GM 32509

GEOLOGICAL REPORT, CHIBOUGAMAU QUEBEC PROPERTY

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Énergie et Ressources naturelles
Québec

ROUANDA MINING CO. LTD.

BRUNEAU MINING CORP.

CHIBOUGAMAU QUEBEC PROPERTY

GEOLOGICAL REPORT 1975 - 1976

Ministère des Richesses Naturelles, Québec
SERVICE DE LA
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LOCATION, ACCESS AND TOPOGRAPHY:

The Bruneau Property is five (5) miles northeast of Chibougamau on the Albanel highway which runs along the south and east boundaries of the property. In 1975, the Forestry Service built an all weather road running through the property north of Trout Lake. An all weather road services the lower adit but the upper adit is accessible only by four wheel drive vehicle. Numerous tractor roads, generally partially overgrown are present on the property.

Rolling hills of up to 500 feet local relief occur with some steep scarps that locally prevented grid cutting, detailed geological mapping and geophysical surveying. Central and south parts of the property were burned over in 1972 with the rest covered by mixed spruce, birch and pine. Outcrop is present over most of the property averaging about fifteen percent.

HISTORY AND WORK COMPLETED

"The history of the Bruneau property has been a long one, the original find being one of the earliest in Chibougamau. The first camps on the property were constructed by A. Fleury, a fur trader who came to Chibougamau from Lyon, France, in 1906. Fleury was active in trapping and prospecting between Chibougamau and Mistassini Lake from that time until his death some fity years later. Olaf Breive, an early Chibougamau prospector made the original find and staked four claims in 1926 not far from Fleury's Dore Lake camp. Fleury staked the adjacent ground and found the present main showing shortly afterwards. He consolidated the present eleven claim group when Breive, his partner, got discouraged and left the area in 1937.

Royran Goldfields Ltd. optioned the property and did preliminary prospecting in 1947. This was followed by a magnetometer survey and X-ray drilling by Kayrand Mining and Development Company in 1951. New Royran Copper Mines reoptioned the property and did a resistivity survey in 1956. Fleury retained the property throughout until his death in 1957. The property was returned to his estate following a litigation in 1958 and incorporated into Snowdon Mining and Explorations Limited.

Bruneau Mines through the efforts of its president

Wm. Lafontaine, the first mining recorder in Chibougamau, optioned the property from Snowdon Mining in 1960 and exercised the option in early 1961 following a geophysical survey that indicated a number of conductive zones.

The first four holes totalling 1128 feet, were directed at conductors in the west portion of the property. These proved to be sulphide with low copper values. Prospecting and detail by W. Lafontaine in the area of the Fleury showing prompted a check electromagnetic survey. Subsequent drilling, in the summer of 1961 in holes 5 to 20 inclusive, 8807 feet, yielded a series of results that encouraged formal financing and the listing of the Company on the Canadian Stock Exchange in 1962.

The underwriting of Bruneau Mines and the direction of it's exploration were undertaken by Rosario Exploration Ltd. in 1962. Preliminary work involved geologising, prospecting and surveying followed by 17,583 feet of diamond drilling in holes 21 to 54 inclusive for a total of 27,518 feet. A detailed magnetic survey was also completed in the north east corner of the property.

The ruggedness of the topography necessitated close survey control to tie in drill holes and outcrops and the use of contour data from aeroplane photograph". (Malouf, 1963)

The majority of the holes drilled by Rosario (holes 21-54) were in the vicinity of mineralization found by the 1961 drilling programme. This drilling programme indicated reserves of 127,194 tons grading 2.81% Copper and 0.019oz Gold in two zones: "A" & "B" (Malouf, 1963)

Following this programme Rosario drilled an additional 4 holes (No. 55-58 - 1,684 feet) on the Bruneau property east of the "A" and "B" zones and 5 holes (KM-6-10, 2,811 feet) in a joint programme with Chib-Kayrand Copper Mines, covering the boundary area and Kayrand claims immediately to the north of the Bruneau Property.

Rosario dropped the option in 1963 as the zones were considered too small to support a mining operation.

In late 1963 and 1964 Bruneau drove an adit at the 1523' level and explored the "A" & "B" zones with drifting and underground drilling. This programme gave encouraging results and lead to Rosario leasing the property and driving an adit at the 1284 elevation.

After a milling agreement was arranged with Merrill Island Mining Corporation production started in late 1965 and continued until June 1967 when the milling facilities at Merrill Island were required to proccess the Icon Sullivan ore. Total production was 68,805 tons of which 57,325 tons were milled by Merrill Island and the remainder stockpiled.

The grade of the mill heads was 1.51% Cu, .39 oz Ag and 0.017 oz Au.

Following the mining operations Bruneau, in 1967, drilled 9 holes beneath the 1284 level which penetrated to vertical depths up to 1580 feet below the 1284 level. This programme of 10,440 feet of drilling indicated a broad zone of low grade mineralization extending at least 1500 feet below the lower adit. This deep zone is within rhyolite fragmental, rhyolite and andesite volcanic rocks which have been altered by epidote, carbonate, and quartz stringers. Copper mineralization was intersected in all holes with the grade varying from 3.01% Cu over 15 feet to 0.47 over 300.4 feet. Good grade silver assays frequently were obtained with high copper values and several good gold assays were obtained over narrow widths. The better mineralized sections are givin in an Appendix A. Most of this drilling was done on east-west sections. As the mineralization at depth may not be related to steeply-dipping north-south fractures, as in the "B" zone, these core lengths may be greatly exagerated.

In 1968 the remaining ore stock-piled on the property was treated at the mill of Patino Mines Limited. The grade and tonnage milled are unknown.

During 1968 Muscocho Explorations explored a zone, east of the Bruneau boundary, by geophysics, stripping, and drilling 7 holes (1496 feet). Several short sections with minor amounts of chalcopyrite were intersected.

Bruneau Mines Limited was reorganized in 1970 into Bruneau Mining Corporation (1970) and the property was enlarged to the west, north and east with the addition of claims from Rosario Exploration Company, Muscocho Explorations Limited, Chib-Kayrand Copper Mines Limited, Con Quest Explorations Limited, Icon Syndicate, Merrill Island Mining Corporation Limited and Yorbeau Mines Inc.

During 1970 a 7 hole (#70-1 to 70-7) surface drilling programme tested 5 electromagnetic conductors in the northern section of the enlarged property. Four of the conductors were due to sulphides with the best assays occuring in:

1) 70-5 .37% Cu, .16 oz Ag, .006 oz Au/13.4'

2) 70-7 .37% Cu, .17 oz Ag, .01 oz Au/17.6'

In 1971 a programme of down-hole geophysics was carried out in an attempt to correlate mineralized intersections obtained in the underground deep drilling programme. These surveys are unavailable. J.T. Flanagan (personal communication, 1976) stated that the geophysics confirmed the mineralized intersections but did not help in clarifying the overall results.

In early 1974 McPhar Geophysics completed an Induced Polarization and Resistivity Survey on the southern section of the original Bruneau property following the recommendations of J.E. Gill (1968). Two anomalous IP zones were located by the survey: One coincident with a known, but untested, anomaly south of Pipe Lake, and a second anomaly west of the old mine workings.

PRESENT WORK:

During the 1975 summer field season work consisted of:

1) recutting the pre-existing grid within the surveyed Bruneau Property boundary.
2) linecutting on additional claims comprising the Bruneau Option.
3) E.M. survey using an Apex Parametrics Max-Min II instrument.
4) a magnetometer survey using a Geometrics 816 total field magnetometer.
5) mapping within the boundary of the Bruneau Property to verify and correlate rock types on pre-existing Bruneau Mining Limited Map at 1"=200'.
6) detailed mapping at 1"=200' of remainder of grid (Bruneau Option, Geological Survey, 1975, 3 sheets, 1"=200').

REGIONAL GEOLOGY:

The Bruneau claims are underlain dominantly by rocks of the Gilman and Blondeau Formations (Duquette, 1970). Regionally the Gilman Formation is a 12,000 footh thick sequence of andesitic to basaltic pillowed lavas. Pillows elongated parallel to bedding, vesicles often more abundant towards flow tops, and intercalated basaltic tuff horizons are common features that aid in delineating tops and individual flows. Rocks of the Gilman Formation underlie south and central parts of the property. Gabbro and diorite sills which intrude volcanic rocks of the Gilman Formation on Bruneau are also common regionally and thought to be intrusive equivalents of the mafic lavas. Ultramafic to mafic bodies, collectively referred to as the Roberge Sill, a unit of regional extent (Duquette, 1970) often occur, as on the Bruneau Property, along the contact of the Gilman and Blondeau Formations. The Blondeau Formation, underlying the northern part of the property is dominantly felsic volcaniclastic greywackes and pyroclastics.

The Bruneau Property is located on the southern limb of a minor syncline developed on the south limb of the major north Chibougamau syncline (Map #1686), (Duquette, 1970). Rocks within the property strike approximately east-west with steep dips to the north. Top criteria in the volcanic rocks indicate tops to the north.

PROPERTY GEOLOGY:

1) Rock Types

a) Mafic Volcanic Rocks:

Three distinctive types of mafic volcanic rocks occur on the Bruneau Property. Dark green basaltic flows are present in the southern part of the south map sheet and the east and west parts of the central and north map sheets (Unit 1a). Abundant chlorite causes the dark green colour. Pillow structures, indicating tops to the north, and a weakly to strongly-developed schistosity, generally oriented 070 to 110^{o} with steep dips to the north, are often present. Brecciated flow tops and pillow breccias are present at (7+70S, 75W) and(38N, 1+50E).

Another basaltic unit located on the north part of the south sheet and the south part of the central sheet is a medium to light green basalt that is usually pillowed. Pillows are generally well formed, one to two feet in diameter, with little flattening. This unit appears to range from 500 to 1200 thick.

Narrow, two to fifteen foot wide, units of basaltic tuff are present throughout the property. These units consist of fine grained chlorite and have a well-developed schistosity usually parallel to the contacts of the unit. This schistosity is probably a reflection of original bedding.

b) Intermediate Volcanic Rocks:

These rocks occur mainly in a broad band striking east across the property near Trout Lake. They are transitional along strike into more mafic dark green basalts. Unit 2b found at eastern and western edges of the central part of the property is a light green to grey, massive to weakly schistose fine-grained volcanic rock. Minor feldspathic, probably tuffaceous rocks occur within this band. This unit is transitional both spatially and in hardness between very soft chloritic basalt and mottled volcanics. Chemical analysis and thin section investigation are needed to document its probable composition.

'Mottled volcanic' is a textural term applied to an extremely complex and erratic volcanic unit found in the central part of the property. It occupies an approximately 3000 foot wide band oriented E-W in the area of Trout Lake. Mottled texture results from an irregular distribution of light grey to cream and dark to light green areas. This patchiness occurs on the scale of both hand specimens and outcrop. Light grey to cream areas have a hardness greater than 5½ while green areas can be readily scratched with a knife and are chloritic. Selected hand specimens and in some cases outcrops of the harder variety could be called rhyolite but taken in context must be classified as mottled volcanic. Irrespective of the texture, outcrops usually show well-defined pillow structures.

Pillow margins are well-defined, often containing fine-grained chlorite or epidote. Amygdules, often elongate and concentrated near the pillow margins and filled with medium to coarse grained chlorite are common. Pyrrhotite and pyrite with minor chalcopyrite and rare sphalerite are common as fine grained disseminations,concentrations interstitially to pillows and in pillow rims.

Intermediate pyroclastics occur as 20 to 200 foot thick units intercalated with volcanic flows. These are subdivided into tuffs and agglomerates on the basis of particle size. Agglomerates contain chert and rhyolite fragments from ½" up to 6" within a fine-grained chloritic feldspathic matrix that weathers a cream to orangey brown. Sulphide fragments of pyrrhotite are present at several locations (sample BR 75-49). Feldspathic tuffs, massive to thinly banded, and composed of fine to medium grained feldspar crystals weather a cream colour (sample BR75-50). Variation in grain size is present both stratigraphically and laterally. Within a single outcrop agglomerate may grade stratigraphically upwards into tuffs indicating tops to the north. Agglomerates dominate in the central part of the property (21W to 45W), but grade laterally into tuffs (66W just north of Mud Lake).

c) Felsic Volcanic Rocks:

Massive to indistinctly bedded, fine grained, light cream but weathering deep brown, ankeritic felsic tuffs are exposed in the extreme southeast part of the grid at (13+50S, 1+50W), (Sample BR 75-13).

Felsic agglomerates occur as lenses and beds within the felsic sequence south of Pipe and Mud Lakes and within the gabbro sill in the central part of the property. These rocks are massive to thickly bedded and contain angular to elongate rhyolite and chert fragments from ½" to 10", in a fine grained, occassionally chloritic matrix. They weather white to cream with a rough surface because of raised clasts (Samples BR 75-6, BR 75-60, BR 75-35, BR 75-38). Fragments of pyrrhotite up to ½" are present in some locations (BR 75-60). Where the matrix is chloritic a weak schistosity parallel to bedding is usually present. Insufficient outcrop is present to establish lateral dimensions of these units in the southern felsic sequence but the thickness is greater than 50-100'. Within the gabbro sill they now occur as separate lenses but probably originally formed one or more discrete horizons.

Massive light grey to white, weathering cream coloured rhyolite occurs south of Pipe Lake and in lenses of volcanic rocks within the gabbro sill. Fine grained disseminated sulphides, dominantly pyrrhotite but with minor chalcopyrite, are present in many locations (as in cliff face oriented northeast at 17S, 39W).

Fine-grained, thinly laminated chert units, from 6" to 6' thick, appear within rhyolites south of Pipe Lake (16S, 33+30W) (Sample BR 75-3), at the rhyolite-basalt interface at approximately (19N, 32W), and intercalated with mafic, and mottled volcanic rocks at (5N, 18W) and (60N, 43W) respectively. These have variously been termed exhalites or silicate-facies iron formation. At (19N, 32W) this unit weathers a rusty brown as it carries up to 15% pyrrhotite and pyrite.

Fine-grained massive sulphides are exposed along the southern contact of the Roberge Sill and mottled volcanics at (49+50N, 60+50W), (50N, 52W) and within siliceous units of northern sediments at (61+25N, 51W). They are mainly pyrrhotite and pyrite with minor chalcopyrite and sphalerite. In all instances they are thinly-banded.

d) Sedimentary Rocks:

Sedimentary rocks of the Blondeau Formation occur in a band striking approximately east-northeast across the northern part of the property. They are subdivided into two varieties.

Siliceous or cherty type (Unit 5) is hard, light grey to

cream, massive to thinly bedded, and often with 1-3% disseminated fine-grained pyrrhotite. At (71+30N, 41+50W), (Sample BR 75-84) the sediment is composed of thinly-bedded chert with 1/16" to 1/8" discontinous layers of pyrrhotite and chalcopyrite.

Unit 4 is a feldspathic greywacke composed of fine-grained feldspar and volcaniclastic detritus. Occasionally volcanic fragments and rarely pyrrhotite fragments, up to ½" may be present.

These sediments, medium to dark grey are usually massive although indistinct bedding may be present. Weakly developed schistosity, when present, is parallel to bedding. Intercalated within these sediments are pyrite, pyrrhotite, and minor chalcopyrite and sphalerite bearing schistose graphitic horizons. Along strike, within a single horizon both massive sulphide (pyrrhotite-pyrite) and graphitic schist occur. The conductor running from (61+30, 51W) to (60+50, 54W) is dominantly massive sulphides at line 51W but on line 54W is dominantly graphitic schist.

e) Mafic to Ultramafic Intrusive Sills:

Thick sills of gabbro to pyroxenite (units 7,8) have intruded the volcanic-sedimentary assemblage within the north part of the property. These are thought to belong to the group of ultramafic bodies collectively referred to as the Roberge Sill (Duquette, 1970). Textural and compositional variations are present within the sills but no attempt was made to systematically

delineate these. These rocks are commonly dark green, medium to coarse-grained with some porphyritic zones resulting from coarse (up to ½") clots of amphibole. Minor sections were olivine-rich and asbestos in fractures up to 1/8" wide was found at several locations. At (52+30N, 53+80W), a fine grained pyroxenite phase contained up to 5% disseminated pyrrhotite (Sample BR 2).

Volcanic rocks of the Gilman Formation have been intruded by sills of gabbro to diorite (unit 9) in the central and southern part of the property. On a regional scale, these sills are approximately conformable to bedding within the volcanics but in detail are often discordant. No attempt was made to subdivide these according to textural or compositional variations. This has been done during previous mapping within the Bruneau Property boundary (Rosario Exploration Company, 1968, 1" = 200').

f) Intrusive Breccia and Dykes

Located approximately 500 feet west of Trout Lake is a body of intrusive breccia, approximately 250' wide and 800 feet long which cross-cuts the stratigraphy. The breccia consists of rounded and angular fragments, 1" to 3' in size in a fine-grained basaltic matrix. Fragments of varying composition include mottled volcanics, coarse porphyritic gabbro, coarse and fine-grained gabbro and chloritic basalt and quartz-feldspar porphyry.

Feldspar porphyry, quartz-feldspar porphyry, basaltic and diabasic dykes are present on the property. Feldspar and quartz-feldspar porphyry dykes are both light grey, weathering cream, with prominent plagioclase phenocrysts up to 1/8" in size in a fine-grained matrix. However, quartz-feldspar porphyry also has 1/8" quartz phenocrysts. These dykes, 2' to 100' wide, cross-cut all rock types at angles from 10° to 90° to the strike of the host rocks. Pyrrhotite, pyrite, chalcopyrite and very rarely molybdenum occur with these dykes. They occur disseminated as in typical porphyry copper type mineralization at (55+30N, 12W), in thin watery quartz veins at (48+50N, 12W), and also along the margin of the dykes at (44+80N, 10+30W). Fine-grained chloritic basalt dykes occur southwest of Pipe Lake.

2) METAMORPHISM:

Metamorphic grade regionally is of greenschist facies. This is exemplified by dark green chloritic schistose basalts of the Gilman Formation in the southern, western and eastern parts of the property. Mottled volcanics within the central part of the property however have been intensely altered. Internal structures such as pillows, patchy or irregular nature of the alteration zones, and apparent lateral equivalence to chloritic basalts suggests these lavas were themselves originally mafic in composition. This would entail processes of intense silicification to produce the presently observed features. An alternate explanation would involve chloritization of felsic lavas that were origianlly of very restricted lateral extent. However, the author favours the former alternative.

Gabbro sills in the central part of the property are generally fresh with little alteration. Contact alteration effects are also generally minimal. Alteration in the northern mafic to ultramafic sills is also minimal consisting of locally developed asbestos veinlets. Contact metamorphic effects also seem to be slight.

3) STRUCTURE

Volcanic and sedimentary units strike approximately east with steep dips to the north at 60 to 85°. Tops to north are indicated by shape of pillows, distribution of amydales and brecciated flow tops. Sills of mafic to ultramafic composition have intruded the lower, dominantly volcanic, sequence and also at the contact between the volcanic Gilman Formation and sedimentary Blondeau Formation. Emplacement was relatively quiet with narrow chilled contacts and only minor disturbance and metamorphism along contacts.

Schistosity, where present, is generally parallel to original bedding. It is most prominent in chloritic basalts and impure greywackes. Jointing, more common in the intrusions, is present throughout the area but no dominant orientations were found.

MINERALIZATION

Various types of mineralization are present on the Bruneau Property:

1) In Volcanic Rocks:

Pyrrhotite and pyrite with minor to trace chalcopyrite are present in siliceous, bedded cherty horizons located at the contact of a mafic and an overlying felsic sequence both along the conductor located 200' south of Pipe Lake and in the central area over the old Bruneau Mine workings.

Massive pyrrhotite and pyrite with minor chalcopyrite and rare sphalerite are present at the top of the sequence of mottled volcanic rocks. These massive sulphides are exposed in two locations, (49+80N, 52+15W), and (49+50N, 61+80W), the latter exposed for 150', reaching a six foot thickness.

Pyrrhotite, minor pyrite, trace chalcopyrite and rare sphalerite occur as disseminations within mottled volcanic rocks. Locally, mineralization occurs on pillow margins and as interpillow concentrations.

Matic chloritic tuff horizons, lying conformably between volcanic units throughout the succession often carry concentrations of pyrrhotite, pyrite, and magnetite with minor to trace chalcopyrite.

The "A" and "B" zones mined by Bruneau Mines Limited consisted of pyrrhotite, chalcopyrite, pyrite and magnetite in felsic pyroclastic units, mottled basalts, and gabbro.

2) In Intrusive Rocks:

Portions of ore zones mined by Bruneau Mines Limited consisted of cross-cutting veinlets of pyrrhotite and chalcopyrite in gabbro rocks of the central sill which intrude the volcanic sequence. Minor mineralization is also present along gabbro-volcanic contacts (at approximately 17+70N, 31+50W).

Up to 5% pyrrhotite occurs locally (52+30N, 53+80W) within ultramafic portions of the mafic to ultramafic sill north of Trout Lake.

Pyrrhotite, pyrite, minor chalcopyrite and rarely molybdenite occur as disseminations, and in thin quartz veins within quartz-feldspar porphyry dykes.

3) In Sedimentary Rocks:

Up to 3% pyrite and pyrrhotite are relatively common as fine grained disseminations within the sedimentary volcaniclastic sequence in the northern part of the property. These sulphides with minor chalcopyrite and sphalerite also occur as massive bedded zones and as clasts and nodules in schistose graphitic zones intercalated within sedimentary rocks. The nature of individual conductors may change along strike from massive sulphides at (61+30N, 51W, up to 4' thick, assaying .123 Zn and 225 ppb Au) to graphitic schists that contain only minor pyrite and pyrrhotite (60+50N, 54+50W).

INTERPRETATION AND GEOLOGICAL HISTORY

The Bruneau Option encompasses an anomalous portion of the Gilman Formation and overlying sequences. As previously described the Gilman Formation regionally is a 1200' thick sequence of dominantly pillow basalts.

In the Bruneau area however, it consists of at least two cycles of mafic to felsic volcanism. The lower cycle consists of chloritic schistose basalts exposed along the south property boundary overlain by a 500 to 1200 foot thick sequence of coarse felsic pyroclastics, rhyolites, and bedded cherts. The second cycle consists of pillow basalts developed north of Pipe Lake with overlying coarse felsic pyroclastics, rhyolites and bedded cherts preserved as xenoliths within the central gabbro sill. These cycles are in turn overlain by thick sequence of pillowed to schistose basalts that in the central portion of the property have been altered to form the mottled volcanic unit.

Throughout its geological history, the central part of the Bruneau area was the focus for volcanic and intrusive processes. This is indicated by a) restriction of felsic parts of two cycles of volcanism to the central part of the property; b) gradation in grain size of felsic pyroclastics from coarse in central parts (L31W), to fine towards edges (L66W); c) greater abundance of bedded, disseminated and stockwork occurrences of sulphides within the central part; d) restriction of mottled volcanics to the central part; and e) greater abundance of quartz-feldspar porphyry dykes in the central parts.

The following is felt to be the geological history of the area:

1) Emplacement subaqueously of lower chloritic basalts exposed along the south edge of the property.
2) Build up of a localized felsic pile consisting of massive rhyolites, felsic fragmentals and weakly mineralized bedded chert horizons.
3) Deposition of a second sequence of pillowed basaltic lavas, the sequence north of Pipe Lake.
4) Deposition of a second, localized felsic pile of rhyolites, felsic fragmentals and mineralized bedded chert horizons.
5) Deposition of a thick sequence of basaltic pillow lavas extending to north of Trout Lake.
6) Within central parts of the grid these lavas were extensively altered, probably by circulating hydrothermal fluids which also generated massive sulphide zones found at the top of this lava sequence.
7) Intrusion of central gabbro sill occurred after or in latter stages of this activity as it is relatively fresh but encloses lenses of altered volcanic rocks. Cross-cutting mineralization in the gabbro is probably related to activity of throughgoing circulation or hydrothermal systems.

8) Deposition of the Blondeau sedimentary and pyroclastic sequence north of Trout Lake. Mineralized horizons represent periods of quiescence with chemical and very fine-grained clastic sedimentation.

9) Intrusion of mafic to ultramafic parts of the Roberge Sill.

10) Intrusion of quartz-feldspar porphyry dykes and formation of the breccia pipe. Both features cross-cut all other rock types. These may be related to the later emplacement of the Chibougamau Plutonic complex and scattered mineralization associated with them, a result of weak porphyry type systems. Certainly the breccia pipe represents explosive degassing of the magma chamber that fed the quartz-feldspar porphyry dyke system.

11) Folding and erosion and metamorphism to present configuartion.

RECOMMENDATIONS

The Bruneau Property should definitely be explored further with a view towards finding massive sulphide ore bodies. Much of the previous work was not geared towards finding this type of deposit using a volcanogenic exhalative approach. Areas requiring further attention are:

1) The weak conductive zone south of Pipe Lake is located within an excellent geological environment but has never been tested with a drill hole.

2) The conductive zone at the Roberge Sill-mottled volcanic contact with bedded massive sulphides (exposed at surface) has never been explored at depth although hole #70-4 drilled by Bruneau in 1970 on a small extension intersected five zones with pyrite, pyrrhotite, and chalcopyrite, from 4 to 6.5 feet wide grading from .05 to .1% Cu and .10 to .18 oz Ag per ton. This hole appears to have been drilled down dip. Tache Lake Mines Property, located approximately 6 miles to the west and on or near the same stratigraphic horizon with reserves in excess of 665,000 tons grading 3.85% Zn and .029 oz/ton Au in 2 zones, indicates potential for copper-zinc massive sulphide orebodies in this environment.

3) Conductive zones B through F (Slankis, 1976) are located within gabbro and mottled volcanic rocks in central parts of the property. Zone C and its probable extension zone E should be tested with holes drilled from the north. Holes #3 and 4 appear to have been drilled down-dip, hence missing the conductor. More detailed mapping in the vicinity of conductors B and D should be done as both zones are likely drill targets. If a favourable, more detailed expression of zone F is found in future geophysical work it would be a very favourable drill target as it is associated with a coarse felsic pyroclastic unit; an extremely favourable geological environment.

4) Consolidated Quebec Yellowknife Mines Limited drilled five holes in the Blondeau sedimentary sequence in the north part of the property in 1956. Holes #4 and #5 intersected 34 feet and 15 feet respectively of graphitic schist with pyrrhotite, pyrite and minor chalcopyrite. No assays were reported in assessment work. One geochemical sample from a surface exposure gave .29% Zn and 370 ppb Au (BR 75-71). Despite these indications of minor mineralization these anomalies must be generally downgraded because of sedimentary environment and ubiquitous graphitic schist. CQYML holes #1, #2, #3 collared in sediments but drilled into a conductive zone associated with the Roberge Sill-

sediment-mottled volcanic contact area. This conductive zone, on lines 33W, 36W, and 39W is separte from the formational sedimentary conductor extending from L 42 W to L 75 W. Several intersections of pyrrhotite, pyrite, and chalcopyrite from 1 to 9 feet wide were found with one section of 1.4% Cu over 2.5 feet (CQYML). However, most of the mineralization was less than .5% Cu and further work on this zone does not seem warranted. Locating the collars of CQYML holes #1, #2, and 3 should be attempted during further mapping to help evaluate the conductors in this section.

5) Conductors along margins of and within mafic to ultramafic rocks of the northern sills are thought to be related to contace phenomena and serpentinization processes and therefore of little interest.

6) Felsic and sideritic tuffs are exposed in the extreme south-east corner of the property. Further mapping should be done on adjacent claims to delineate these horizons. Similarily further mapping is recommended along strike in lower pyroclastic horizons to the west of Mud Lake where they are exposed at the extreme southern edge of the property. At present, ground involved in both locations is held by Patino Mines Ltd.

7) Detailed investigation of data from old Bruneau workings should be undertaken to try and define orientations of the fracture and stock work systems. If these zones represent feeder systems, then their orientations would be extremely valuable in searching for stratigraphically higher massive sulphide orebodies. Such orebodies would be at a shallower depth than their feeder systems as structurally the property is part of a syncline. This would be advantageous in drilling for such suspected zones.

8) Additional geophysical work is needed to more clearly define the F conductive zone. Also additional EM surveys using a greater cable separation would be worthwhile in exploring at greater depths the geologically favourable sequence at the A conductive zone.

November, 1976

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APPENDIX A

RESULTS OF UNDERGROUND DEEP DRILLING PROGRAM

1967

Hole No.	From	To	Feet	Copper %	Gold oz.	Silver oz.	Host Rock
148	1050.6	1052.0	1.4'	0.65	0.01	6.64	G
	1279.4	1288.5	9.1'	1.01	Trace	0.50	V
1093	491.3	492.0	0.7'	1.80	Trace	0.30	G
	605.0	606.0	1.0'	2.00	0.01	0.34	G
	616.0	620.5	4.5'	1.20	0.025	0.30	G
	643.0	643.7	0.7'	10.00	0.01	2.44	G
1092	597.6	598.2	0.6'	10.60	0.01	2.04	G
	633.0	640.0	7.0'	2.21	0.02	0.41	G
1082	711.3	719.7	8.4'	1.88	0.01	0.34	G
	798.8	803.7	4.9'	1.10	0.01	0.50	G
	846.0	851.0	5.0'	3.15	0.03	1.20	V
	863.0	867.0	4.0'	1.75	0.01	0.50	V
	1479.2	1480.3	1.1'	3.25	0.01	0.92	V
	1492.0	1492.5	0.5'	2.25	0.01	0.85	V
	1557.0	1558.0	1.0'	3.05	0.04	1.10	V
	1579.0	1582.4	3.4'	1.85	0.01	0.81	V
1116	670.0	674.9	4.9'	1.10	0.01	0.35	V
	735.5	742.0	6.5'	1.35	0.07	0.43	V
	789.0	794.0	5.0'	1.20	0.02	0.40	V
	895.0	902.6	7.6'	2.31	0.02	0.82	V
	960.0	962.0	2.0'	1.45	0.01	0.59	V
	1014.0	1016.2	2.2'	1.15	0.01	0.39	V
	1134.6	1149.6	15.0'	3.01	0.01	0.87	V
	1191.0	1196.5	5.5'	2.05	0.01	0.85	V
	1257.0	1258.0	1.0'	6.15	0.01	1.89	V
	1865.0	1877.0	12.0'	3.16	0.02	0.80	V
1099	112.0	113.0	1.0'	1.20	Trace	0.60	G
	592.5	595.5	3.0'	1.20	0.38	0.62	V
	631.0	636.0	5.0'	1.43	0.03	0.46	V
	690.7	698.1	7.4'	1.56	0.02	0.60	V
	719.0	720.0	1.0'	4.60	0.08	2.12	V
	742.8	744.5	1.7'	1.30	0.06	0.68	V
	752.0	756.0	4.0'	1.00	0.02	0.54	V
	763.0	765.0	2.0'	2.20	0.04	0.76	V
	850.0	851.0	1.0'	3.40	0.10	2.10	V
	876.0	877.6	1.6'	4.30	0.10	1.84	V
1101	886.0	890.5	4.5'	1.25	0.01	0.41	V
	895.5	904.0	8.5'	1.07	0.01	0.44	V
	942.7	944.5	1.8'	4.55	0.42	1.66	V
	965.0	969.0	4.0'	4.90	0.08	1.60	V
	1015.0	1020.7	5.7'	1.25	0.02	0.50	V
	1128.0	1133.0	5.0'	1.00	0.02	0.46	V
	1138.0	1143.0	5.0'	1.00	0.04	0.50	V
	1163.0	1168.0	5.0'	1.00	0.01	0.63	V
1089	579.0	586.0	7.0'	0.50	0.01	-	V
1100	770.0	774.0	4.0'	1.90	0.01	0.97	V
	843.0	845.0	2.0'	2.10	0.02	0.80	V

APPENDIX B

SAMPLE DESCRIPTIONS AND LOCATIONS

FOR

BRUNEAU OPTION 1975

MAPPING

SAMPLE DESCRIPTIONS AND LOCATIONS
FOR BRUNEAU OPTION 1975 MAPPING

Sample No.	Rock Type	Comments	Location
BR-1	Massive sulphide	-dominantly po, minor py, tr. cpy-sph.	(49+50N, 61+80W)
BR-2	Pyroxenite	-fine grained dark green to black pyroxenite, up to 5% po	(52+30N, 53+80W)
BR-3	Mottled Volcanic	-light grey-green, hard, silicified intermediate volcanic from pillowed outcrop, 3-5% po, minor cpy, sph.	(49+60N, 54W)
BR75-1	Basaltic tuff	-up to 15% py in clots and diss., fine grained chlorite schistose basalt in a felsic tuff outcrop	(13S, 20W)
BR75-2	Rhyolite	-light cream to grey, weathers rusty, massive to finely fractured	(13+60S, 21+10W)
BR75-3	Cherty Exhalite	-thinly bedded, cream to white, fine grained chert	(15+90S, 33+40W)
BR75-4	Felsic Volcanic	-massive fine grained, rhyolitic to possibly dacitic volcanic	(15+60S, 33+40W)
BR75-6	Felsic Agglomerate	-chert and rhyolite fragments in a siliceous matrix	(17+40S, 44+60W)
BR75-8	Basalt-Andesite	-light green, pillowed, medium grained, feldspar phenocrysts, minor diss. po	(0+70S, 3+20W)
BR75-9	Basalt-Andesite	-similar to 75-8	(3+10S, 4+30W)
BR75-10	Gabbro	-fine grained, similar to coarse grained basalt	(6S, 4+70W)
BR75-11	Felsic Volcanic	-massive, light grey to pale green, rhyolite, 2-5% py, disseminated and on fracture	(15+50S, 6W)
BR75-12	Cherty Exhalite	-py bearing, bedded chert in a 2' wide band	(16+20S, 10+40W)

SAMPLE DESCRIPTIONS AND LOCATIONS
FOR BRUNEAU OPTION 1975 MAPPING

Sample No.	Rock Type	Comments	Location
BR75-13	Felsic Tuff	-pale cream, deep brown weathering ankeritic fine grained massive felsic tuff or exhalite	(14+70S, 2+50W)
BR75-14	Mottled Volcanic	-mottled green & cream, poorly banded and schistose silicified intermediate volcanic	(13S, 1+30W)
BR75-15	Mottled Volcanic	-fine grained, banded, light green, concoidal fracture, probably silicified intermediate volcanic	(12+50S, 0+70W)
BR75-16	Mottled Volcanic	-similar to BR75-15	(19+50S, 5+70W)
BR75-17	Gabbro		(8S, 10W)
BR75-18	Gabbro		(4S, 11+40W)
BR75-19	Quartz-Feldspar Porphyry		(0+20S, 11+70W)
BR75-20	Gabbro		(4+20S, 15W)
BR75-21	Basalt-Andesite	-massive, light green, medium grained	(3+10S, 16+20W)
BR75-22	Basalt Andesite	-similar to BR75-21	(3+10S, 15+10W)
BR75-23	Rhyolite	-fine grained, has minor feldspar phenocrysts	(13+30S, 19W)
BR75-24	Felsic tuff		(16S, 45W)
BR75-25	Intermediate Agglomerate	-rhyolite and chert fragments in a chloritic intermediate matrix	(13+50S, 56+70W)
BR75-26	Rhyolite		(15S, 56+75W)
BR75-27	Felsic Agglomerate	-rhyolite fragments in a fine grained felsic matrix -tr. cpy.	(16S, 60W)
BR75-28	Intermediate Agglomerate	-felsic fragments in an intermediate matrix	(13+40S, 60+60W)

SAMPLE DESCRIPTIONS AND LOCATIONS
FOR BRUNEAU OPTION 1975 MAPPING

Sample No.	Rock Type	Comments	Location
BR75-29	Basalt Andesite	-fine grained, light green, pillowed	(9S, 60+60W)
BR75-30	Felsic tuff	-light cream coloured, 2-5% py	(17+40S, 66+20W)
BR75-31	Intermediate Agglomerate	-2"-3" elongate chert fragments in a chloritic intermediate to mafic matrix	(20+50S, 83+70W)
BR75-32	Intermediate Volcanic	-spotted texture due to 2-3 mm. green pyroxene phenocrysts	(15+70S, 84+30W)
BR75-33	Intermediate Volcanic	-light green, outcrop pillowed, varies from hardness 4-5, to 6-7	(9S, 84W)
BR75-34	Intermediate Volcanic	-light green, outcrop pillowed, hard	(4S, 83+70W)
BR75-35	Felsic tuff	-massive, but has feldspar clasts in a fine grained light grey rhyolitic matrix	(5+40N, 32+90W)
BR75-36	Mottled Volcanic	-pillowed, chlorite filled amygdules	(28N, 31+20W)
BR75-37	Mottled Volcanic	-po-py and minor cpy both disseminated and on narrow veinlets	(31N, 30+50W)
BR75-38	Felsic Agglomerate	-chert and chlorite fragments in siliceous matrix, clasts up to 5" but average 1"	(10+80N, 38+80W)
BR75-39	Mottled Volcanic	-massive to fractured, 2-3% po, minor cpy	(34N, 39W)
BR75-40	Mottled Volcanic	-extreme silicification so that rock is similar to a rhyolite	(36+20N, 42+50W)
BR75-41	Mottled Volcanic	-from a pillowed outcrop	(39+40N, 43W)
BR75-42	Mottled Volcanic		(34+70N, 41+70W)

SAMPLE DESCRIPTIONS AND LOCATIONS
FOR BRUNEAU OPTION 1975 MAPPING

Sample No.	Rock Type	Comments	Location
BR75-43	Feldspathic Tuff	-feldspars partially replaced by chlorite, also coarse grained chlorite in amygdules	(31+60N, 42+10W)
BR75-45	Mottled Volcanic	-massive, dark grey, very hard, similar appearance to a rhyolite	(28+50N, 45+50W)
BR75-46	Andesite	-grey, medium hard, diss. po, tr. cpy-sph.	(21+90N, 60W)
BR75-48	Mottled Volcanic	-example of mottled volcanic with alternate zones that vary from very hard to soft	(11N, 62+90W)
BR75-49	Intermediate Agglomerate	-feldspar, sulphide, (po), and felsic clasts up to 10" in intermediate matrix	(11+50N, 63+70W)
BR75-50	Feldspathic Tuff	-thinly bedded with feldspar clasts	(0+50S, 67+50W)
BR75-52	Feldspathic Tuff	-similar to BR75-50	(17+80N, 74+60W)
BR75-53	Intermediate Tuff	-ankerite-siderite rich tuff, weathers deep rust brown	(13+50N, 79+75W)
BR75-54a b	Tuff, Chert	-sample probable fine grained mafic tuff, weathers with cream spots, second sample of intercolated chert, as 2-6' bands.	(5N, 81W)
BR75-56	Mafic Volcanic	-medium green, schistose, spotted texture	(19S, 90W)
BR75-57	Mafic Volcanic	-probably tuffaceous	(27N, 80+50W)
BR75-58	Gabbro	-fine grained, possibly a basalt	(24N, 80W)
BR75-59	Feldspathic Tuff	-specimen has fine grained chilled gabbro contact	(4+50N, 26W)
BR75-60	Felsic Agglomerate	-chert and sulphide (po) fragments up to 3" in a chloritic bedded fine grained matrix	(7+50N, 27W)

SAMPLE DESCRIPTIONS AND LOCATIONS
FOR BRUNEAU OPTION 1975 MAPPING

Sample No.	Rock Type	Comments	Location
BR75-61	Feldspar dyke	-feldspar rich dyke cutting gabbro	(7+65N, 14+15E)
BR75-62	Mottled Volcanic	-cream coloured with irregular green areas, chlorite in amygdules, disseminated po-py, tr. cpy.	(39+50N, 6W)
BR75-63	Ultramafic	-possibly pyroxenite in 10-15' wide dyke, with up to 25% po	(34+50N, 26+50W)
BR75-64	Gabbro to Pyroxenite	-may contain olivine	(41+70N, 1+20E)
BR75-65	Gabbro to Pyroxenite	-may contain olivine	(59+10N, 00+00)
BR75-66	Gabbro	-fine grained	(81+20N, 00+00)
BR75-67	Gabbro	-very coarse grained	(70+80N, 3+30W)
BR75-69	Graphitic Schist	-an angular erratic with py, trace cpy	(63+30N, 18W)
BR75-70	Greywacke	-fine grained, possibly tuffaceous	(79+75N, 24W)
BR75-71	Greywacke	-with graphite and pyrite	(79+50N, 27+60W)
BR75-72	Mottled Volcanic	-extreme silicification appears similar to a rhyolite	(40N, 21W)
BR75-73	Mottled Volcanic	-extreme silicification, with potassium and epidote	(46+30N, 35+60W)
BR75-74	Chert	-thinly bedded with po	(70+50N, 33W)
BR75-75	Feldspathic tuff	-sulphide clasts, po, minor cpy	(75+80N, 33W)
BR75-76	Chloritic Tuff	-up to 10% po-py and some graphite	(61+80N, 36+30W)
BR75-77	Mottled Volcanic	-extreme silicification so that it resembles a rhyolite	(48+20N, 45+50W)

SAMPLE DESCRIPTIONS AND LOCATIONS
FOR BRUNEAU OPTION 1975 MAPPING

Sample No.	Rock Type	Comments	Location
BR75-78	Mottled Volcanic	-2 samples, 1 extreme and 1 weak silicification	(42+80N, 48W)
BR75-79	Pyroxenite	-olivine rich	(79N, 46+90W)
BR75-82	Mottled Volcanic	-similar to a rhyolite due to extreme silicification	(41+50N, 54W)
BR75-83	Massive Sulphide	-from trench at mottled volcanic - gabbro contact, po-py	(49+80N, 52+15W)
BR75-84	Siliceous sediment	-seams and beds of po and minor cpy	(71+30N, 41+50W)
BR75-85	Andesite	-veinlets po and cpy	(61+50N, 38+80W)
BR75-86	Chloritic Tuff	-disseminated fine grained po and cpy	(64+70N, 2+30E)
BR75-87	Chloritic Basalt	-probably tuffaceous, weathers with cream spots	(48+75N, 12E)
BR75-89	Gabbro	-disseminated cpy	(57+15N, 11+70E)
BR75-89a	Gabbro	-fine grained, heavily altered, possibly a meta-volcanic	(49+30N, 61+50W)
BR75-90	Gabbro	-very coarse grained	(54+80N, 9E)
BR75-90a	Siliceous Sediment	-fine grained, massive to thinly bedded, with minor po, tr. cpy	(59+70N, 60W)
BR75-91	Massive Sulphide	-layers within siliceous sediment, po, tr. cpy-sph.	(61+20N, 51W)

APPENDIX C

BRUNEAU ROCK ASSAY

&

GEOCHEMICAL RESULTS

BRUNEAU ROCK ASSAY and GEOCHEMICAL RESULTS

Sample Number	Cu	Pb	Zn	Ag	Au	Ni	Rock Type	Location
BR-1*	.02%	Tr%	.06%			Tr%	- massive sulphides from trench, dominantly po,minor pyrite	(49+50N, 61+80W)
BR-2*	.01%	Tr%	.42%			nd%	- find grained pyroxenite,up to 5% po.	(52+30N, 53+80W)
BR-3*	.18%	Tr%	.02%			Tr%	- mottled volcanic with po-cpy, minor sph, disseminated and on pillow rims	(49+60N, 54W)
BR75-11	60ppm	56ppm	112ppm	3.2ppm	265ppb		- pale green rhyolite, 2-5% pyrite, disseminated and on fractures	(15+50S, 6W)
BR75-13	24	32	95	1.2	55		- pale cream, ankerite-siderite rich felsic volcanic	(14+70S, 2+50W)
BR75-30	24	44	50	1.2	35		- felsic tuff, 2-5% po-py	(17+40S, 66+20W)
BR75-69	155	36	65	2.1	85		- erratic of graphitic schist with py-cpy	(63+30N, 18W)
BR75-71	810	440	2950	8.5	370		- greywacke with graphite and py.	(79+50N, 27+60W)
BR75-76	120	51	151	1.6	20		- mafic fine grained tuff,10% po-py, minor graphite	(61+80N, 36+30W)
BR75-83	1230	50	88	3.4	225		- massive sulphide at gabbro volcanic contact	(49+80N, 52+15W)

NOTE: * Assay Results

BRUNEAU ROCK ASSAY and GEOCHEMICAL RESULTS

Sample Number	Cu	Pb	Zn	Ag	Au	Ni	Rock Type	Location
BR75-85	1370	22	97	1.9	75		-mafic volcanic- veinlets po + cpy.	(61+50N, 38+80N)
BR75-86	70	23	183	2.0	5		-mafic fine grained tuff, disseminated po + cpy.	(64+70N, 2+30E)
BR75-89	860	20	70	1.0	35		-gabbro with disseminated cpy.	(57+15N, 11+70E)
BR75-90	480	19	86	1.4	<5		-coarse grained gabbro, minor cpy.	(54+80N, 9E)
BR75-91	680	27	80	1.8	15		-massive sulphide from cherty sediment	(61+20N, 51W)

APPENDIX D

ADDITIONAL INFORMATION ON FILE

i) Unpublished Property Reports

ii) Additional Maps on File

iii) Drill Logs on File

i) UNPUBLISHED PROPERTY REPORTS

Malouf, S.E., 1963, Summary Report on Bruneau Mines Limited

Masterman, P.C.,1964, An Examination of the Upper Adit Level

Krause, C.A., 1964, Bruneau Appraisal

Flanagan, McAdam & Co., 1967, Report on Deep Diamond Drilling

Gill, J.E., 1968, Property of Bruneau Mines Limited

Prochnau, J.F., 1968, Comments on Dr. Gill's Bruneau Report

Prochnau, J.F., 1968, Report on 1968 Exploration Program, Bruneau Mines Property

Muscocho Explorations Limited, 1968, Report on Electromagnetic and Magnetometer Surveys, Roy-McKenzie Group.

Muscocho Explorations Limited, 1969, Report on Magnetic and Electromagnetic Surveys, McKenzie Township

Daly, S.P., 1973, Summary Report on Bruneau Mining Corporation (1970)

McPhar Geophysics, 1974, Report on the Induced Polarization and Resistivity Survey on the Bruneau Property.

ii) ADDITIONAL MAPS ON FILE

	Scale	Date
Bruneau Mines Ltd.		
Sections Surface Drilling Sections SI-S43, S91, S92	1"=50'	
Plan DDH "A" Zone	1"=50'	1966
Vertical Section A-A B-B C-C D-D E-E F-F Holes 1050,1052-1054,1060	1"=50'	
Section DDH 1079,1080,1081	1"=50'	1966
"	1"=20'	1966
Section DDH 1063,1064	1"=50'	1966
Section DDH 1060, 50,54	1"=20'	1966
Rosario Exploration Ltd.		
Dr9474, Level 1523	1"=20'	1966
Stope 9400	1"=20'	1966
Stope 9410 1523 Adit XC	1"=20'	1966
Stope 9410 1284 Adit XC	1"=20'	1966
"A" Zone	1"=20'	1967
9337 Shrinkage Stope	1"=20'	1966
9410 " "	1"=20'	1966
Bruneau Mines Ltd.		
Section 7250E 9350E 7300E 9400E 7350E 9450E 7400E 9500E 7450E 9550E 9200E 9600E 9250E 9650E 9300E 9700E 9750E	1"=50'	

	Scale	Date
Sections Deep Drilling Program		
DDH 1099	1"=50'	1967
1089		"
1092		"
1093		"
148		"
1100		"
1101,140,145,1082,1116		"
1099 1284 Adit XC		"
1101 XC 9325		"
1284 Level Down Holes		"
DDH 1088		1966
1090		"
1082		"
1089		"
1088		"
1082		"
Proposed Stoping Drawings		
i) Bruneau Mines		
Proposed Stoping Area E of 9337 Stop	1"=20'	1966
Proposed Stoping Area Composite Plan	1"=20'	1966
Proposed Stoping Area Section in Plane of Hole #53	1"=20'	1966
Proposed Stoping Area Longitudinal Section Looking S78°W	1"=20'	1966
ii) Rosario Exploration Ltd.		
Longitudinal Section 7230E	1"=50'	1968
7400E	1"=50'	1968

Rosario Exploration Ltd.		Scale	Date
Section	9150N 9450		
	9175N 9475		
	9200N 9500		
	9225N 9550	1"=50'	1968
	9250N 9600		
	9275N 9625		
	9300N 9700		
	9325N		
	9350N		
	9375N		
	9400N		
	9425N		
Rosario Exploration Ltd.			
1284 Level	(1)	1"=20'	1968
	(2)	"	"
	(3)	"	"
	(4)	"	"
1284 Geology Plan		1"=50'	"
1284 Level		1"=50'	"
1523 Level		1"=20'	"
Composite Map		1"=50'	"
Shallow Shears and "B" Zone Structure		1"=50'	"
"B" Zone Section 7300E		1"=50'	"
1284 Borehole Locations in 1967		1"=100'	1967
Rosario Exploration Ltd.			
Drilling Plan 1523 Level		1"=20'	
Sample Map 1523 Level		1"=20'	
Geological Plan 1523 Level		1"=20'	
Miscellaneous Information 1523 Level		1"=20'	
Surface Drill Holes 1523 Level		1"=50'	
Underground DDH 1284 Level		1"=50'	
Surface DDH 1284 Level		1"=50'	
Geology and DDH 1284 Level (1)		1"=20'	
Geology and DDH 1284 Level (2)		1"=20'	
Geology 1284 Level		1"=20'	
Rock Types 1284 Level		1"=20'	
Geology Plan 1284 Level		1"=50'	
Sample Map 1284 Level		1"=20'	1965

	Scale	Date
Plan of Average Assays 1284 Level	1"=20'	
Composite Map Underground Workings	1"=50'	1966
Geology N-S Vertical Section	1"=50'	1967
Rosario Exploration Co.		
Geological Plan Bruneau Mines	1"=200'	1968
Bruneau Mines Ltd. Composite Plan	1"=200'	1968
Magnetometer Survey Bruneau Mines Property	1"=200'	1968
Chib-Kyrand Copper Mines Ltd.		
EM Survey	1"=200'	1961
Chib-Kyrand Option Magnetometer Survey by Rosario	1"=200'	1968
Geology Composite Plan	1"=200'	
Geology West Half	1"=200'	
East Half	1"=200'	
Quebec Mining and Smelting Co. Ltd.		
Geological Plan	1"=200'	
Bruneau Mining Corporation		
Profile DDH 70-1 to 70-7	1"=40'	1970
Muscocho Exploration Ltd.		
Magnetometer Survey	1"=200'	1969
EM Survey	1"=200'	1969
Flanagan-McAdam		
Burneau Mines Ltd. EM Survey	1"=200'	1970
Rosario Exploration Co.		
Topographic Plan Bruneau Property	1"=200'	1962

	Scale	Date
Bruneau Mining Corporation		
Claim Group	1"=2650'	1970
Grid Compilation Roy-McKenzie Townships	1"=1000'	1970
Geological Plan Roy-McKenzie Townships	1"=1000'	1970
Bruneau Mines Ltd.		
Official Survey Bruneau Mines Property	1"=10 chains	1961

iii) DRILL LOGS ON FILE

Company	Date	Holes
Consolidated Quebec Yellowknife Mines Ltd.	1956	1-16A
Red Crest Gold Mines Ltd.	1956	1-10
Bruneau Mines Ltd.	1961	1-20
Bruneau Mines Ltd.	1962	21-54
Bruneau Mines Ltd.	1963	58
Bruneau-Chib-Kyrand	1963	KM6-KM10
Bruneau Mines Ltd.	1967	1082,1089 1092,1093,1099 1101,1116, 148
Muscocho Explorations Ltd.	1968	1-7
Bruneau Mining Corporation	1970	70-1 - 70-7

BRUNEAU 1976

During 1976 the office and field work consisted of:

1.- A study of the previous drill results and mine plans.

2.- Additional geophysical work on geophysical conductors consisting of detailed horizontal loop and I.P. surveys.

3.- Detailed geology of areas surrounding the E.M. conductors.

4.- Geochemistry on selected 1975 rock specimens from areas surrounding E.M. conductors and additional sampling of gossans and rocks.

5.- Diamond Drilling - 7 drill holes for a total footage of 1763.5 feet.

REVIEW OF PREVIOUS DRILLING

During May to July the drill results of Bruneau Mines and Rosario Resources were reviewed in an attempt to clarify the underground geology and related the mineralized volcanics at depth to the surface geology.

Interpretation of the underground geology is hindered by:

1.- Many of the drill logs are unavailable for the underground drill programmes.

2.- No drill core remains.

3.- Much of the drilling was orientated parallel or sub-parallel to the stratigraphy.

4.- The deep drill holes are suspected to have deviated considerably from their plotted positions.

5.- The drilling was too widely spaced for effective correlation.

The geology in the previously mined section consists of a rhyolite and rhyolite fragmental unit overlain by andesite. The volcanics have been cut by a lower and upper gabbro and later north-south striking quartz-feldspar porphyry dykes.

The deep drilling programme intersected a volcanic sequence at least 500 feet thick beneath the lower gabbro.

sequence at least 500 feet thick beneath the lower gabbro. The lower volcanics consist of rhyolite, rhyolite fragmental and intermediate to basic volcanics. Beneath this volcanic sequence is a gabbro sill of unknown thickness. Mineralization in this lower sequence occurs mainly in the intermediate volcanics. Silicification, epidotization, and/or chloritization complicates the identification of the original rock unit and no well-defined marker horizon exists. No correlation of the deep mineralization is possible due to widely-spaced holes drilled parallel to sub-parallel to the strike of the volcanics.

1.- L 24+00W to L 39+00W, 4+00N to 9+50N

2.- L 39+00W to L 48+00W, 10+00N to 13+50N

These units were covered by geophysics, mapped in detail and sampled. Results, however, were not sufficiently encouraging to warrant drilling.

Additional surface Geology:

All geophysical conductors outlined or confirmed by the 1975 field work were mapped in detail and sampled.

Diamond drilling followed on 6 of the most promising areas but no sulphides of economic significance were intersected.

76-1 on Conductor A - massive pyrite with tr. sphalerite, chalcopyrite occurs in rhyolite and intermediate tuff with some graphite. No economic values (186.5').

76-2,76-3 on Conductor F - The two holes intersected massive gabbro throughout with tr. amounts of sulphides. The cause of the conductor remains unexplained (298'+261').

76-4 on Conductor B - This hole intersected gabbro cut by narrow basic dykes, minor pyrrhotite veining with rare tr. chalcopyrite may be the cause of the conductor (258').

76-5 on Conductor C - This hole was drilled on a previously tested conductor drilled down dip. Several narrow sections of 10-50% pyrrhotite with trace chalcopyrite and rare tr. sphalerite in chloritic intermediate tuff explain the conductor (287').

76-6 on Conductor D - A 10' section contains pyrrhotite veining with tr. chalcopyrite. (238')

76-7 on Conductor H - Two wide sulphide zones were intersected in silicified andesite. No economic values were obtained (235').

RECOMMENDATIONS

The fragmental units south of the Bruneau Mines ore zones were covered by geophysics and detailed geology but no obvious drill targets were outlined. A deep drilling programme will be necessary to test these units down dip in order to establish if they can be correlated with the mineralized volcanics intersected in the deep drilling programme carried out by Bruneau Mines in 1967.

BRUNEAU

SAMPLE No.	LOCATION	COMMENTS	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppb
Br 76-A5	30W, 11+90N	Felsic Agglomerate chloritized, porphyritic.	58	8	56	0.8	10
Br 76-A26	40+80W, 10+75N	Felsic to Intermediate Aggl. vague fragments, 1-2% Po.	58	8	89	1.0	5
Br 76-A27	40+30W, 10+75N	Banded Tuff in Felsic Aggl.	111	6	56	0.7	30
Br 76-A48	32W, 9+00N	Felsic to Intermediate Aggl. weak chlorite alteration.	26	9	20	0.4	ND
Br 76-A50	28W, 7+50N	Felsic to Intermediate Aggl. weakly epidotized locally. 1-5% Po., traces Py, Cpy, some Po,-Cpy, accretions up to 2 cm.	67	16	65	0.6	ND
Br 76-A56	38+50W, 12+00N	Felsic Agglomerate, weak epi-chlorite alteration, up to 5% Po-Cpy., some Po-Cpy, frags. up to 2 cm.	356	10	107	1.0	ND
Br 76-A57	38+35W, 12+00N	Feldspathic tuff, weak epidote, minor Po-Py traces Cpy.	19	9	48	0.7	ND
Br 76-A60	37+80W, 12+00N	Intermediate volcanic, amygda-loidal, mod. chloritized.	61	13	64	1.0	ND
Br 76-A61	38+64W, 12+00N	Felsic agglomerate, weakly epi-chlorite, minor Po-Cpy., traces sphalerite.	151	8	21	0.4	ND
Br 76-A62	38+80W, 12+10N	Felsic agglomerate, v. fine gra., weak epidote alteration, 1-2% dissem. Po-Cpy.	73	9	152	0.7	ND

SAMPLE No.	LOCATION	COMMENTS	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppb
Br 76-A63	38+70W, 11+20N	Felsic Agglomerate, weak chl. minor Po.-Cpy.	26	12	55	0.7	ND
Br 76-A64	38W, 11+00N	Gabbro, weakly chloritized up to 5% dissem. Po.-Cpy.	145	8	32	0.6	ND
Br 75-2	21+10W, 13+60N	Rhyolite, diss. py.	65		206		<5
Br 75-3	33+40W, 15+90S	Chert, diss. py.	62		620		ND
Br 75-6	44+60W, 17+40S	Felsic Agglomerate, diss. po.	42		236		ND
Br 75-9	4+30W, 3+10S	Basalt, diss. po.	56		68	0.5	<5
Br 75-12	10+40W, 16+20S	Chert, diss. py, po.	86		53	0.9	20
Br 75-19	11+70W, 0+20S	Quartz-felspar porphyry	13		36	0.3	10
Br 75-15	0+70W, 12+50S	Mottled volcanic minor diss. py.	7		34		<5
Br 75-24	45+00W, 16+00S	Felsic tuff, diss. py. tr. cpy.	41		38		<5
Br 75-27	60+00W, 16+00S	Felsic Agglomerate diss. py, tr. cpy.					
Br 75-31	83+70W, 20+50S	Intermediate Agglomerate chert frags.	12		87		ND
Br 75-37	30+50W, 31+00N	Mottled volcanics diss. po., py., tr. cpy.	275		57		<5
Br 75-40	42+50W, 36+20N	Mottled volcanic high silicification	217		48		ND
Br 75-50	67+50W, 0+50S	Feldspathic tuff.			54		ND
Br 75-53	79+75W, 13+50S	Intermediate tuff, diss. py.	35		43	1.3	<5

SAMPLE No.	LOCATION	COMMENTS	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppb	Mo ppm	Ni ppm
Br 75-54	81+00W, 5+00N	Cherty tuff.	53		760		5		
Br 75-61	14+15E, 7+64N	Feldspar-rich dyke cutting gabbro	19		61		ND		
Br 75-73	35+60W, 46+30N	Silicified mottled volcanic	40		36		5		
Br 75-74	33+00W, 70+50N	Chert, diss. py.	18		27		ND		
Br 75-84	41+50W, 71+30N	Siliceous sediment, seams po., minor po.	137	15	27	0.5	ND		
Br 75-89A	61+50W, 49+30N	Altered gabbro.	58		51	2	5		
Br 76-A10	1+30W, 43+10N	Quartz-feldspar porphyry	480	18	30	0.9	15	9	
Br 76-A1	30+40W, 14+50S	Rhyolite	10		18		10		
Br 76-A7	48+00W, 8+00N	Gabbro	92		46		ND		
Br 76-A2	56+00W, 25+60N	Rhyolite Agglomerate	10		21		15		
Br 76-A4	59+80W, 17+40N	Andesite, diss. py. po.	242		15		10		59
Br 76-A3	55+50W, 27+20N	Andesite, diss. py, po., tr. cpy.	540	28	63		5		
Br 76-A13	2+60W, 6+00N	Intermediate volcanic, diss. py.	545		68	1.4		6	192
Br 76-A13-A	2+60W, 6+00N	Quartz-feldspar porphyry	90		16	0.5	ND	5	24
Br 76-A13-B	2+60W, 6+00N	Graphite in intermediate volcanics	100		2	0.4	5	2	26
Br 76-A15	10+85W, 54+80N	Andesite, diss. py, cpy., malachite	600		46	0.8	5		118
Br 76-A18	38+00W, 70+40N	Cherty tuff.	39		3	0.4	165	3	27

SAMPLE No.	LOCATION	COMMENTS	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppb	Mo ppm	Ni ppm
Br 76-A20	37+20W, 14+00S	Rhyolite gossan, diss. py. cpy.,po.	63		3	0.8	25	3	30
Br 76-A20-A	37-20W, 14+00S	Quartz vein diss. py., tr. cpy.	26		2	0.5	15	2	39
Br 76-A25	48+00W, 14+40S	Rhyolite agglomerate, diss. po. py. tr. cpy.	20		2	1.3	15	2	48
Br 76-A9	35+50W, 34+20N	Gabbro, gossan diss. py.	288	9	70	1.2	5		
Br 76-A28	62+50W, 12+25N	Intermediate Agglomerate, diss. py.	36	7	45	0.5	5		
Br 76-A29	64+60W, 16+10N	Silicified chloritic andesite diss. py.	32	7	44	0.7	5		
Br 76-A30	59+20W, 17+20N	Silicified chloritized andesite	116	10	83	0.8	5		
Br 76-A31	48+00W, 123+00N	Intermediate Agglomerate diss. py.	134	218	86	0.8	15		
Br 76-A32	35+20W, 34+10N	Gabbro, gossan, diss. py.	240	25	63	0.8	5		
Br 76-A33	30+00W, 31+20N	Silicified Andesite, py.	298	41	54	0.7	5		
Br 76-A35	68+00W, 48+20N	Silicified Andesite, banded po. tr. py. cpy.	116	42	26	1.7	5		
Br 76-A36	78+30W, 48+00N	Silicified Andesite, py., po.	30	23	133	0.8	ND		
Br 76-A38	73+50W, 56+30N	Pyroxenite, diss. py.	220	20	51	0.8	ND		
Br 76-A39	51+00W, 61+00N	Siliceous sediments, mass. po. minor py.,tr. cpy.	700	28	54	1.4	10		

SAMPLE No.	LOCATION	COMMENTS	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppb
Br 76-A40	44+00W, 60+00N	Feldspathic sediment, diss. py. po., tr. cpy.	67	18	37	0.4	5
Br 76-A41	7+00W, 9+40S	Rhyolite gossan, diss. py.	44	25	12	3.6	28
Br 76-A45	53+75W, 25+30N	Felsic Agglomerate, tr. py.	26	9	20	0.4	ND
Br 76-A46	51+50W, 27+60N	Basalt, chloritic, tr. py., cpy.	68	12	44	0.8	ND
Br 76-A47	29+80W, 30+80N	Gabbro, gossan,diss. po., py.	185	11	49	0.8	ND
Br 76-A49	28+50W, 11+50N	Chloritic gabbro diss. cubic py.	920	19	88	3.3	55
Br 76-A51	24+00W, 10+50N	Sheared chloritic gabbro, minor po., cpy.	55	11	13	0.5	ND
Br 76-A52	21+00W, 15+10N	Magnetite in gabbro, minor po.,cpy.	271	20	7	1.0	5
Br 76-A53	21+20W, 7+20N	Felsic to intermediate agglomerate	45	13	17	0.6	ND
Br 76-A55	31+80W, 13+00N	Gabbro, gossan, minor po.,py.,tr. cpy.	334	8	31	0.9	5
Br 76-A65	37+70W, 16+00N	Felsic tuff, minor diss. po.	53	9	91	0.3	ND