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1975 PROPERTY REPORT

TITLE	1975 REPORT, BRO COPPER PROSPECT
AUTHOR	D.A. Silversides, B. Hall
DATE	March, 1976
COMMODITIES	Cu
LOCATION - Area	- Babine Lake, North Central B.C.
- Mining Division	- Omineca
- Coordinates	- Lat. 54°53'N, Long. 126°25'W
- NTS	93L 16 E
OWNERSHIP	CITIES SERVICE MINERALS CORPORATION By claim staking
WORK DESCRIBED	Geological mapping, Geochemical, I.P., and Magnetic Surveys, Core Logging

CITIES SERVICE MINERALS CORPORATION

VANCOUVER OFFICE

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SUMMARY

The BRO copper prospect is situated in west-central British Columbia, at lat. 54°53'N, long. 126°25'W. It lies within the general area of the Babine Lake porphyry copper deposits.

The property was previously held by Amoco. Cities aquired the prospect by staking in the fall of 1974.

Amoco has refused to allow Cities to examine any of their data. Consequently, a program of geological mapping, geochemical, magnetic, and I.P. surveys, and core logging was carried out in the summer of 1975 to determine if Amoco had left some untested drill targets.

Geological mapping indicates the prospect contains a complex dyke swarm - multiple stock of Eocene biotite - hornblende - feldspar porphyries which intrude argillite, andesite flows and tuffs, and amygdaloidal basalt. The volcanic and sedimentary rocks are Jurassic, Eocene, and possibly Miocene in age.

A very large area of pyritization occurs within and adjacent to the central northwest side of the porphyry complex. Pyrite in amounts of 1 to 10% are present over an area 4000 x 2000 feet in diameter. Rocks show a moderate to intense chlorite - epidote - calcite alteration assemblage.

Fine-grained, disseminated and fracture-filling chalcopyrite occurs sporadically through the pyritized area, but appears to be concentrated in the center. Diamond drill-core assays suggest a zone of .05 to .10% Cu approximately 1200 x 1000 feet in size is situated within the central part of the pyrite zone. A zone of incipient hydrothermal biotite occurs with the higher copper grade.

Geochemical soil sampling results are difficult to interpret because of the depth and nature of overburden. Clay-boulder till with depths of up to at least 170 feet covers most of the area. Most of the anomalous values of copper (70 ppm to a maximum of 280) occur within the pyritic area.

The I.P. survey outlines and confirms the high pyrite area. It also indicates two other anomalous areas. A north-south trending anomaly situated west of the main sulphide zone is most likely caused by graphitic argillite. A northeast trending anomaly situated north of the main sulphide zone is considered to be a significant drill target. It has corresponding weakly anomalous copper values in soil samples and nearby outcrops with malachite on fractures. It was not tested by Amoco's drilling. It is considered to be an attractive drill target.

The magnetic survey is difficult to interpret. It has in part helped to determine the extent of particular rock types.

CONCLUSIONS

The objective of the 1975 BRO Program was to determine if there are any drill targets untested by Amoco. The density of drill-holes within the main sulphide zone eliminates the possibility of an open pit deposit in this locality. There is, however, some intrigue with depth. The present .05 to .10% copper zone and its incipient hydrothermal biotite may represent the upper portion of a better grade zone.

The northeast trending I.P. anomaly presents an attractive drill target.

Several other features of the prospect require examination. These include a more thorough examination of an outcrop of amygdaloidal basalt which contains chalcocite and malachite, and the examination of outcrops of malachite - stained andesite tuff.

RECOMMENDATIONS

The following work is recommended:

(I) Drill a vertical hole 500 feet in length in the northeast - trending I. P. anomaly.

(II) Consider drilling a vertical hole 1000 to 1500 feet in length in the higher grade copper zone to test the depth possibility. Grades favorable to block caving are a possibility, since .8 to 1% copper is known in the Babine porphyry copper deposits.

(III) Carry out a more thorough mapping and sampling of the copper bearing basalt and andesite tuff areas.

(IV) Do a limited I. P. survey (one or two set-ups) over the north part of the BRO grid area.

It is recommended that this program be carried out in July, August, 1976. Assessment work is due by Sept. 5, 1976. A program including 2000 feet of diamond drilling is estimated to cost $40,000.

INTRODUCTION

Location and Access (See figure 1)

The BRO Copper Prospect is situated in north-central B.C., at lat. 54° 53'N, long. 126° 25'W. The property is situated in the Babine Lake area and lies 9 miles west of Granisle, the nearest town. Smithers, the nearest supply center, is situated 30 miles to the southwest.

The property is accessible via road to its northern extremities, by way of the Smithers landing road and the connecting road to Granisle. To reach the main area of interest however, helicopter must be used.

A tote road to the center of the property, suitable for only winter conditions, was built by Amoco in 1973. This road connects to the Smithers landing - Granisle road.

History

The property was originally discovered by Amoco Petroleum Company Ltd., whose attention was drawn to the area by a relatively subtle aeromagnetic "low" as depicted on the government aeromagnetic maps. Their ground examination indicated the presence of pyritized biotite-feldspar porphyry similar to that of the Granisle and Newman copper deposits situated 12 miles to the northeast. Consequently, Amoco proceeded to carry out the following work during 1972 and 1973:

(1) Staked a total of 436 claims generally referred to as the Saturday Lake Property.

Location of the BRO

COPPER PROSPECT

1:500,000

Fig. 1

(11) 54.3 line miles of I.P. survey

(111) 54.3 line miles of ground magnetometer survey

(1V) 1435 soil, silt, water, and rock geochemical samples

(V) 19 diamond drill holes totalling 6,606 feet*

* Three of these holes were drilled north of the area staked by Cities. They encountered only argillite.

(V1) Geological mapping on a scale of 1"=500 feet.

Amoco put in a large plywood and 2 x 4 frame tent camp on the property. All drill-core was stored in racks at the camp site.

In the early summer of 1974, Amoco closed their exploration operations in B.C. They allowed their claims to lapse in August and October, 1974.

In the summer of 1974, Cities carried out exploration work in the vicinity of the property. As part of this work, outcrops on the prospect were examined, and 30 soil samples were obtained for a case history. The drill core was quickly logged, and representative specimens were obtained. A few specimens were analyzed for Cu, Mo, Zn, and Ag in geochemical amounts.

Upon completion of this work, it was the writer's opinion that the property did indeed resemble the Granisle and Newman deposits in terms of rock types, alteration and pyrite content. When the Amoco claims lapsed in August, 69 BROclaims were staked by Cities personnel. A further 30 claims were added in November, to bring the total number to 99.

The BRO claims were staked in the hope that Amoco's sudden termination of exploration activities left some untested (by drilling) areas on the property. An effort was made to obtain the data from Amoco through their Toronto Office. However, Amoco's representative refused to accept any trade of information or cash payment for data. The only way Cities would be able to get this data was by allowing Amoco to have an interest position in the property. The writer recommended that Cities should not purchase the data in this manner, but instead, re-survey the property. This re-survey was carried out in the summer of 1975. The approximate cost is estimated to be $24,925.00 (see Appendix I for details)

Work Carried Out In 1975

The following work was carried out in the summer of 1975.

(1) The location of 40 line miles of picket line previously cut by Amoco was determined by chain and compass survey.

(2) All outcrops within this system of picket lines were geologically mapped.

(3) A geochemical survey consisting of 24 rock chip, 10 silt, and 1188 soil samples, was carried out over the 40 line miles of picket line. Samples were analyzed for Cu, Mo, Zn, and Ag.

(4) A total of 30.5 line miles were surveyed with a Scintrex MF-2 magnetometer.

(5) An I.P. survey of 20.2 line miles, n = 4, a = 300', was carried out by Morrison and DePaoli, I.P. contractors.

(6) All drill-holes were located, and drill core logged. Core from several holes was assayed for copper.

(7) All claim posts within the picket line area were located by chain and compass.

This work was carried out by crews working under the general Babine prospecting program. The majority of the geochemistry, geological mapping, and core logging was done by B. Hall.

Claims Situation

Cities originally had 99 claims (BRO 1-99) covering the prospect. Cities filed costs of the I.P. survey for assessment in the fall of 1975 on 60 BRO claims, which are now valid until the fall of 1976. The list of claims presently held in good standing is given in Table 1. Their location is shown in figure 2.

TABLE 1

List of BRO Claims

Claim	Date Staked	Staked By	Tag Number	Date Recorded	Record Number	Date Claims Lapse
BRO 1	Sept 1/74	C. R. Hallwood	474101 M	Sept 5/74	132003	Sept 5/76
2	"	"	2 M	"	4	"
3	"	"	3 M	"	5	"
4	"	"	4 M	"	6	"
5	"	"	5 M	"	7	"
6	"	"	6 M	"	8	"
7	"	"	7 M	"	9	"
8	"	"	8 M	"	10	"
9	"	"	9 M	"	11	"
10	"	"	10 M	"	12	"
11	"	"	11 M	"	13	"
12	"	"	12 M	"	14	"
13	"	"	13 M	"	15	"
14	"	"	14 M	"	16	"
15	"	"	15 M	"	17	"
16	"	"	16 M	"	18	"
17	"	"	17 M	"	19	"
18	"	"	18 M	"	20	"
19	"	"	19 M	"	21	"
20	"	"	20 M	"	22	"
21	"	"	21 M	"	23	"
22	"	"	22 M	"	24	"
23	"	"	23 M	"	25	"
24	"	"	24 M	"	26	"
25	Sept 2/74	"	25 M	"	27	"
26	"	"	26 M	"	28	"
27	"	"	27 M	"	29	"
28	"	"	28 M	"	30	"
29	"	"	29 M	"	31	"
30	"	"	30 M	"	32	"
31	"	"	31 M	"	33	"
32	"	"	32 M	"	34	"
33	"	"	33 M	"	35	"
34	"	"	34 M	"	36	"
35	Sept 1/74	I. Flanagan	35 M	"	37	"
36	"	"	36 M	"	38	"
37	"	"	37 M	"	39	"
38	"	"	38 M	"	40	"
39	"	"	39 M	"	41	"
40	"	"	40 M	"	42	"

Claim	Date Staked	Staked By	Tag Number	Date Recorded	Record Number	Date Claims Lapse
41	"	"	41 M	"	43	"
42	"	"	42 M	"	44	"
43	"	"	43 M	"	45	"
44	"	"	44 M	"	46	"
45	"	"	45 M	"	47	"
BRO 46	Sept 1/74	I. Flanagan	474146 M	Sept 5/74	132048	Sept 5/75
47	"	"	47 M	"	49	"
48	"	"	48 M	"	50	"
49	"	"	49 M	"	51	"
50	"	"	50 M	"	52	"
51	"	"	51 M	"	53	"
52	"	"	52 M	"	54	"
53	"	"	53 M	"	55	"
54	"	"	54 M	"	56	"
55	"	"	55 M	"	57	"
56	"	"	56 M	"	58	"
70	Nov 25/74	D.A. Silversides	70 M	Dec 13/74	133503	Dec 13/76
71	"	"	71 M	"	04	"
76	"	"	76 M	"	09	"
77	"	"	77 M	"	10	"

List of References

(1) Geology of the Northern Babine Lake Area, B.C.D.M. Preliminary Map No. 12, August, 1973.

(2) Mineralogy, Zonal Regulationships, and Economic Significance of Hydrothermal Alteration at Porphyry Copper Deposits, Babine Lake Area, British Columbia, D.J.T. Carson and J.L. Jambor, CIM Bulletin, February, 1974.

(3) Trace Element Variations in Porphyry Copper Deposits, Babine Lake Area, B.C., G.S.C. Paper 74-9, J.L. Lambor, 1974.

(4) Overburden Profile Studies in Glaciated Terrain as an aid to the Geochemical Exploration for Base Metals in the Babine Lake Area, B.C., by Edem Effiong Okon, M.Sc. Thesis, University of Alberta, Calgary, 1974.

(5) BRO Copper Prospect, D.A. Silversides, Cities Report, March, 1975.

(6) 1975, Geophysical Report on a Low Level Aeromagnetic Survey over the Fulton Lake Area, G.M. DePaoli, January, 1976.

REGIONAL SETTING (see figure 3)

The geology of the Babine Lake area (ref. 1), the mineralogy, hydrothermal alteration, and zonal relationships of the porphyry copper deposits (ref. 2), the trace element variations in rock (ref. 3), and the secondary geochemical dispersion of the deposits (ref. 4) have all been recently described.

Jambor (ref. 3) has summarized the geological setting of the Babine Lake Area copper deposits as follows:

" All the porphyry copper deposits and prospects in the area are related to small biotite-plagioclase porphyry intrusions of early Eocene age (51.2±2 million years; Carter, 1972). This type of porphyry in known locally and informally as "BFP" (biotite-feldspar porphyry). Host rocks for the biotite-feldspar porphyry intrusions are mainly Jurassic Hazelton Group andesitic, dacitic, and rhyolitic flows, plugs (?), and fragmentals, and marine siltstones, sandstones, and conglomerates that are mainly of volcanic rocks have been identified in the southwestern part of the map area, and continental sediments believed to belong to the Cretaceous Sustut Group have been preserved within two linear grabens in the northeast.

Major faults trending north-northwest appear to have been the loci of emplacement of the Tertiary intrusions. Subsidiary northeast-trending faults may also be present. The rocks are gently to moderately folded along north-northwesterly axes.

The form of the biotite-feldspar porphyry intrusions varies - stocks, dykes, and possibly sills being present. They have a distinctive light to dark grey and white speckled appearance and are characterized by $\frac{1}{4}$-5 mm phenocrysts of biotite, plagioclase, and hornblende in a fine-grained to aphanitic matrix of the same minerals plus quartz and K-feldspar.

Extensive differences in the appearance of the porphyry result from highly variable grain sizes and phenocryst contents, and the effects of several types of hydrothermal alteration. The compositions of fresh specimens straddle the boundary between quartz diorite and granodiorite. Many of the intrusions, including those at Granisle (Kirkham, 1971) are multi-phase. Breccias, believed by Carson and Jambor (1974) to include both intrusive varieties and diatremes, are known to be present at Granisle, Bell Copper and Dorothy.

> The copper-bearing zones range from a few hundred to a few thousand feet in diameter. They are centrally located within much larger elliptical or circular areas of hydrothermal silicate alteration, and are also encircled by annular pyrite haloes. The main copper mineral, chalcopyrite, occurs both disseminated and as fracture-fillings in biotite-feldspar porphyry, and to a lesser extent, in the adjacent country rocks. Bornite is important in the central portions of the higher-grade deposits. Limited supergene enrichment, with the formation of secondary chalcocite and covellite, has occurred only at Bell Copper. However, the commercial exploitation of this deposit, as well as Granisle, is dependent on hypogene sulphides."

The geology of the Babine Lake Area, and locations of its most significant copper deposits is shown in figure 3. Only the Eocene intrusions and volcanic equivalents are colored to emphasize their distribution.

Reference to the northwest alignment of stocks by Jambor is readily apparent on figure 3. It has been proposed (ref. 5) that these stocks and associated copper deposits fall in to 4 belts, referred to as the Fulton Lake Belt, the Granisle - Old Fort Belt, the Morrison - Fort Babine Belt, and the Nakinilerak - Trail Peak Belt. The geology of the BRO prospect as currently known is described in the following section.

1975 PROGRAM RESULTS

Geological Survey

General Statement

Geological mapping and core logging on the prospect has been carried out mainly by B. Hall. A thorough search for outcrops within the grid area was made. All drill core was logged. Certain holes were assayed for copper.

The BRO grid area is one of moderate relief, ranging from 2900 to 3400 feet above sea level.

Outcrops are scarce. Boulder till overburden ranges to at least 170 feet in places, and tree cover ranges from moderate to thick. Because of the scarce outcrop situation and the complex geology of the prospect, many geometric boundaries of the rock types are not defined precisely.

The geology of the property, in plan view, is given in figure 4. Geological cross-sections are presented in figures 5, 6, 7. Descriptions of diamond drill core for the individual holes is given in Appendix II.

The BRO prospect contains a complex dyke swarm-multiple stock of biotite-hornblende-feldspar porphyries which intrude argillite, andesite flows and tuffs, and amygdaloidal basalt. An absolute age of 49 m.y. has been obtained from the porphyries. The volcanic and sedimentary rocks have been assigned to the Jurassic Hazelton Group, to the Eocene, and possibly Miocene.

The following sections describe rock types, alteration, and mineralization.

Rock Types

Outcrop mapping and core logging recognized 5 types of intrusive rocks, 3 types of sedimentary rocks, and 4 types of volcanic rocks on the property.

(a) Intrusive Rocks

Three of the five types of intrusive rocks are hornblende-biotite-feldspar porphyries of Eocene age. The other two types are a gabbro and basalt dykes or small plugs.

The porphyries together are concentrated in an elongate mass trending northeast. The dimensions of this mass are approximately 8000 x 4000 feet. This complex is not fully delineated to the southwest and northeast.

One of the three types of porphyry is by far the most abundant. This porphyry (unit B_1), is a dark grey, fine to medium-grained biotite-hornblende-feldspar porphyry. It exhibits minor variations in bulk composition and texture, but is consistent enough to use as a mappable unit. It consists of plagioclase (40%), hornblende (3-4%), and biotite (2-8%) phenocrysts, set in a dark grey aphanitic matrix. Hand specimens tested with a pencil magnet are slightly to moderately magnetic.

The main mass of B_1, porphyry is likely represented by the several outcrops shown on figure 4. Several small stocks may coalesce at depth to form an elognate northeast trending body.

Many dykes of the B_1 porphyry extend out to the northwest from the main mass. These dykes have apparent dips to the southeast (see figures 5, 6, 7) and range from a few inches to several hundred feet in thickness. In some cases, the contact portion with argillite contains a relatively large number of inclusions of argillite (drill holes 72-1, -12).

The next most abundant phase of Babine type porphyry is a light grey, medium-grained biotite-feldspar porphyry. This type (B_2) occurs only in drill holes 72-3 and -4. This porphyry is relatively consistant in texture throughout the drill-core intervals. It is composed of 30% plagioclase, and 3 to 5% biotite phenocrysts set in a light grey aphanitic matrix. This porphyry is slightly more magnetic than the B_1 porphyry. Dykes of B_2 porphyry probably dip to the southeast, as shown in figure 6. They vary from a few to at least 200 feet in thickness.

The thrid variety of porphyry is a light grey, medium-grained, hornblende-feldspar porphyry (type B_3). This type is found only in drill core of hole 72-12 (see figure 7). The distinguishing feature of this porphyry is its black euhedral hornblende phenocrysts and almost complete lack of biotite.

A relatively large zone of breccia is present in hole 72-12 . associated with this type of porphyry (see figure 7). Abundant fragments of argillite, tuff, and andesite flows are healed by the B_3 porphyry.

The relative age of the B_3 porphyry with respect to the others is unknown, since no cross-cutting relation ships were observed.

A small body of gabbro (unit C) occurs on the west side of the area of figure 4. It outcrops in the vicinity of L 76E, at 70 N and is intersected by drill-hole 72-11 (see figure 7). Outcrops and drill-hole intersection locations suggest it is a sill or dyke cutting argillite. It has an apparent dip of approximately 70° to the east and an apparent thickness of about 120 feet. It probably strikes north-south.

The gabbro is composed of mostly hornblende (80%) and some slender laths of plagioclase (20%). Its texture varies from fine to medium-grained and is dark green in color. It is moderately magnetic in hand specimen, with very evident seams and blotches of pyrrhotite.

A small dyke of B_1 porphyry cuts the gabbro (see figure 7), so it is as old or older than Eocene. It may be as old as Jurassic.

Dark black, mottled green basalt (unit A) occurs in hole 72-13. No outcrops were located. A very anomalous low of several thousand gammas relief occurs about hole 72-13. The basalt core is extremely magnetic, thus explaining the low. A similar low occurs to the south. Two small dykes or plugs of basalt are interpreted as being present as shown in figure 4.

A small dyke of B_1 porphyry cuts the basalt in hole 72-13, thus indicating an age of at least Eocene.

(b) Sedimentary Rocks

Sedimentary rocks on the property consist of thin-bedded, graphitic argillites, minor greywacke, and calcareous argillite. The graphitic argillites and minor greywacke are part of the Hazelton Group. The calcareous argillites are interbedded with Eocene andesite porphyry flows and flow breccia. The sedimentary rocks of the Hazelton Group have been separated into a separate map unit (unit 3), whereas the Eocene sediments are included with the andesite porphyry as a single map unit.

The graphitic argillites and minor greywacke forms a relatively thick unit on the west part of the grid area. Outcrops are relatively scarce, but the combination of these outcrops, the intersections of argillite in drill holes 72-1, -11, -12, and -14, and the resistivity and frequency effect readings obtained from the I.P. survey, suggest the sedimentary unit strikes North-northwest and dips 70° - 80° west (see figure 7). The unit is at least 1200 feet thick and is known to outcrop a mile south of figure 4.

The argillites are generally well fractured, thin-bedded, and contain numerous calcite veinlets at closely speced intervals. Relatively abundant films of graphite are present on the bedding planes.

(c) Volcanic Rocks

Volcanic rocks have been divided into 3 assemblages; Hazelton Group, Eocene, and Eocene or Miocene.

Those volcanics (unit 4) assigned to the Hazelton Group occur immediately to the east of the argillite (unit 3). Although no bedding attitudes were observed, it is likely they parallel the sedimentary rocks. The volcanics consist predominantly of fine to medium-grained andesite tuffs and breccias, with minor, fine-grained andesite flows and basaltic tuffs. They vary from light to dark green, brown to black.

The volcanics of Eocene (unit 2) are characterized by strikingly porphyritic dark green andesite flows. Generally these flows have a very dark green matrix, with up to 50% white to light green plagioclase laths and 5-10% chlorite clots which are probably pseudomorphs of original biotite and hornblende. Abundant calcite veining is generally present. Intense chloritic alteration is pervasive.

Ovoid clasts of argillite up to $\frac{1}{2}$" in diameter are common in the flows. Calcareous argillite, with very contorted bedding occurs interbedded with the volcanics. A marine environment, with repetitive volcanism and dissruption of unconsolidated mud to produce the contorted bedding, is implied.

The outcrop distribution and drill-hole intersections of unit 2, indicate that it forms a north-south trending band which likely overlies the Hazelton Group unconformably.

Scattered outcrops of amygdaloidal basalt (unit 1) occur in the northeast part of the grid area and immediately north of Saturday Lake. The basalt is a dark green color, with about 10% amygdules. It is moderately magnetic. The amygdules consist of quartz, calcite, chlorite, and epidote. In the outcrop north of Saturday Lake, chalcocite is found in amygdules.

The basalt is tentatively assigned to the Miocene or Eocene. Similar basalts of probably Miocene age occur a few miles east of the property.

Mineralization

Pyrite is the most abundant sulphide and is present over a considerable area. The pyrite varies in quantities of trace amounts to up to an estimated 10% by volume over an area 7200' in diameter. This large pyrite zone is situated on the south side of Broughton Creek and is denoted by a large area of I.P. response indicating sulphides in excess of 2% as shown in figure 4.

Pyrite tends to be disseminated in the porphyries whereas it occurs mainly along fractures and quartz-calcite veinlets in the surrounding volcanic and sedimentary rocks. The highest pyrite observed occur in drill-holes 72-2, -3, -4, -7, and -8.

Pyrrhotite is the next most common sulphide. It appears to be restricted to andesite tuffs (Hazelton) in holes 72-4, and 5, and within the gabbro and immediately adjacent argillites in hole 72-11. It occurs as veinlets and disseminations, and locally reaches amounts estimated to be 5% by volume. It occurs in similar amounts in andesite tuff outcrops in the vicinity of L80, 70 to 80. A zone of pyrrhotite approximately 800 x 1600' is suggested (see figure 4).

Pyrite commonly rims and cross-cuts pyrrhotite, indicating is later. The causative source for the pyrrhotite may be the gabbro. The distribution of pyrrhotite suggests the gabbro plunges northeast.

Chalcopyrite occurs in drill-core in holes 72-3, 4, and 7. The best values of copper obtained from assaying are present in hole 72-3, where the grade ranges from .10 to .16% over a distance of 120'. A zone of .05 - .10% copper which includes holes 72-3, 4, and 7, is implied (see figure 4).

Chalcocite occurs in fracture coatings and amygdules in a basalt outcrop on L 30N at 104E, immideately north of Saturday Lake (see figure 4). Examinations of this occurrence have not been thorough enough to determine if the chalcocite is genetically associated with the basalt, or is derived from a nearby source through groundwater circulation.

Malachite also occurs on fractures in the aforementioned basalt outcrop. Malachite is present in two locations north of Broughton Creek (see figure 4). In both cases the malachite occurs on fractures in pyritized Hazelton Group andesite tuff. Again, only a cursory examination has been made of these outcrops.

Trace amounts of molybdenite were observed in drill holes 72-4, and -7. The molybdenite occurs in quartz veinlets.

Galena and sphalerite occur in very minor quantities in holes 72-2 and 73-3.

Alteration

Incipient to moderate amounts of hydrother mal biotite are present in the dyke swarm-tuff part of the upper portion of hole 72-3, and in the B_1 porphyry and andesite tuff at the bottom part of hole 72-7. The biotite is a dark brown to very dark green, very fine-grained, and occurs as flakes along fractures and within the matrix of the porphyries and the tuffs. A zone of weak hydrothermal biotite about 1000 to 1600 feet in diameter is implied (see figure 4). The fact that it is at surface at hole 72-3 and at depth in 72-7 suggests the zone plunges shallowly to the southeast.

Propylitic alteration (chlorite-cpidote-calcite) is the most common type on the property, and is present in all rock types. It occurs in its greatest concentration within and peripheral to the sulphide zone south of Broughton Creek, and surrounds the incipient zone of hydrothermal biotite.

Epidote-chlorite-calcite is also present in andesite tuffs north of Broughton Creek.

Patchy clay and sericite zones are fairly common in the more sheared and pyritic parts of the drill holes.

Geochemical Survey

A detailed soil sampling survey was undertaken in an attempt to define the subsurface mineralization. Soil samples were taken mostly at 200 foot intervals, over 40 line miles of grid. Most samples were taken from the B horizon, but swampy ground prevented this in some cases. Sampling was done with a mattock. The depth to sample averaged about 10 inches. The samples were placed in Kraft hi-wet strength envelopes, air-dried and sent to Rossbacker Laboratories for analysis for Cu, Zn, Mo and Ag. Rock chip and silt samples were taken whenever possible.

The most common soil type present on the property is wooded brown. Gleysols are the next most common, being developed in the swampy ground.

Almost without exception, the parent material is a boulder-clay till. Overburden depths are known to reach at least 170 feet (in hole 72-14) thus the expected geochemical dispersion should be erratic.

A total of 1222 geochemical samples were taken; this total being made up of 1188 soil samples, 24 rock samples, and 10 silt samples.

Graphs of % frequency and cumulative % frequency have been plotted for copper and zine values to aid in determining anomalous values.

Copper Results

Copper values in soils range from 8 to 280 ppm. The frequency distribution is given in figure 8. Results are shown in figure 9.

A consideration of figure 8 indicates the top 5% of the samples are those 70 ppm and greater. These are considered to be anomalous. The 50% level is 25 ppm. Samples 25 ppm and less are background. Those between 25 ppm and 70 ppm are considered to be threshold values.

Copper results on figure 9 have been color coded according to the following scheme.

8 - 69 ppm - background and threshold

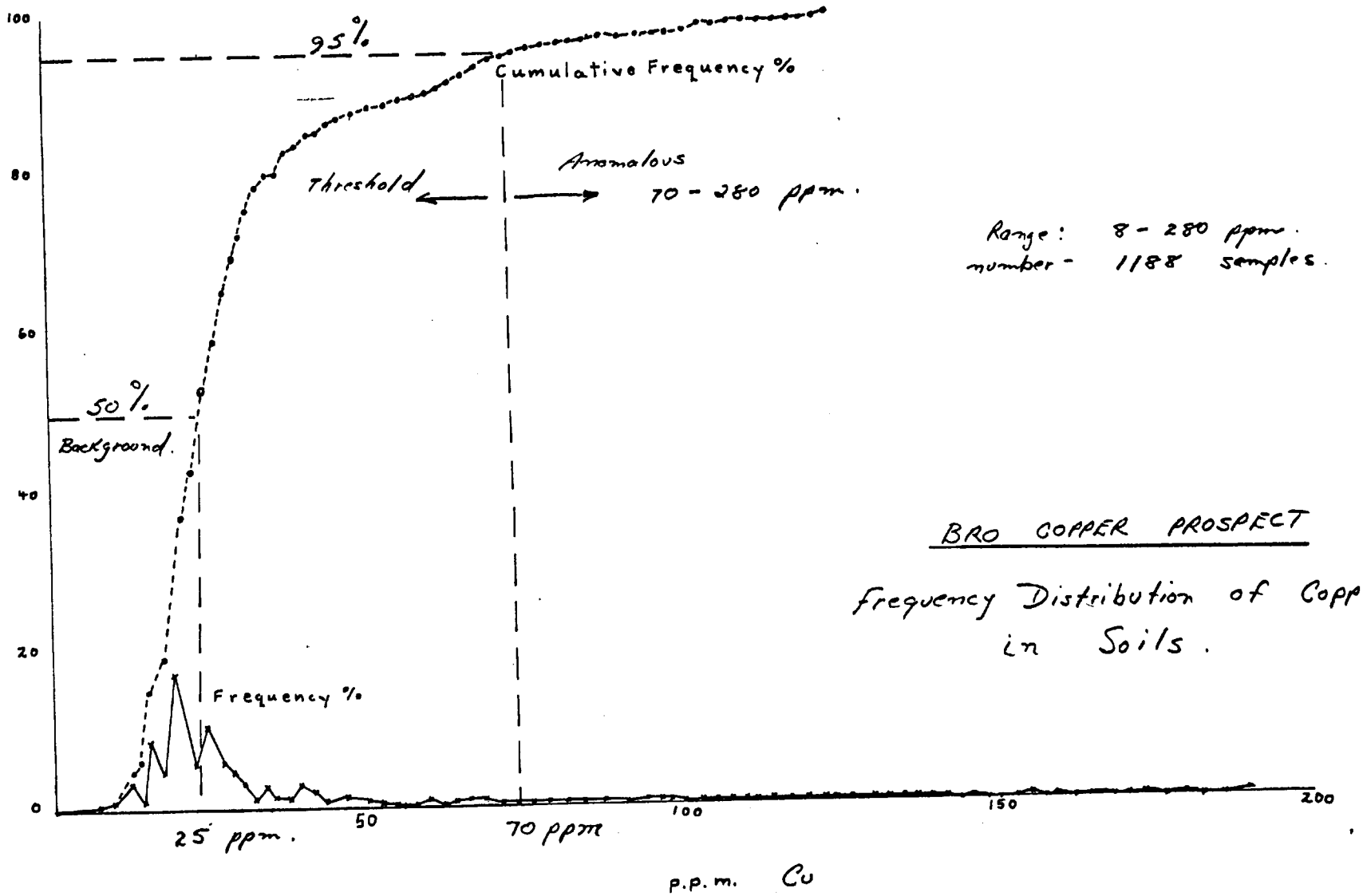
70 - 139 ppm - anomalous

140 - 280 ppm - moderately anomalous

Figure 9 also shown the areas of anomalous I. P. response, and the area of .05 to .10% copper indicated by drill core assays.

Anomalous values are very erratic in their distribution, which is a reflection of the overburden. Several features, A-D, are believed to be significant.

Bro - Copper
Soil Survey



Range: 8 - 280 ppm.
number - 1188 samples.

BRO COPPER PROSPECT

Frequency Distribution of Copper in Soils.

fig. 8.

(a) The area termed A includes the highest number of anomalous values (70 - 139 ppm Cu) and almost all the moderately anomalous values.

It shows good correspondence with the large area of high I. P. response south of Broughton Creek.

(b) The areas termed B contain anomalous copper values which are in correspondence with the northeast trending I. P. anomaly.

(c) Feature C is a high copper value 730 ppm in andesite tuffs. This value confirms the presence of malachite in the outcrop.

(d) Features D, and D_2 are anomalous copper values, (710 and 20,000 ppm) in basalt. Again, virtually no work has been carried out on these outcrops.

Molybdenum Results

Molybdenum values range from 2 to 10 ppm. Values of 2 and 4 ppm are interpreted as being background and threshold. Values of 6, 8, and 10 ppm are interpreted as being weakly anomalous.

Molybdenum values are shown in figure 10. A few scattered weakly anomalous values are present, mainly within the central I. P. anomaly south of Broughton Creek.

Zinc Results

The frequency distribution of Zn in soils, silt, and rocks are shown in figure 11. Results are shown in figure 12. Values range from 18 to 2100 ppm in soils.

Bro-Zinc
Soil Survey

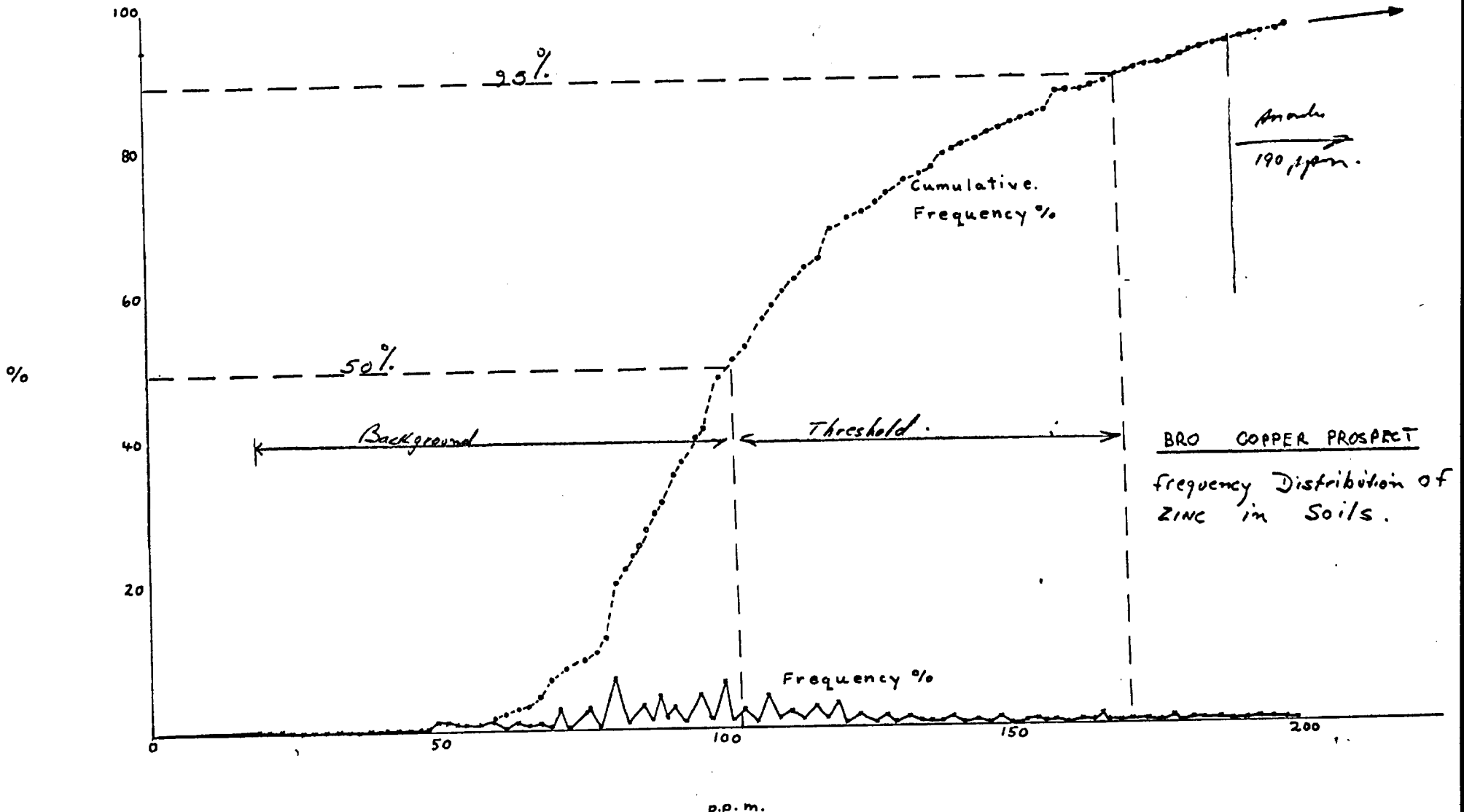


fig. 11.

The highest rock sample contains 1020 ppm Zn. No significant values are present in the silts.

The top 5% of the samples are those of 190 ppm to 2100 ppm. These are considered to be anomalous. Values less than 190 ppm are background and threshold amounts.

Zinc results on figure 12 have been divided and color coded according to the following:

18 - 189 ppm = background and threshold

190 - 380 ppm = anomalous

381 - 2100 ppm = moderately to strongly anomalous

As with copper, anomalous and moderately to highly anomalous zinc values are concentrated in the area of high I.P. response south of Broughton Creek.

Silver Results

Silver results range from .2 to 2.2 ppm. Results are shown on figure 12. No significant silver values are present.

Magnetic Surveys

Two types of magnetic survey coverage have been carried out; airborne and ground. The airborne survey was carried out in the general area north of Fulton Lake. Its results are described in reference 6.

A detailed ground magnetometer survey was carried out over 30 line miles of grid, using a Scintrex MF-2 fluxgate magnetometer. Readings were taken at 100 foot intervals. The instrument was initially adjusted to near zero at L 80E on line BL 74N. Lines BL 74N, and BL 120E were then surveyed and corrected to the initial reading. The north-south and east-west picket lines were then surveyed and corrected, using the corrected stations on the two BL lines.

The magnetic contour plan for the airborne survey over the BRO property area is shown in figure 13. The ground magnetic survey is shown in figures 14 and 15. Figure 14 shows corrected readings for each station, whereas figure 15 shows the isomagnetic contours.

The texture of the contour plan of the aeromagnetic survey has been divided into the following relatively distinct units.

(1) Areas likely underlain by volcanic rocks-characterised by relatively high relief of contours between 1200 to 1400 gammas. These are elongated N-S.

(2) A north trending low of 1200-1100 gammas contour values which is most likely representative of argillite.

(3) A north east trending low which marks the abrupt northern termination of the low representing argillite, and the disruption of the area of probable volcanics underlying much of the BRO grid. This feature most likely represents a northeast trending fault.

(4) A very pronounced low, feature A, of 1100 gammas to less than 700 gammas contour values is the most striking feature occurring central to the BRO grid.

(5) Two small very pronounced lows occurring on the north fringes of the BRO grid. Feature B_2 was examined and found to be in part underlain by biotite-feldspar porphyry. No outcrop was found in the vicinity of B_1.

(6) Features C_1 and C_2 are north-trending highs. Amygdaloidal basalt is known to occur within the area of C_1.

The texture of the contours of the aeromagnetic survey (figure 13) compare very closely with those of the ground survey (figure 15). The following comments apply to figure 15.

(1) Areas known to be underlain by volcanic rocks are characterized by variable relief of magnetic contours with a general N-S trend. Two such areas lie within the area covered by the ground survey, one within the east half of the BRO grid, the other, on the northwest fringe.

(2) Only the eastern half of the area that is probably underlain by argillite has been covered by the ground survey. It is characterized by low magnetic relief with readings of 100 to 200 gammas.

(3) The northeast trending implied fault evident of the aeromagnetic survey is also evident on the ground survey. The ground survey suggests that it joins a east-west trending fault towards the southwest.

(4) The anomalous low (feature A) on the aeromagnetic survey is very evident on the ground survey results. The ground survey results show a corresponding low marked by the 0 gamma contour line. The cause of this low is very difficult to explain in terms of a single causative rock type. The main southern part of it contains an outcrop of biotite-hornblende feldspar porphyry. The several drill-holes within it intersected rocks varying from porphyry to relatively magnetic, pyrrhotite-rich, gabbro.

(5) Two very striking magnetic lows showing several thousand gammas negative relief are evident on the ground survey. Drill hole 72-13 is situated in the most northerly of these two lows. Drill-core at the bottom half of the hole is extremely magnetic basalt. The cause of these two lows is believed to be small dykes or plugs of basalt. The low values indicate reverse remnent magnetism with respect to the present day earth's field.

(6) Feature C_1, the north-south trending high evident in the aeromagnetic survey, is very evident in the ground survey. It shows up as a high with values of 500 to over 1000 gammas trending northward through Saturday Lake. Its cause is believed to be amydaloidal basalt.

(7) Feature B_1, the low on the northwest side of the BRO grid, is evident on line 136 N on the ground survey map, between lines 40 E and 56 E.

I.P. Survey

A total 20.2 line miles of induced polarization/resistivity surveying were completed by Morrison and DePaoli, I.P. contractors. The results of this survey were recorded as assessment requirements in the fall of 1975. The report satisfying the assessment regulations is included as Appendix C of this report.

An interpretation of the sulphide distribution has been carried out by G. DePaoli (see appendix C). DePaoli's interpretation of the high sulphide boundaries has been shown on the geological (fig. 4), geochemical (figures 9, 10, 12) and airborne (fig. 13) and ground magnetic (fig. 15) survey maps.

The areas of anomalous I.P. response can be regarded as three distinct entities.

(1) A north trending zone situated between lines 57 E and 72 E. It is almost certain that this anomaly in entirely caused by graphitic argillites. Drill-holes 72-14, and 12 which contains this rock type are within it. It corresponds to the flat magnetic low attributed to argillite.

(2) A major area of I.P. response situated on the south side of Bronghton Creek. This anomaly is the feature which Amoco has drilled. It is indicative of a zone of sulphides of 1 to 6% by volume (frequency effect readings of up to 19%) with dimensions of 4000 x 2000 feet. Within the center of this zone, drilling suggests a zone of .05 to .10% copper is present.

The I.P. anomaly is readily explained by the large amounts of pyrite and pyrrhotite visible in outcrops and drill core.

(3) A northeast trending linear anomaly is present north of Broughton Creek and is coincident with the fault zone suggested by the magnetic surveys. The cause of the anomalous I.P. response is believed to be due to sulphides and not to graphitic argillites.

The only outcrop within the anomaly is pyritic Hazelton Group tuff and Eocene andesite flows. Anomalous copper in soils occurs coincident with the highest part of the anomaly along line 80 E (see figure 9). The next nearest outcrops are situated to the north and contain malachite on fractures. As DePaoli points out, the northeast direction is the direction of the stock complex and ore body at Granisle.

DISCUSSION

The objective of the 1975 BRO program was to determine if there were any drill targets remaining that Amoco failed to test. As can be seen from the foregoing data, Amoco has thoroughly drilled the main sulphide zone to a maximum depth of 651 feet (hole 72-4). Assay results suggest a zone of .05 - .10% copper situated within the main sulphide zone. This zone may plunge southeast, as suggested by Holes 72-3, and 72-7. This higher copper zone shows a corresponding zone of incipient hydrothermal biotite.

The density of drill-holes virtually eliminates the possibility of an open pit deposit being outlined within the main sulphide zone.

There is however, a possibility for large tonnages of viable grade at depth. It is possible that the weak .05 - .10% copper zone and its incipient hydrothermal biotite is indicative of better grade below the present bottom of drill-holes. Grades amenable to block caving are a possibility, since the core portions of Granisle and Bell Copper contain grades of .8 to 1.0% copper. It is conceivable that we are seeing only the top part of a deep ore body on the BRO prospect. Consideration should be given to drilling a vertical hole 1000 to 1500 feet in depth. The recommended location for this hole is shown in figure 4.

APPENDIX II

BRO

DIAMOND DRILL CORE LOGS

SUMMARY DRILL LOG

HOLE 72-1 — LOGGED BY B. Hall

BEARING — — ELEVATION 3235'

DIP -90° — LOCATION L 80E

LENGTH 267' — @ 60N

Footage	Description
0-25'	- Overburden.
25'-58'	- Hornblende-feldspar-biotite porphyry - unit B - fine to med. grained, medium gray, portions have greenish cast, slightly magnetic, 1% disseminated pyrite, sporadic calcite-qtz-pyrite veinlets, several small shear zones. Inclusions of bleached argillite, tuff common.
58'-138'	- Zone of porphyry and intrusive breccia - porphyry same as 25-58'. Breccia consists of abundant angular fragments of argillite, lesser amounts of tuff and porphyry, healed in a porphyry matrix. - probably originally hornfelsed argillite that has been intruded by the porphyry. Breccia contains 2% pyrite as disseminations and veinlets. Several 1' to 3' intersections of porphyry dykes. 81'-82' - basalt dyke - unit A.

footage	Description
138'-156'	- Argillite, greywacke - Hazelton - unit 3 - mainly greywacke, 1 to 2% disseminated pyrite, cut by several porphyry dykes - same as 25'-58'.
156'-267'	- Andesite tuffs, flows - Hazelton - unit 4 - fine to medium grained, medium to light green andesite flows and tuffs., chlorite - epidote - calcite in shears, fractures. 1-2% pyrite.

Summary Drill-Log.

Hole - 72-2
Bearing - -
Dip - -90°
Length - 289'.

Logged by: B. Hall.
Elevation 3195'
Location: L 80 E, 64 N.

Footage	Description
0 - 16'	- overburden.
16 - 85'	- green porphyritic Andesite flow - Eocene - unit 2 0-30' - FeO_x zone rock is very porphyritic, plagioclase phenocrysts ± 30%, dark green chlorite phenocrysts (after biotite, hornblende), set in medium grained matrix. Ovoid fragments of argillite common, rock only slightly magnetic. Pyrite in sporadic veinlets, 8-10% in some sections, average 2%. Calcite chlorite veining very pronounced, some quartz veining. Shearing common. Alteration: chlorite - carbonate - epidote.
85 - 115'	- dark green, porphyritic andesite flow breccia - Eocene - unit 2. andesite is same as 16-85', but contains abundant angular fragments of argillite,

Footage	Description
	limey argillite, and Hazelton Group tuff. Patchy chlorite alteration, calcite veining abundant, pyrite increasing to 3-4%.
115' - 140'	- Andesite tuff, flows - Hazelton - unit 4. - light to medium green, fine to medium grained andesite tuffs and flows. Moderately magnetic, patchy chlorite along fractures, pyrite in chloritic shears, average 2-3% by volume, shows steady increase towards bottom of hole.
140' - 146'	- hornblende - biotite - feldspar porphyry - unit B - fine-grained, medium grey, slightly magnetic, 5-6% pyrite in qtz - sericite veinlets.
146' - 149'	- Andesite tuff, flows - Hazelton - unit 4. - same as 115' - 140'.
149 - 157	- hornblende - biotite - feldspar porphyry - Unit B - same as 140' - 146'.
157' - 289'	- Andesite tuff, flows - Hazelton - unit 4 - same as 115' - 140', pyrite increasing to 5-6% by end of hole @ 289'.

SUMMARY DRILL LOG

HOLE	72-3.	LOGGED BY	B. Hall
BEARING		ELEVATION	3167'
DIP	-90°	LOCATION	L 80 E
LENGTH	439'		68 N

Footage	Description
0-23'	- overburden
23'-234'	- altered biotite-feldspar porphyry dyke swarm cutting andesite porphyry flows (Eocene?) and andesite tuffs (Hazelton?). Section 23' - about 80' is andesite porphyry, grades into tuff. Contact not definite due to alteration. Rock is dark grey-brown, due to fine-grained hydrothermal biotite. Rock cut by qtz-calcite-pyrite veinlets, with minor chalcopyrite, 4-7% pyrite, very magnetic (magnetite) in more altered sections. This section is the best alteration and chalcopyrite mineralization observed in all the drill-holes.
234'-439'	- biotite-feldspar porphyry - unit B_2, - medium grey, fine to medium grain, trace pyrite, fine-grained chlorite from 300-345', 380'-439'. Section 380'-439' contains disseminated chalcopyrite.

SUMMARY DRILL LOG

HOLE 72-4 — LOGGED BY B. Hall

BEARING - — ELEVATION 3156'

DIP -90° — LOCATION L80E

LENGTH 651' — 72N

Footage	Description
0-34'	- overburden.
34'-46'	- andesite tuff - Hazelton - unit A - fine-grained, dark green, slightly magnetic, Pyrite 4%, trace of chalcopyrite, patchy dark green biotite alteration.
46'-51'	- biotite-feldspar porphyry dyke - unit B - same as hole 3, medium gray, fine to medium grained, 3% pyrite, some quartz veining with trace of molybdenite
51'-74'	- andesite tuff - Hazelton - unit A. - same as 34'-46'
74'-81'	- biotite-feldspar porphyry dyke - unit B - same as 46'-51'.
81'-651'	- andesite flows, breccias, and tuffs - Hazelton - unit A. - patches of bleaching and brecciation

footage	Description
	mixed throughout section. Pyrrhotite increases towards bottom, by about 250' have 4% pyrrhotite, 2% pyrite, pyrite rims pyrrhotite. Rock varies from slightly to highly magnetic depending on pyrrhotite content. Patchy chlorite - calcite alteration, trace amounts of chalcopyrite and molybdenite in quartz - calcite pyrite veinlets. Section cut by biotite - feldspar porphyry dykes @ 104' - 105' 111' - 112' 126' - 128' 200' - 202'.

SUMMARY DRILL LOG

HOLE 72-5 — LOGGED BY B. Hall

BEARING - — ELEVATION 3114'

DIP -90° — LOCATION L 80E

LENGTH 219' — 76 N.

Footage	Description
0-14'	- overburden
14'-219'	- andesite flows, tuffs, and breccias - Hazelton - unit 4. patchy chlorite - calcite veinlets, 4-6% disseminated and vein pyrite, only slightly magnetic, dark green overall color. 146'-149' - fine-grained, biotite feldspar porphyry dyke., pyrite in veinlets and disseminations ≈ 2%.

SUMMARY DRILL LOG

HOLE	72-6	LOGGED BY	D.A. Silversides
BEARING	-	ELEVATION	3116'
DIP	-90°	LOCATION	L 88E
LENGTH	239'		60N.

Footage	Description
0-29'	overburden.
29-81'	- porphyritic andesite - Eocene - unit 2 - dark green, porphyritic andesite, with abundant ovoid argillite fragments 1/8" to 1/4" in diameter. Section cut by abundant epidote - carbonate veinlets, abundant chloritic shears, only trace amounts of pyrite. - rock probably volcanic equivalent of the porphyries.
81-107'	- argillite - Eocene - unit 2. - mottled dark black - white calcareous argillite, abundant white calcite veinlets 1/16" - 1/4" thick, no visible sulphides.
107'-146'	- porphyritic andesite flow breccia - Eocene - unit 2 - same as 29'-81', but contains much more angular argillite fragments.

footage	Description
146-160	- <u>argillite</u> - Eocene - unit 2 - same as 81-107'
160-178	- <u>porphyritic andesite flow breccia</u> - Eocene - unit 2 - same as 107'-146', but much more altered, highly sheared, talc-coated slickensides, pervasive chloritic alteration abundant calcite-epidote veinlets.
178-187'	- <u>argillite</u> - Eocene - unit 2 - same as 81'-107'
187'-239	- <u>andesite tuff</u> - Hazelton - unit 4 - fine-grained, medium green, becoming progressively more bleached, pyrite appears in quartz-carbonate veinlets @ 200', increases to 3-5% by end of hole at 239'. Core is very sheared from 218 to end of hole, has patchy sericite alteration.

SUMMARY DRILL LOG

HOLE 72-7 — LOGGED BY D.A. Silversides

BEARING - — ELEVATION 3130'

DIP -90°. — LOCATION L 88E

LENGTH 407' — 68N.

Footage	Description
0-17'	- overburden
17-79'	- biotite - hornblende - feldspar porphyry - unit B_1 - dark grey, medium to fine-grained, abundant pyrite 3-5% by volume as disseminations and in thin fractures and quartz veinlets, veinlet spacing 6". Trace amounts of chalcopyrite and molybdenite. alteration - dark greenish brown - by hornblend biotite? throughout rock, chlorite. epidote on fractures.
79'-124'	- andesite tuff - Hazelton - unit 4 - dark to light green, 3-5% pyrite in fractures, disseminations, and quartz veinlets, trace of chalcopyrite and molybdenite.
124'-134'	- biotite - hornblende - feldspar porphyry - unit B_1 - same as section 17'-79'.

footage	Description
134'-137'	- andesite tuff - Hazelton - unit 4 - same as section 79'-124'.
138'-148'	- biotite - hornblende - feldspar porphyry - unit B, - same as 17'-79'.
148'-270'	- andesite tuff - Hazelton - unit 4 - same as section 79'-124'. 179'-180' - biotite - feldspar - porphyry at about 225', patchy clay - sericite alteration appears, general pyrite content picks up to 5-7%, have an increase in quartz - carbonate veinlets
270'-276'	- biotite - hornblende - feldspar porphyry - B, - same as 17'-79'
276'-295'	- andesite tuff - Hazelton - unit 4 - same as 148'-170'
295'-334'	- biotite - hornblende - feldspar porphyry - B, - same as 17'-79'
334'-377'	- andesite tuff - Hazelton - unit 4 - very fine-grained, light reddish brown (biotite?), cut by dark green

footage	Description
	hydrothermal biotite or chlorite seams, 5-7% pyrite, trace of chalcopyrite.
377'-407'	- biotite - hornblende - feldspar porphyry - B1 - brown cast to matrix - initial stage of hydrothermal biotite?, 2-4% pyrite, trace of chalcopyrite.
	- at about 350', alteration and pyrite content starts to increase.

SUMMARY DRILL LOG

HOLE 72-8 — LOGGED BY D. A. Silversides

BEARING — — ELEVATION 3150'

DIP -90° — LOCATION L 88E

LENGTH 264' — 76 N.

Footage	Description
0'-71'	- overburden
71'-108'	- porphyritic andesite flow breccia - Eocene - unit 2. - grey green, andesite porphyry with abundant argillite fragments 1/8" - 1/4", pervasive chlorite - epidote - carbonate alteration, 4-7% pyrite in quartz - carbonate veinlets, trace amts of chalcopyrite.
108'-110'	- biotite - hornblende - feldspar porphyry - B_1 - dark grey matrix, feldspars altered to clay. 2-3% disseminated and vein pyrite; trace of chalcopyrite
110'-124'	- porphyritic andesite flow breccia - Eocene - unit 2. - same as 71'-108'.
124-187'	- andesite tuff - Hazelton - unit 4 - fine to medium grained, black & light green color. pyrite 4-7%, rock

footage	Description
	becoming more bleached, fractured.
187'-192'	- biotite-hornblende-feldspar-porphyry - unit B_1
	- same as 108'-110'.
192'-222'	- andesite tuff - Hazelton - unit 4
	- Same as 124'-187'.
222'-264'	- biotite-hornblende-feldspar porphyry - unit B_3
	- same as 108-110, except becoming
	more pyritic, sheared,

SUMMARY - DRILL LOG

HOLE 72-9 — LOGGED BY D.A. Silversides

BEARING — — ELEVATION 3100'

DIP -90° — LOCATION L 88E.

LENGTH 250' — 84N.

Footage	Description
0-120'	- overburden
120'-171'	- porphyritic andesite breccia - Eocene - unit 2 - fine to coarse-grained feldspar porphyry flow breccia - matrix and fragments are andesite porphyry, argillite fragments angular. 1-2% pyrite, very abundant epidote-chlorite-carbonate stringers and veinlets diminish @ 120'
171'-214'	- andesite flow breccia - Eocene - unit 2 - dark green, < 1% pyrite.
214-250	- andesite tuff - Eocene - unit 2 - dark green, < 1% pyrite.

SUMMARY DRILL LOG

HOLE	72-10	LOGGED BY	B. Hall
BEARING		ELEVATION	3120'.
DIP	-90°	LOCATION	L 80 E
LENGTH	279'		84 N.

Footage	Description
0'-120'	- overburden
120'-279'	- green porphyritic andesite flow - Eocene - unit 2 - flows vary from very porphyritic to almost aphanitic, only very slightly magnetic. Contain 2-3% disseminated pyrite, abundant calcite veining, chloritic shears.

SUMMARY DRILL LOG

HOLE 72-11 LOGGED BY D.A. Siversides

BEARING - ELEVATION 3209'

DIP -90° LOCATION L76E.

LENGTH 439' 70N.

Footage	Description
0-8'	- overburden.
8'-136'	- argillite - Hazelton - unit 3. - black to mottled green and light cream color, moderate epidote chlorite alteration, 1-2% pyrite in fractures, increasing by 90' to 3% pyrite, corresponding increase in pyrrhotite, trace amounts of chalcopyrite, some garnet stringers. Some greywacke layers 2" to 2' thick.
136'-387'	- gabbro - unit C. - dark green, moderate chlorite alteration, 3-5% pyrrhotite-pyrite in veinlets, trace amounts of chalcopyrite in quartz-calcite-pyrite veinlets. 319'-321' - hornblende porphyry dyke, 2-3% disseminated pyrite. - gabbro varies from slightly to moderately magnetic.

footage	Description
387'-439'	- <u>argillite</u> - Hazelton - unit 3 - bleached, mottled light green to cream, 3-4% pyrite, no pyrrhotite.

SUMMARY DRILL LOG

HOLE 72-12 — LOGGED BY D.A. Silversides

BEARING — — ELEVATION 3120'

DIP -90° — LOCATION L72E.

LENGTH 548' — 68N.

Footage	Description
0'-22'	- overburden.
22'-257'	- argillite - Hazelton - unit 3. - black, thin-bedded, graphitic argillite, trace of pyrrhotite, cut by barren calcite veinlets spaced 1-2", increasing to 1/2" spacing by 90'. Veinlets are hairline to 1/4" thick. Chlorite increases noticeably at about 90'. Angle of bedding 90° to core axis, therefore beds nearly vertical. Pyrite content increases rapidly @ 190' to about 3-5% by volume. By 244', bleaching has increased to total pervasive, rock mottled light green to cream. Rock cut by 1/16" pyrite - chlorite stringers every 1/2".
256'-258'	- hornblende - feldspar porphyry dyke - unit B3 - light grey, fine to medium grained, 3-5% disseminated pyrite., not magnetic.

Footage	Description
258'-274'	- argillite - Hazelton - unit 3 - bleached, pyritic - same as 211'-256'.
274'-345'	- hornblende-feldspar porphyry - unit B_3 - same as 256'-258', trace of chalcopyrite, 2-3% disseminated pyrite
345'-400'	- argillite - Hazelton - B_3 - same as 244'-256'. @ 348', black sphalerite, pyrite, pyrrhotite in a 1" quartz-filled breccia zone.
400'-402'	- Breccia - healed by hornblende-feldspar porphyry - B_3 - angular ½" fragments of bleached argillite healed by hornblende-feldspar porphyry, 3-5% disseminated pyrite.
402'-404'	- hornblende-feldspar porphyry - unit B_3 - same as 274'-345'
404-405	- argillite - Hazelton - unit 3 - same as 345'-400'
405-406	- Hornblende-feldspar porphyry - unit B_3 - same as 274-345'.

footage	Description
406-407	- argillite - Hazelton - unit 3 - same as 345'-400'.
407-408	- hornblende-feldspar porphyry - unit B_3 - same as 274-345'.
408-410	- Breccia - healed by hornblende-feldspar porphyry - B_3 - same as 401-402.
410-447'	- argillite - Hazelton - unit 3 - same as 345'-400'.
447'-455'	- biotite-hornblende-feldspar porphyry - unit B_1 - fine to medium grained, dark grey matrix, 2-3% pyrite
455'-485'	- breccia - healed by biot-horn.-feld. porphyry - B_1 - fragments are bleached argillite, 3-5% disseminated pyrite.
485'-541'	- biotite-hornblende-feldspar porphyry - B_1 - same as 447'-455'
541'-548'	- argillite - Hazelton - unit 3 - same as 345'-400'.

SUMMARY DRILL LOG

HOLE 72-13 — LOGGED BY B. Hall

BEARING - — ELEVATION 3190

DIP -90° — LOCATION L84E.

LENGTH 209' — 55N.

Footage	Description
0-6'	overburden
6-140'	- biotite-hornblende porphyry - B; - medium gray, dark gray matrix, moderately magnetic to strongly magnetic in section 130'-140'. - very slight epidote carbonate alteration, < ½% pyrite. - chill zone 130'-140'
140-209	- basalt - unit A. - black, dense, fine-grained, some fragments to 1/8", small plagioclase phenocrysts, very magnetic. cut by biotite-hornblende porphyry dyke 174'-176'. - basalt cut by epidote-chlorite stringers. - basalt is a dyke or small plug.

SUMMARY DRILL LOG

HOLE 22-14 — LOGGED BY B. Hall

BEARING - — ELEVATION 3170'.

DIP -90° — LOCATION L64E

LENGTH 209' — 88N.

Footage	Description
0-171'	- overburden
171-209'	- argillite - Hazelton - unit 3. - thin-bedded, graphitic argillite, bedding @ 10° to core axis., cut by numerous 1/16" - 1/4" calcite veinlets, no pyrite.

SUMMARY DRILL LOG

HOLE 73-3 — LOGGED BY B. Hall

BEARING 90° — ELEVATION 3135'

DIP -45° E. — LOCATION L 92E

LENGTH 500'. — 62N.

Footage	Description
0-28'	- overburden
28'-378'	- hornblende-biotite-feldspar porphyry - unit B, - fine to medium grained, generally 2-3% disseminated and veinlet pyrite, moderate chlorite alteration, patchy clay alteration, very slightly magnetic. - 128-137' - highly fractured, clay alteration of plagioclase. 318'-339' - coarse-grained. 343-378 - zone of brecciated, faulted porphyry, heavy FeO_x stain, many slickensided surfaces.
378'-404'	- andesite tuff - Hazelton - unit 4. - brecciated and faulted, dark green chloritic andesite tuff, 1-2% disseminated and vein pyrite
404'-435'	- andesite tuff - Hazelton - unit 4 - very fine grained, 1-2% pyrite, siliceous.

footage	Description
135-165	- basaltic tuff - Hazelton - unit 4 - black, fine grained basalt matrix, with abundant andesite, tuff fragments up to 1/2"; 1-2% pyrite in fractures; moderately magnetic.
465'-481'	- andesite tuff - Hazelton - unit 4. - light green, fine-grained, 3% pyrite 476' - 480' - fine-grained hornblende-feldspar porphyry dyke - B_1.
481'-500	- Andesite tuff - Hazelton - unit 4 - dark green, medium to coarse grained, 4% pyrite on fractures, abundant epidote.

SUMMARY DRILL LOG

HOLE	73-9.	LOGGED BY	B. Hall.
BEARING	270°	ELEVATION	3190'
DIP	-45°	LOCATION	L 92E
LENGTH	500'.		70 N.

Footage	Description
0-46'	- overburden
46'-500'	- biotite-hornblende-feldspar porphyry - unit B1 - medium to fine-grained, dark grey matrix, 1-2% pyrite in fracture, slight chloritic alteration, patchy clay zones.

SUMMARY DRILL LOG

HOLE 73-5. LOGGED BY B. Hall.

BEARING 90° ELEVATION 3220'

DIP -45° LOCATION L 96E.

LENGTH 226' 87 N.

Footage	Description
0-16'	- overburden
16-100'	- biotite - hornblende - feldspar porphyry - unit B. - medium grained, dark gray matrix, trace of disseminated pyrite. 100'-101' - fault zone.
100-141	- andesite tuff - Hazelton - unit 4. - dark green, heavily chloritized, 1% pyrite, abundant FeO_x, sheared from 100-140, fault zone.
141'-226	- basaltic tuff - Hazelton - unit 4. - slightly magnetic; 1-2% pyrite, increases towards bottom of hole.