mamainsean: Diabase grading into gabbro and diorite. A few lava flows.

Batchawana Series: Banded iron formation, arkose, greywacke, banded slate, acid and basic lavas and schist equivalents.

In the mapped area, the writer found more of the Batchawana Series than Moore had recognized in his far less detailed mapping. This is chiefly because the hard, resistant, "gabbro" forms the core of most of the higher hills, and provides most of the larger rock exposures. The Batchawana Series found here is mainly volcanic. Though of widespread occurrence, these rocks are less competent and are exposed chiefly on the fringes of the gabbro hills and probably underlie most of the lower ground.

The writer's rock sequence differs from Moore's. One major difference is due to the lack of concrete evidence that there are two ages of "gabbro", or, the existence of what Moore considered a major, older "Mamainsean", gabbro. A second difference is the recognition of an important breccia, which the writer considers to be intrusive for the most part. Thirdly, although Moore recognized late quartz porphyry and syenite intrusives as younger than the Keweenawan diabase and gabbro, the writer feels that the late felsite and aplite dykes found in this area are far more important, economically, than their limited size and occurrence would suggest.

The rock sequence, from younger to older, is as follows:

Unconsolidated Sediments: clay, sand, gravel, boulders.

Intrusives: Trap, felsite, aplite, breccia.
Gabbro, diabase, diorite
Granite

Older Country Rock: Pillow lavas (mainly andesite), basalt, acid lavas - dacitic to rhyolitic, tuffs - acid to intermediate, including chlorite schists, possibly sediments - greywacke to arkose, including minor selicitic schist.

While the above rock sequence appears to apply to the mapped area on the Tribag property, from the evidence to date, it must be emphasized that it in no way denies the correctness of Moore's general age relationships for the entire belt.

Unconsolidated Sediments:

Although there is one known, and a few suspected, small gravel-bearing drumlins, overburden is generally shallow on the tops and flanks of the hills. It consists, mainly, of sand and boulders topped by a thin layer of black, organic material formed by the decomposition of the hardwood, leaves and ferns. This black material is dusty when dry, and treacherously slippery under foot when wet.

A few "erratics" - rock boulders which have been transported during glacial times from some outside area - may be found, but most of the boulders are "float", derived from the underlying bedrock, and have not been moved very far from their source. Actually, the "float" is an aid in mapping the rock types, as granite boulders predominate in granite areas, gabbro boulders in gabbro areas, etc. In a few local areas on the hills, a bluish silty clay, leached in places to almost white, may be found.

Sand, gravel and boulders form thicker deposits in the lower creek valleys and in the outwash plain of the Batchawana River.

## INTRUSIVES:

### Trap Dykes:

Late fine grained basic dykes were observed in a few places in the area. Near 1350 S on Line 0, is the best exposure seen by the writer. This 12"-15" dyke is associated with a sharp, strong magnetic linear which strikes slightly more north-west than the picket line, and comes to an abrupt halt a few hundred feet north of the base line on Line 2W. Other fine grained trap material is seen in some outcrops, but may be the fine grained edges of diabase and gabbro, with which these dykes cannot be differentiated by eye. Trap has also been noted in the drill core, and, although further study is desired, appears to be in the form of late, un-mineralized dykes.

These dykes cut the gabbro and are definitely younger. However, the age relationships of the trap and the felsite, aplite and breccia has not been definitely established. On the geological maps, the trap is shown as the same age as the acid dykes.

### Felsite-aplite:

Highly quartzose dykes, from a few inches in width up to 30 or 40 feet in width, cut the volcanics, gabbro and granite. One lone 1" feldspar dykelet, cutting gabbro, was the only indicator of the late syenite intrusives observed by Moore in other sections of the belt. The siliceous dykes vary from very fine, reddish to grey, felsite, generally porphyritic with bluish-green quartz "eyes", to typical sandstone-textured aplites. Generally, but not in all places, they carry disseminated pyrite. Disseminated chalcopyrite is not uncommon, and molybdenite has been observed.

There appears to be a close relationship between these acid dykes and the breccia.

### Breccia:

Three large breccia zones have been mapped in the area under study, and breccia has been noted in four other surface exposures, as well as an overburdened drilled area.

The oreccia is made up of angular to sub-rounded fragments of all the known rock types in the area, possibly excluding trap dykes, and, generally, a matrix of quartz-carbonate. In certain sections the fragments are predominantly basic; in other places they are essentially acid. The surface exposures of the Breton zone are not too fresh, and the writer has not had an opportunity to study the drill core to the extent he would wish. However, on the basis of surface observations on the other breccia zones, it would appear that they are caused by an intrusive breccia dyke, or series of dykes, which has entered the area and caused an extensive shattering of the wall-rock. Not enough depth drilling has been carried out to determine whether the intrusive breccia zones are part of, or connected with, breccia pipes.

The quartz-carbonate matrix poses a problem still to be solved. Is it contemporaneous with the breccia or has it come in later? Was the breccia a dry intrusive pushed up under extreme pressure or has an original lubricant been removed, to be replaced by the quartz-carbonate? Certainly, some quartz-carbonate is later than the breccia as it is found in some faults which offset the breccia.

A peculiar aspect of the matrix is the development of quartz crystals both within the solid rock and as terminated crystals up to 3 or 4 inches in geodes and cavities.

Some observations made by the writer suggest that the breccia may be closely related to the felsite and aplites described above. In the first place is the close association - the acid dykes are more prevalent in all three major zones, and the four other known occurrences of breccia are close to or in felsite-aplite. Secondly, where "breccia" are found without a quartz-carbonate matrix, they are made up of basic fragments in felsitic, aplitic or granitic material.

The difficulty in assessing the age of the breccia is the confusion between the actual intrusive breccia and the brecciated wall-rock. Intrusive breccia dykes intrude the volcanics, gabbro and granite. The writer has not seen breccia cutting the felsite-aplite, but these acid dykes may be found strongly brecciated. On the other hand, massive, unbrecciated volcanics, gabbro and acid dykes are found within the general breccia zones. And, among the talus at the bottom of the breccia cliff near the south end of Line 72E, is a large piece of fallen loose in which a sharply angular fragment of breccia, carrying several different kinds of rock fragments, is enclosed in a massive, medium grained gabbro.

It is probable that the origin and age relationships of the Batchawana breccia will be long debated.

1) Breton Zone:

This is the original discovery zone, and has received most of the drilling attention to date. It is exposed in four places in the creek just west of Line O, north of the Base Line. It has an indicated width of 300 feet, a strike of N 80 deg. E, and has been followed by drilling for some 800 feet to date. Its limits, both to the west and east, and to depth, are not known. It appears to widen at depth.

The zone lies in the granite up to several hundred feet from the volcanic contact. Gabbro dykes, cutting the granite, are also involved and form part of the shattered wall-rock which is included within the "breccia zone". Detailed re-logging of all the drill core is warranted in an attempt to differentiate between the intrusive breccia and the brecciated wall-rock. Such a distinction may throw some light on the structural control of the mineralization.

Structurally, this breccia zone appears to be associated with a drag fold in the volcanic-granite contact, and may have a plunge to the east. A NNE fault is suspected to enter the breccia near the surface exposures in the creek.

2) East Zone:

This has the largest surface expression of the three zones, extending for about 2000 feet in a N 70 deg. E. direction, from 5700 E to 7700 E, and showing a width up to 800 feet. However, many of the exposures within the zone are massive, or only weakly brecciated, so that the continuity, and extent, of the intrusive breccia within the zone is not too evident. The quartz-carbonate matrix-filling appears to be more erratic in distribution in this zone, although it may be quite extensive in some sections.

Near Line 72 E, about 2000' S, a cliff face shows considerable massive felsite-aplite adjoining a sizeable exposure of breccia, and amongst the talus can be found large boulders of this acid material enclosing 2' - 3' angular fragments of gabbro. More study in this area might provide some answers to the breccia problem.

Several copper shows have been found in this breccia zone from near 76 E through to 58 E. One rich showing, coinciding with a NNE self-potential anomaly, is being drilled at present.

3) <u>West Zone</u>:

This breccia lies between 1600' W and 3500' W, about 1800' south of the Base Line. It has a surface expression of 1900 feet and a width up to 600 feet in its central section. It is cut, and offset horizontally, by two or more faults, and, although it includes some weakly brecciated wall-rock, appears to be mainly intrusive breccia. The matrix, wherever observed, is quartz-carbonate. The strike, somewhat complicated by the faulting, is generally N 60 deg. E.

Very little prospecting attention has been given to this zone, but at one place on the 350 foot length of cliff exposure west of Line 28W, the writer took time to break into fresher material, and found good chalcopyrite mineralization.

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It should be pointed out in this description of the breccia, that very little rust, or evidence of sulphide, can be seen in the surface exposures. Some of the creek exposures, or float, eroding at a quicker pace by the water action, are rusty, and would attract the attention of the prospector, but the average surface exposure seems to be well leached. Drilling holes and blasting into fresh rock is necessary for effective surface prospecting.

In considering the economic importance of these breccia zones in the light of our present knowledge, there seems no reason to doubt that the East and West zones will become as important as the Breton zone. When we have learned more about the structural controls effecting the mineral concentrations in these breccias, we may be able to assess their relative importance. The known and suspected structural environments of the three zones will be considered under Structure.

<u>"Gabbro"</u>:

Under this heading is an intrusive complex consisting of rock composed essentially of hornblende -

hornblendite or amphibolite - grading into hornblende gabbro, diorite and quartz diorite, and in at least one area, granite. An ophitic, or diabasic, texture is common to most of these exposures; hence, much of the rock could be called Diabase.

This intrusive complex occurs as dykes of various widths and as irregular bodies cutting the Batchawana Series of volcanics, and the granite. In only two or three places did the writer observe gabbroic rock conforming in strike and dip to the volcanics, suggesting sill-like bodies. In these cases, the gabbroic material is sheared to some extent - unlike the majority of the gabbro - and may represent the older, or Mamainse, gabbro. However, these "gabbro sills", although more coarse in grain than the normal andesites, could be recrystallized basalts rather than their intrusive equivalents.

Thus, as far as the writer is concerned, the bulk of the gabbro, which represents a good 50% of the "greenstone" belt, came in after the greenstone was folded and intruded by the granite. It would be, then, equivalent to the Lower Keweenawan diabase as described by Moore.

In describing the gabbro complex, some of Moore's notes are well worth repeating. In the "Batchawana Area", page 60:

> "The Mamainse is a very monotonous formation to study in the field. For the most part, it forms great hills of normal diabase, grading in places into diorite, epidiorite and gabbro ......... It is impossible to separate this diabase from the Lower Keweenawan diabase where they are about equally metamorphosed."

and, on page 61:

> "Both formations" (Mamainse and Lower Keweenawan) "vary greatly in the extent to which they have been altered in different parts of the area."

Thus, Moore had difficulty in recognizing the two ages of gabbro. His evidence for two ages is cited on page 61:

> "The relations between the granite, the Mamainse diabase, and the Keweenawan formations may be well observed in Mica Bay. Here, in a small area, the granite is found cutting the

older diabase, cut by the latest dykes of the region, the olivine diabase, and overlain by the Upper and Middle Keweenawan sediments and lavas."

Although the writer has differentiated on the map between gabbro (3), diorite (3a) and "granite" (3b), much of the 3a, and certainly the 3b, is altered, silicified, gabbro. Generally, the "diorite" is found in, or near, mineralized zones and acid dykes. There are, however, some clean-cut diorite dykes which cut the gabbro and granite, suggesting they are a late derivative of the gabbro complex. The example of "granite" is found at the edge of the breccia on and near Line 20W. Here a north-west striking "diabase" is cut off sharply by the breccia. In the one good exposure on Line 20W, 1525S, the massive diabase is seen to have changed gradationally from gabbro to diorite to granite within an area of 20 feet. Undoubtedly, the breccia is later, and siliceous juices have altered the diabase.

In summary, this gabbroic intrusive complex is, as far as is known, older than the mineralization, and where suitably fractured, could contain ore bodies.

Algoman? granite:

In the mapped area, the granite varies from grey to pink, carries considerable quartz, and minor dark mineral. Generally, the dark mineral is biotite mica, but some white mica was noted in an outcrop just north of the Base Line near 40 W, and hornblende has been observed in places. Near the contact with the volcanics, there is a considerable amount of quartz porphyry, which appears to be a contact phase of the main mass, although some may be related to the late acid dykes. No definite apophyses, or dykes, of this older granite were recognized in the field, although one exposure of 5a, on the southern end of Line 36E, has the appearance of granite.

Some of Moore's remarks are apt here. In "Batchawana Area", page 61, he writes of the granite:

> "..... mainly biotite type, but it grades into types which have more hornblende or pyroxene ....."

On page 62:

> "The granite is considerably altered near its contact with the older formations, and in some cases there is little left but kaolin and sericite from the feldspars and chlorite or serpentine from the ferro-magnesian minerals ......... In some places the granite grades into granite porphyry near the contact, and in others into a speckled dioritic rock rich in secondary hornblende."

These remarks should be born in mind when studying the variable granite types and degrees of alteration found in the drill core from the Breton zone.

As mentioned earlier, the Breton breccia zone lies within the granite. Another zone, called S.P. Anomaly 4 was found to contain interesting amounts of copper in granite breccia near a NNE fault. Therefore, the granite is a potential host rock for ore where structural conditions are good.

Batchawana Series:

These rocks proved to be the most difficult to map. It is seldom that the outcrops have clean exposures; the massive nature and dark colouring make them so similar to the fine grained gabbro, that identification, even after considerable study, is tentative. Volcanic textures and structures are scarce and identification is based on grain size for the most part. Several exposures which are labelled 3F - fine grained gabbro - on the map may be basalt. Similarly, the weathered appearance of basalt, andesite, dacite and some of the rhyolite, is so similar that fresh specimens must be examined under hand lens to ensure identification. The writer is now of the opinion that most of the volcanics are on the acid side and that the symbol "1a" should have been used for more exposures. Even some of the pillow lavas, particularly smaller pillows, appear to be on the dacitic side.

The pillows vary in size from 6" to 18", and all of the observed horizons show limited widths of two to three pillow layers. Vesicles and amygdules are not common. Only about three top determinations were considered definite enough to include on the map, although all but one of a dozen determinations were in agreement as to direction of flow top.

The label, "lb - tuffs", is, admittedly, a catch-all for a variety of rocks which could not be classified satisfactorily in the field. Very few of these exposures show good bedding, but coarse, well-bedded tuffs were noted in some of the drill core. The "tuffs" generally show some banding or mineral alignment, and vary from fine chloritic schists over widths of a few feet, to medium grained acid rocks up to 35 feet in width. These acid "tuffs" may be sedimentary arkose in some exposures. In a few cases, because of limited exposure, acid tuffs may have been confused with aplitic dykes, and vice versa. However, it is felt that most of the exposures labelled on the map as "lb", are sedimentary, whether or not they are derived from volcanic material.

These "tuffs", and a few pillowed exposures, supplied the strike and dip information used for structural interpretation.

Moore had difficulty in classifying the volcanics as shown by his remarks, page 60, "Batchawana Area":

> "Pillow lavas were not recognized with certainty ..... The acid lavas and arkose have been altered to sericite schists in some sections .... The arkose and rhyolite are distinguished in some parts of the area with great difficulty ..... Even in thin sections, the differences are not always marked, owing to recrystallization."

The volcanics, then, have a wide variety of acid and basic types and grain size. Sulphide mineralization has been noted in all the varieties. Given the proper structural conditions they are good host rocks for ore.

## STRUCTURE

The relatively poorly exposed "greenstone" has been mapped over a limited width up to ½ mile for a distance of about three miles. It is bounded on the north by a large intrusive granite mass, and is cut up and dyked by considerable gabbro. Nevertheless, the greenstone has retained a fairly uniform E-W strike and medium steep southerly dip. Based on a few top determinations on pillows, the rocks would appear to have their tops to the north. If these observations are correct and represent the entire mapped area, the "greenstone", lies on the northern, overturned flank of an anticline. Considering the great amount of intrusion which took place after the folding, this uniformity of strike and dip is amazing.

Moore was also struck by this fact as his remarks on page 64, "Batchawana Area" indicate. Referring to the Lower Keweenawan diabase, he states:

> "These dykes are so numerous in some sections that they constitute a considerable proportion of the rock formation. Apparently a tremendous amount of the crust must have been in the liquid condition when these intrusions occurred, although they entered the older rocks so quietly that very little disturbance resulted and the contact metamorphic effect was very slight."

The granite-volcanic contact has a general N 60 deg. E strike, parallel to the Base Line, so that it is not conformable with the volcanics. The contact has been observed in very few places, but where seen, it shows flat dips to the south, steep dips to the north, and vertical dips. The structure which controlled this contact direction is not known, although a N 60 deg. E fault or shear direction is indicated in a few places in the mapped area. Apparently, there was little dyking of the "greenstone" by the granite, suggesting that the former was in a very competent, or tight, condition when the granite entered.

The gabbro complex presents a very different picture. Obviously, the granite and the "greenstone" were in a very brittle, easily fractured, condition when the gabbro arrived as the dyking occurs in a bewilderingly variety of directions. The bedding direction of the volcanics was one of the directions, giving the impression that much of the gabbro is in the form of sills. However, as mentioned earlier, most of the gabbro following the strike does not conform to the dip of the volcanics. Generally, the dykes are steep to vertical. Moore noted this fact on page 5 of the "Mississagi Reserve ....." report.

> "In the sediments the tabular intrusions" (diabase) "follow the strike of the strata, and

> they have the appearance of sills rather than dykes; but since the sediments were closely folded before the diabase was intruded and most of the intrusives have a nearly vertical dip, they might in some cases be regarded as dykes or sills on edge."

In some sections, the gabbro dykes make sweeping curves, or turn back in fold-like structures, suggesting tight, steeply plunging folds in the rocks. However, except very locally, the writer found no marked change in the general E-W, south dip, trend of the older volcanics. It is possible that the volcanics and gabbro are more conformable than the mapping suggests, in that many of the "tuffs" which supplied the strike-dip information may be old shears rather than bedding. However, the writer was aware of this problem while mapping, and was unable to find better evidence.

The breccia are the most interesting rock formations, and little can be added by the writer to the earlier descriptions. The Breton zone lies in the granite near an apparent drag in the volcanic contact. The East Zone appears to be buttressed by massive gabbro on the west, south and east. The West Zone appears to have intruded volcanics, with minor gabbro in evidence. Thus, the wall-rock, and perhaps structural, environment of each of the major zones is somewhat different, adding to the problem of the origin of the breccia.

The late acid dykes and the few trap dykes show a more limited variety of strike directions than do the gabbroic intrusives, but here, again, no one structural direction is dominant.

Two major, late, fault directions were discovered in the mapping. The earlier strikes about N 15 deg. E and has a steep (60-85 deg.) dip to the NW. Considerable horizontal offsetting is indicated on the fault which crosses the Base Line near 15E. The granite-volcanic contact appears to be offset in a left-hand direction for about 1000 feet, and magnetic evidence suggests that some diabase dykes have an apparent offset up to 1500 feet. Three or four parallel left-hand faults are suggested in the mapped area, and others are suspected. The result of this faulting is to shove the contact from about 1100 feet north of the Base Line around

28E to more than 1500 feet south of the Base Line a mile and a half, or so, to the west.

The second, and perhaps the latest, fault direction was carefully mapped on Line 4W about 2000S. This fault strikes about N 35 deg. W to N 50 deg. W and has an apparent right-hand horizontal offset of 350 - 400 feet. It appears to be in a series of two or more block faults, dipping steeply west. In the creek at 2150S or Line 4W, a few inches of quartz-carbonate has been intruded along the slip planes, but in the exposure at 15W, 500S, a knife-edge slip separates coarse granite fro... andesite at the fault. This fault offsets the granite-volcanic contact, displacing it in the opposite direction to the NE faulting. A similar fault, but with left-hand movement and striking more westerly, is indicated near Lines 36W and 32W. These NW faults appear to be later than the NE faults and offset them.

Earlier fault or shear directions are suspected. A good example of a N 60 deg. E fault is indicated at 1600S from Line 32E to 42E in a creek. A sharp chasm has been cut at 34E into this south-dipping, relatively narrow fault zone by the water and rusty mineralized rocks of all types appear to curve into the fault, particularly on the south side. The extensions of this fault are not clear, nor can the amount of offsetting, if any, be determined. There is no real evidence of the age of this fault, but it is inferred that it is an early shear direction in the volcanics, and it may be related to the structures which controlled the granite emplacement on the north.

An even earlier fault direction is indicated just east of Line 32E on the south edge of the above fault. A N 30 deg. W, steeply west-dipping slip separates some diorite and "greenstone". The slip terminates against the N 60 deg. E. slip planes. If we were to relate this N 30 deg. W slip to the latest NW fault directions described earlier, the N 60 deg. E. would be the youngest. However, this is the only known exposure in the mapped area, and the writer feels that if this were the youngest fault direction, its late effects would be more evident in other sections.

In summary, we see in this section of the Batchawana Belt, folded, overturned "greenstone" rocks in contact with a granite which has not stoped into or dyked the "greenstone" to any extent, and whose emplacement was apparently controlled by a strong N 60 deg. E structure, rather than the bedding planes of the "greenstone". Gabbroic intrusives entered the "greenstone" and granite under conditions of brittleness which allowed easy access in numerous directions. The N 60 deg. E direction of the granite contact and the general E-W bedding direction of the "greenstone" were both used by the gabbro, as well as many other directions of entry.

Following the gabbro intrusions, dyking took place by material of acid composition, of basic composition, and the peculiar breccia.

Finally, post-breccia faulting took place, first in a NE direction and then in a NW direction.

## MINERALIZATION

The copper mineralization has been found in all the known rock types with the possible exception of the trap dykes. It is found in most places associated with quartz-carbonate and, generally, felsite-aplite dykes and breccia are involved or are near by.

Several of the self potential anomalies, indicating sulphide concentrations, are found close to known faults. Sufficient study has not been made to draw specific conclusions, but the writer feels that the NE and NW faulting may have caused the last fracturing of rock prior to the entry of the mineralizing solutions, and that anomalies closely associated with the faults are of major importance.

Of all the potential host rock - "greenstone", "gabbro", granite and the late intrusives, the breccia appears to be the most favourable for rich concentrations. The best values in the Breton zone found in the drilling to date are along Line 0, and it is suspected that a NE fault enters the breccia in this area. On the East zone, the rich surface showing is apparently associated with a N15 deg. E anomaly - the direction of the NE faulting - and this anomaly is being drilled. In the West zone, the breccia is offset by NE and possibly NW faulting. Early information suggests that self potential anomalies have been found in and near the West zone around fault intersections.

Sulphide anomalies in other environments have been found and should certainly be tested by drilling, but from the evidence obtained to date, the most likely areas to find ore are in the breccia zones near known or indicated faults.

## RECOMMENDATIONS

With diamond drilling securing additional information daily, and the final results of the geophysical work still to be assessed, recommendations must be of a general nature.

To solve problems on geology and structure mentioned in this report, the writer recommends:

1) A careful re-logging of all the drill core.

2) Close study, possibly involving stripping and/or trenching of several key outcrop areas.

3) Some additional mapping of recently-cut lines in the south-west section around the West breccia zone.

In conclusion, the writer believes the property has exceptional merit and recommends a continuance of the exploration program.

"S. V. Burr"

S. V. Burr
September 15, 1962.

## CERTIFICATE

I, Stanley Vernon Burr of the City of London in the Province of Ontario, hereby certify as follows:

1. That I am a Consulting Geologist and that I reside in London.

2. That I am a graduate in Geology of Queen's University, holding the degree of Master of Arts, a Fellow of the Geological Association of Canada, a member of the Society of Economic Geologists, the Canadian Institute of Mining and Metallurgy, the Mineralogical Association of Canada, and of the Professional Engineers of Manitoba, and I have been practising my profession for over twenty years.

3. That I have no interest, either directly or indirectly, in the property covered by this report, nor in Tribag Mining Company, nor do I expect to receive such interest.

4. That this report is based on actual field work over the period described in the body of this report.

"S. V. Burr"

S V Burr

S. V. Burr, M.A.

Dated at London, Ontario, this 15th day of September, 1962.

OM4-4402
63A.416

# TRIBAG MINING COMPANY LIMITED

## GEOLOGICAL SURVEY, BATCHAWANA AREA, ONTARIO

Survey made by S. V. Burr, (WITH NO ASSISTANTS)
130 Elliott St.,
London, Ontario.

Work carried out between July 17th and September 3rd, 1962, entailing the equivalent of 87 - 8 hour man days.

Assessment credit thereof is 87 x 4 or 348 man-days.

Claims covered were as follows:

| | | |
|---|---|---|
| Claims | 35127-35129 inclusive | 3 |
| | 35131- 35133 inclusive | 3 |
| | 35135-35143 inclusive | 9 |
| | 35168 and 35169 | 2 |
| | 61115-61117 inclusive | 3 |
| | 61120-61122 inclusive | 3 |
| | 61124 | 2 |
| | 61126 | |
| | 61129-61141 inclusive | 13 |
| | 62168 | 3 |
| | 62191 | 2 |
| | 62194 | 5 |
| | | 48 |
| | 62199 and 62200 | |
| | 62205-62209 inclusive | |

Total claims covered by this survey -----48

Man-days per claim --- $\frac{348}{48}$ equals 7.25 man-days

ALSO COVERED: (35130)
(62183-84-86)
(62190-93-95-96)
(62210, 61114)
(63642)

S. V. Burr

TOTAL CLAIMS 11 + 48 = 59

225.5
87
Balance 138.5 man days
transferred to Geophysical survey
on file 63.1197

∴ TECH = 87
LINE = 87
174 x 4
= 696 ÷ 59
= 11.7 DAYS/CL.

Tech 87
Line 87 (deduct from 225 1/2)
174 x 4 = 696 ÷ 59 = 11.7 days per claim

TRIBAG MINING COMPANY LIMITED

ASSESSMENT WORK, LINE CUTTING, 1962

BATCHAWANA AREA

| Name | Address | Period worked | Days Worked |
|---|---|---|---|
| O. Kallela | Sault Ste. Marie, Ont | May 23-June 9 | 15 |
| C. McMillan | Batchawana, Ont | May 23-May 31 | 3 |
| G. Barker | Geraldton, Ont | May 20-May 31 | 9½ |
| A. Kakapshe | Batchawana, Ont | June 2-June 24 | 21 |
| H. Cadran | Batchawana, Ont | June 11-July 15 | 13 |
| T. Jordan | Batchawana, Ont | June 11-June 24 | 13 |
| B. Morin | Batchawana, Ont | June 12-July 30 | 33½ |
| L. Hodgson | Batchawana, Ont | June 22-July 30 | 22 |
| R. Gingras | Batchawana, Ont | June 25-July 15 | 10 |
| F. Gingras | Batchawana, Ont | July 10-Sept. 12 | 37½ |
| M. Waboose | Batchawana, Ont | July 10-July 15 | 5 |
| G. Agwa | Batchawana, Ont | Aug. 1-Sept 12 | 23½ |
| H. Tanninen | Sault Ste. Marie, Ont | July 1-July 5 | 3 |
| N. Robinson | Batchawana, Ont | Aug. 4-Aug 15 | 1½ |
| S. Barwick | Batchawana, Ont | Aug. 13-Aug 31 | 5½ |
| M. Chartrand | Batchawana, Ont | May 23-June 5 | 9½ |
| | | | 225½ |
| | | | x4 |
| | | | 902 |

Number of Claims covered 55

Man-days per claim $\frac{902}{55}$ equals 16.4

Claims covered:

3 35127-35129 inclusive
3 35131-35133 inclusive
9 35135-35143 inclusive
2 35168 and 35169
3 61115-61117 inclusive
3 61120-61122 inclusive
2 61124
61126
13 61129-61141 inclusive
2 62168
62185
4 62189-62191 inclusive
4 62194-62197 inclusive
2 62199-and 62200
6 62205-62210 inclusive
56

ALSO COVERS
35130
62183-84-86
62193
63642

TOTAL CLAIMS 6456=62

MAY LINE - 62x5= 310 MAN DAYS

[signature] P.Eng

41N01SW0052 0023A1 NICOLET

900

December 18, 1962

Mr. D. A. Jodouin,
Mining Recorder,
Sault Ste. Marie, Ontario.

Dear Sir:

We are forwarding today under separate cover transfers for the following mining claims, 135 in all:

SSM 35127 to 35133 inclusive
SSM 35135 to 35143 inclusive
SSM 35168 and 35169
SSM 61111 to 61141 inclusive
SSM 62168
SSM 62183 to 62212 inclusive
SSM 63112 to 63125 inclusive
SSM 63397 to 63399 inclusive
SSM 63417 and 63418
SSM 63425 to 63428 inclusive
SSM 63642 to 63659 inclusive
SSM 63716 to 63729 inclusive

Also enclosed are Work Reports, Forms 12 for Geological and Geophysical Surveys, including Line Cutting, and Forms 12A for Diamond Drilling and Trenching, together with Drill Logs in duplicate , Plans in duplicate showing location of drill holes, and sketch showing location of trenching.

Will you please acknowledge receipt of this material, and in the event of any error or omission, please advise us immediately so that we may take steps to protect our claims.

Yours very truly,

TRIBAG MINING COMPANY LIMITED

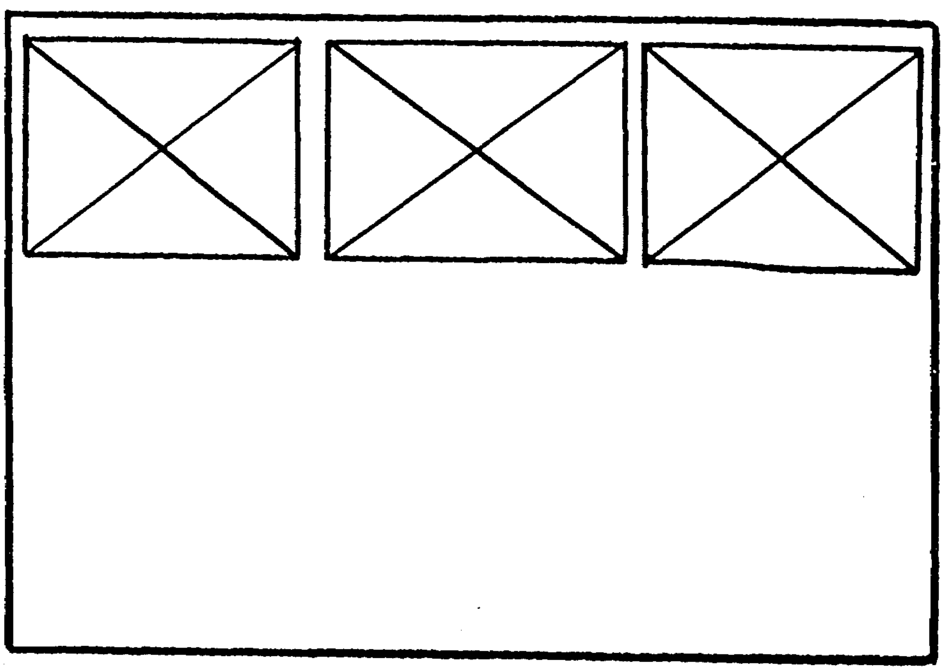
per P D Hattie

CC: Department of Mines
Toronto.

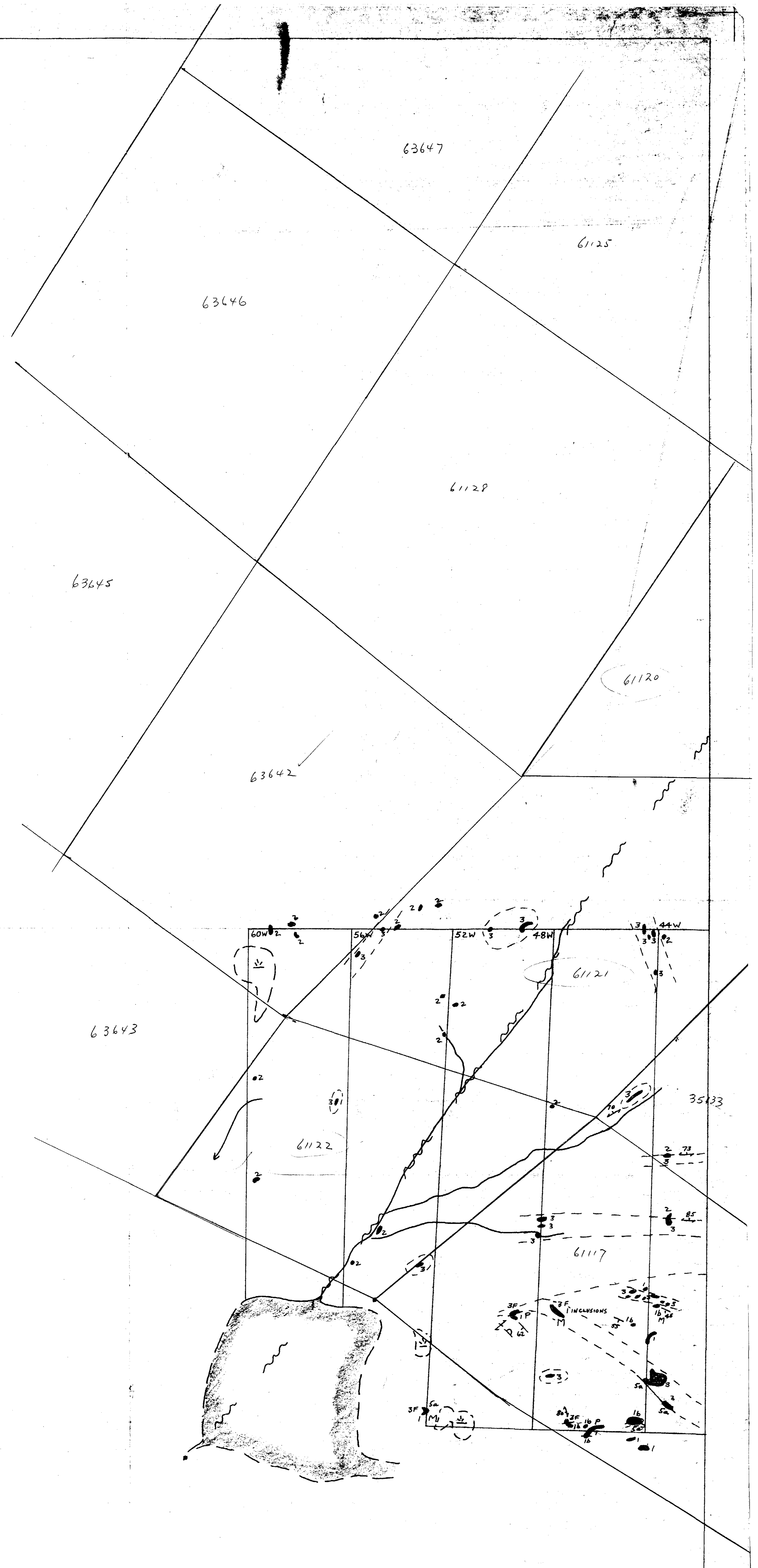
SEE ACCOMPANYING MAP(S) IDENTIFIED AS

NICOLET 0023-A1, #1,2,3

LOCATED IN THE MAP CHANNEL IN THE FOLLOWING SEQUENCE (X)



LEGEND
TRAP DYKE 5a - FELSITE, APLITE
BRECCIA
GABBRO 3a - DIORITE 3b - "GRANITE" 3F - FINE GRAIN
▪ - CLAIM POST
GRANITE
ANDESITE, BASALT. 1a - DACITE, RHYOLITE 1b - TUFF
P - PILLOW LAVA
- PILLOW TOP DETERMINED
M - SULPHIDES NOTED
- BRECCIA FLOAT
- DRILL HOLE
- SHEAR OR CONTACT STRIKE AND DIP
- BEDDING STRIKE AND DIP
- CURVING SLIP PLANES SHOWING PLUNGE
- FAULT
NOT TO BE REMOVED FROM THE OFFICE OF THE RESIDENT GEOLOGIST, ONT. DEPT. OF MINES SAULT STE. MARIE, ONT.
RECEIVED JAN 24 1963 RESIDENT GEOLOGIST SAULT STE. MARIE
TRIBAG MINING CO. LTD.
Sault Ste. Marie Min. Div. - Batchawana, Ont.
GEOLOGICAL MAP Surface SHEET 0-0
Scale 1"-200'
Date: Sept. 1962
S.V. Burr
Drawing - No. 1
Twp 28 R XIII
Twp 27 R XIII
1" = 4 miles
NICOLET 0023-A1 #1
ASSESSMENT WORK




LEGEND

SEE SHEET 0-0

TRIBAG MINING CO. LTD.

Sault Ste. Marie Min. Div. Batchawana, Ont.

GEOLOGICAL MAP
Surface
SHEET 0-1W.

Scale 1"=200' Date: Sept 1962

S.V. Burr. Drawing - No. 1

NICOLET 0023-A1 #2

210


LEGEND - SEE SHEET 0-0

| TRIBAG MINING CO. LTD. | |
|---|---|
| Sault Ste Marie Min. Div. | Batchawana, Ont. |
| GEOLOGICAL MAP Surface SHEET 0-1E | |
| Scale 1" = 200' | Date - SEPT. 1962 |
| S.V. Burr | Drawing - No. 1 |

NICOLET 0023-A1 #3

220