6436

QUEEN CLAIMS
NTS 82 E 2
Drilling, August 1977
-77-#328-#6436

R. V. Longe
September 1977

SUMMARY

One diamond drill hole 304 metres in length was drilled to test an I.P. anomaly developed by McIntyre in 1967, confirmed by Riocanex in 1977, and thought to coincide with the inferred position of the Basal Brooklyn Limestone.

The hole intersected 152 metres of Upper Sharpstone and related rocks, distributed over the length of the hole by 142 metres of Tertiary dykes and sills. The I.P. anomaly was shown to be due to pyrite and graphite in chloritic cherts at the base of the Upper Sharpstone sequence. The last rocks of the Brooklyn formation to be intersected (at 228 m) were pyrite-bearing cherts. The Basal Brooklyn Limestone is now thought to lie beneath these cherts and is still considered a good target for copper-gold orebodies of the Phoenix type.

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INTRODUCTION

Exploration by Riocanex in the Greenwood camp during 1975 and 1976 led to the conclusion that there exists two sharpstone-limestone sequences, an Upper and a Lower and that the Lower (the host to the Phoenix body) was a likely host for large bodies of copper-bearing sulphide minerals.

Search for this Basal limestone in Wallace Creek (the Forshaw Option) was unsuccessful, it being either too deep, or limited by faults. The vicinity of the Copper Queen Mining Camp however, appeared likely to contain the Basal limestone underneath volcanic cover. The presence of copper sulphides (as small ore bodies mined at the beginning of the century) in the Upper Limestone, together with an I.P. anomaly that appeared to coincide with the inferred position of the Basal Limestone provided sufficient encouragement to stake and option claims over the Copper Queen Mining Camp. Option agreements were concluded in early 1977. This report describes the results of one diamond drill hole directed at the I.P. anomaly.

2. LOCATION DATA

The claims lie 8 km northwest of the city of Greenwood in Southern B.C., and 13 km north of the U.S. border (Figure 1).

N.T.S. 82/E/2

Location of principle workings of the Copper Queen Camp:

Latitude; Longitude	118°46.5' W ; 49°7.5 N
U.T.M.:	370100 mE ; 5442000 mN; Zone 11
Elevation:	4220 feet above sea level

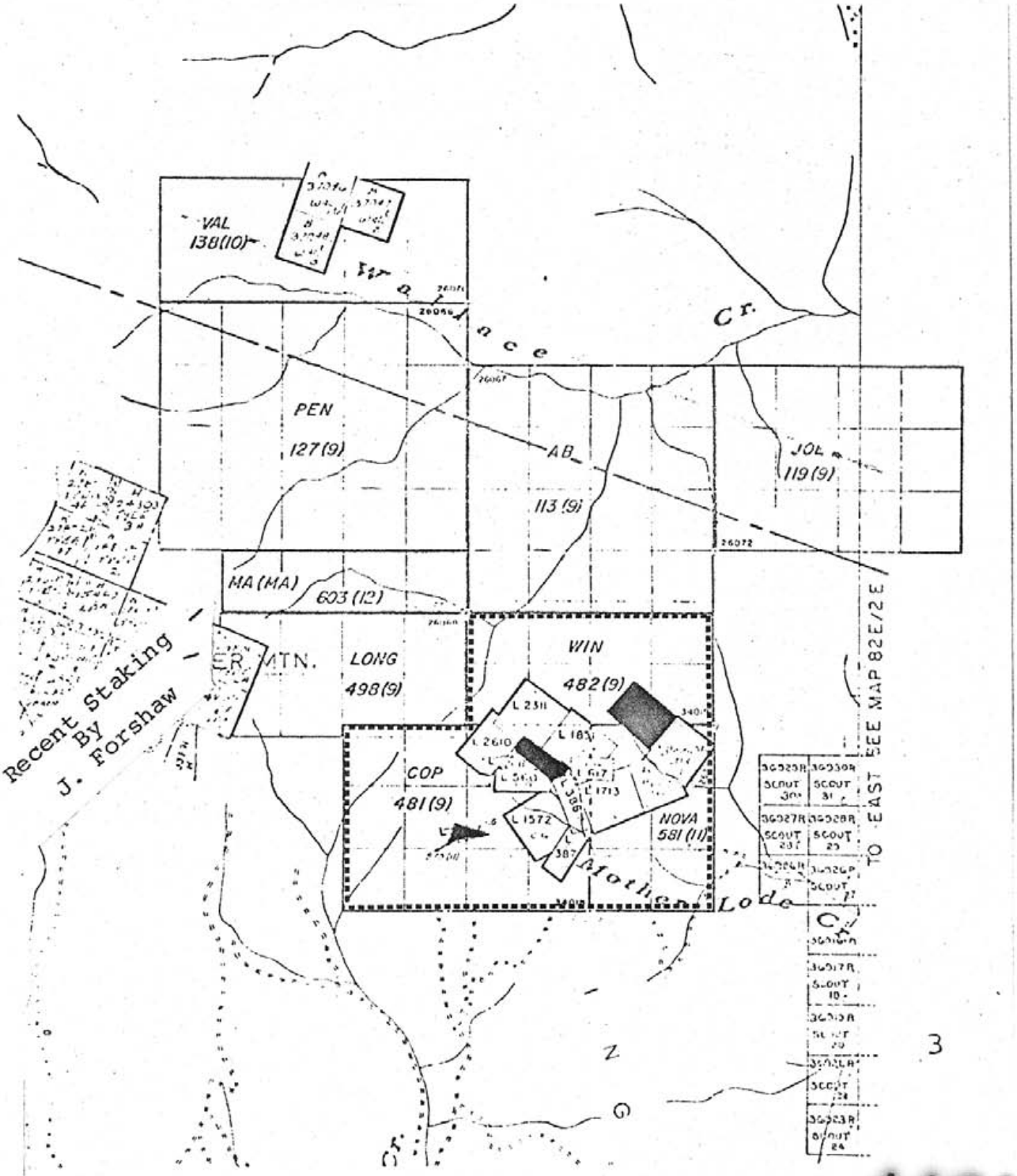
3. TOPOGRAPHY AND ACCESS

The claims straddle a ridge trending northeast-southwest. To the southeast of the ridge the ground slopes steeply from 5,000 ft. at the top of the ridge to 4,000 ft. below. To the northwest lies a dissected plateau at approximately 5,000 feet. Most of the south slopes are covered by widely-spaced timber and grassland. On other slopes and in the valleys timber is of moderate size and the undergrowth thick in places. Access is by 8 km of earth road between Greenwood and the main workings. Although partly overgrown, a branch road remains usable for driving to the I.P. anomaly. 50 metres of new road makes the 1977 drill site accessible to four-wheel drive vehicles.

OWNERSHIP AND CLAIM STATUS (Figure 2)

Two claims were staked in August 1977: the COP claim (12 units) and the WIN claim (8 units). A third claim (NOVA) was staked for Riocanex in November 1976. Three reverted crown grants were acquired by application. Nine of the remaining 10 crown grants were optioned. A tenth crown grant (number L2610) was not optioned because the owner could not be reached and because at the time this crown grant did not appear to cover promising ground.

A description of the claims follows in Tables 1 and 2.



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outline of Queen Claims

Crown Grants acquired by application

Crown Grants sought under option

Claims belonging to D.F. Pasco

QUEEN CLAIMS

Source: B.C. Dept. Mines Microfilm date Jan 27 77

Figure 2

TABLE I

LOCATED CLAIMS AND REVERTED CROWN GRANTS

ON COPPER QUEEN MINING CAMP

held by Riocanex September 1977

QUEEN CLAIMS

NAME	UNITS	RECORD NUMBER	DATE RECORDED	DUE DATE
COP	12	481	Sept 3, '76	Sept 3 '77
WIN	8	482	Sept 3, '76	Sept 3 '77
NOVA	6	581	Nov 26 '76	Nov 19 '77
COPPER MINE	20 Acres	577	Nov 19 '76 Crown Grant	Nov 19 '77
JUMBO	39.3 "	576	Nov 19 '76 Crown Grant	Nov 19 '77
COMMANDER	6.38 "	575	Nov 19 '76 Crown Grant	Nov 19 '77

OTHER CLAIMS WITHIN QUEEN CLAIM BLOCK

Two 2-post claims, JR 1 & JR 2, belong to Mr. D. F. Pasco who has verbally given Riocanex right of first refusal in return for performance of assessment work.

TABLE II

CROWN-GRANTED MINERAL CLAIMS WITHIN COPPER QUEEN MINING CAMP UNDER OPTION TO RIOCANEX, SEPTEMBER 1977

L 387
L 388

Held by:
Roberts, E.P. and Roberts W.D. of:
2102 Lincoln Street,
Spokane, Washington, U.S.A.
(copy to McArthur, W.E., Box 629,
Greenwood, B.C.)

L 617
L 1572
L 1713

Held by:
McArthur, W.E.
Box 629,
Greenwood, B.C.

L 1851
L 2311
L 660
L 2611

Held by:
Sandner, R.E.
Cascade, B.C.

Unoptioned By Riocanex

L 2610 Held by:
Healy, P.C.
c/o Healy, W.W.
6428 North Pleasant Fresno,
California 93705
U.S.A.

5. THE GREENWOOD CAMP

The Copper Queen camp lies on the fringes of the Greenwood Mining camp, the ore deposits of which fall into two classes: conformable copper or copper-zinc orebodies lying in Brooklyn Limestone, and silver-gold veins associated with granitic intrusives. All the significant base-metal deposits belong to the first category.

Most mines in the area ceased operation in 1919. By this time the Boundary Camp, as the area was then known, had produced 22 million tons of ore averaging slightly over 1.5% Cu, 0.03 oz/ton Au, and 0.5 oz/ton Ag, - over half the tonnage was produced from deposits now incorporated into the Phoenix orebody. Including its production since 1956, the Phoenix deposit re-opened by Granby in 1956, has yielded 25 million tons of 1.0% Cu plus significant gold values. The Motherlode orebody produced 3.8 million tons of 1.12% Cu plus 0.044 oz/ton Au. The B.C. Mine was smaller (100,000 tons) but of higher grade (5.8% Cu, 2.8 oz/ton Ag).

6. HISTORY OF COPPER QUEEN CAMP

The earliest record of activity in the Copper Queen camp is found in the 1894 edition of the B.C. Dept. of Mines in which an 18 foot shaft and a 40 ft. tunnel are reported on the Copper Mine. Widths are reported to have been 40 ft. in the Copper Mine and 26 ft. in the King Solomon in which grades are reported to have been between 15% and 20% copper. No information exists on tonnage mined prior to 1902 but because no railroad was put in to the Copper Queen camp, tonnage can be assumed to have been small. The 1902 and 1903 editions of the Annual Report of the B.C. Dept. of Mines report 850 tons shipped in 1901 and "about 1,000 tons" in 1902. In 1917 the King Solomon and the Big Copper between them, shipped 950 tons. After 1918, the property lay dormant until 1950 when the late W.E. McArthur carried out a programme of drilling and stripping which led to further exploration.

7. PREVIOUS WORK

Prior to the end of the first world war there had been tunnelling (probably amounting to three or four hundred feet), shaft sinking (tens of feet), and mining of a few thousand tons of oxidized copper ore from the Upper Brooklyn Limestone.

In 1953 and 1954 the late W.E. McArthur of Greenwood carried out a programme of diamond drilling and stripping of the King Solomon and Copper Mine claims. This work led to the discovery of a body of sulphides from which two carloads of ore was shipped to the Tacoma Shelter.

In 1954 Noranda Mines Ltd. drilled for extensions of the roughly-conformable body passing through the Copper Queen and King Solomon claims. It is believed, on the basis of a map supplied by McIntyre Porcupine, that four holes were drilled by Noranda. In 1955 the Consolidated Mining & Smelting Company drilled a further four holes, again in search of the conformable body passing through the Copper Queen claim. This drilling intersected mineralized limestone but of too low a grade.

In 1967 McIntyre Porcupine Mines held options on several of the crown grants in the vicinity and carried out geological mapping, soil sampling, induced polarization surveys, bulldozer stripping and diamond drilling. McIntyre drilled four holes (see figure 4) all directed at I.P. anomalies.

DDH M-1 was drilled at an angle of -50° towards the anomaly on Line 19. The drill hole was directed down-dip. If the anomaly represents a conformable body a drill hole would have passed beneath it. Although the rock intersected is called "Knob Hill" in the original drill log, on the basis of Riocanex's relogging of the core it includes upper Sharpstone among cherty lithologies which appear to belong to the same unit.

DDH M-2 was drilled on Line 18 at an angle of -60^{o} towards the I.P. anomaly. The rock intersected, includes sharpstones and cherts of the Upper Sharpstone unit.

DDH M-3 was drilled vertically on Line 13. Although going to 520 feet it failed to penetrate beneath the layer of Tertiary volcanic rock.

DDH M-4 was drilled vertically on Line 16 to the southeast of the I.P. anomaly. After penetrating 557 feet of Tertiary volcanic rock the drill intersected massive white limestone. The last 53 feet of the hole were in skarn including a rock described as "green epidote brecciated sections in fine grained dense purplish rock (hornfels), 587-590 limestone, 1-2% finely disseminated pyrite". The limestone intersected in this hole was almost certainly Basal Brooklyn Limestone. Equally certainly, the base of this limestone unit was not reached. Moreover, the skarn rock described from the bottom of the hole sounds remarkably similar to the purple skarn rock found in the vicinity of the Phoenix orebody.

In 1970 Pechiney Development staked a block of eleven claims to the east of the Copper Queen camp. Work included geological mapping, magnetometry and geochemical soil sampling (B.C. Dept. of Mines Assessment Report 2453). No sub-surface testing was undertaken.

8. WORK PERFORMED BY RIOCANEX

1977

Phoenix Geophysics on behalf of Riocanex performed approximately three line miles of induced potential survey. Old mine workings on the Big Copper Crown Grant (L 456) were sampled. One diamond drill hole (the subject of this report) was drilled to a depth of 304 metres.

1976

During 1976, the property and surrounding area were mapped at a scale of 1:5000. Comparisons were made between stratigraphic sections south of Wallace Creek (drilling on the Forshaw claim), north of Wallace Creek, and near the Phoenix Mine.

Geological work was carried out by R. Wilson, N. Wilson and the writer.

9. REGIONAL GEOLOGY

Much of the country between Grand Forks and Rock Creek is underlain by a sequence of volcanic and sedimentary rocks of Permian and Triassic age known as the Knob Hill and Anarchist Groups respectively. These are cut by Cretaceous granitic batholiths. Tertiary flows and pyroclastics laid down on a subdued version of the present land surface cover much of the area. Associated Tertiary dykes and sills are numerous. The sequence (represented in Figure 3) is as follows:

4. Tertiary: Hypabyssal intrusives and volcanic-related sediments

3. Cretaceous: granitic intrusions

2. Triassic: Anarchist group
   - 2.5 Upper (Brooklyn) Limestone*
   - 2.4 Upper Sharpstone*
   - 2.3 Basal (Brooklyn) Limestone*
   - 2.2 Basal Sharpstone*
   - 2.1 Rawhide Shale

Unconformity

1. Permian: Knob Hill volcanic rocks and cherts

The Knob Hill volcanic rocks which were metamorphosed and uplifted in Permo-Triassic time are unconformably overlain by Basal Sharpstone and locally by Rawhide Shale, the oldest unit in the Anarchist group. This shale unit

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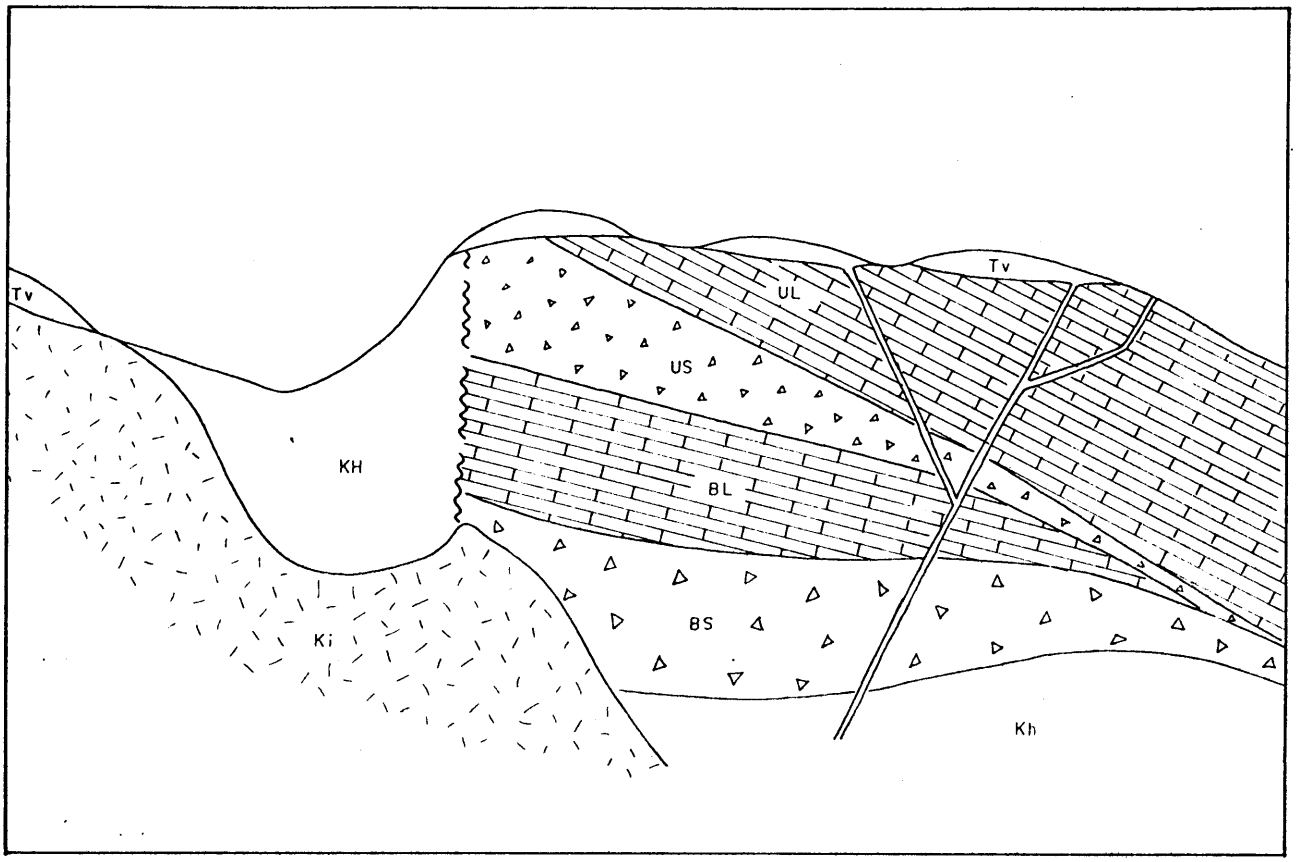
*Riocanex adaptation of terms: "Sharpstone" and "Brooklyn Limestone"used by Seraphim (1956)

SCHEMATIC SECTION SHOWING STRATIGRAPHIC RELATIONSHIPS ON THE FORSHAW & QUEEN CLAIMS



DESCRIPTION	FORMATION NAME	AGE	SYMBOL
Volcanic rocks, tuffs and related sediments	Marron, Kettle River	Tertiary	Tv
Granitic Intrusives	Nelson ?	Cretaceous	Ki
Limestones, grey and white, grading into cherty dolostones and cherty siltstones	Brooklyn: Upper Limestone	Tertiary	UL
Sharpstone conglomerate, green or mauve, fine to medium grained, locally water sorted and/or calcareous	Brooklyn: Upper Sharpstone		US
Massive white limestone, often banded	Brooklyn: Basal Limestone		BL
Sharpstone conglomerate, brown-weathering, very coarse grained	Brooklyn: Basal Sharpstone		BS
Metamorphosed volcanic rocks	Knob Hill	Permian	KH

D.W.G. G.C. - 6462

FIGURE 3

is restricted: it occurs as a lens 400 feet thick extending for 2000 feet along strike, southeast of the Phoenix pit. A shale occurring to the immediate south west of the Forshaw claim block may belong to the same unit. The Rawhide Shale is thought to represent depressions in a pre-Sharpstone landscape. The "Sharpstone" conglomerates are sedimentary, unsorted breccias consisting of angular clasts of chert ranging in size from 0.1 to 4.0 cm. Mapping in 1976 led to the recognition of two distinct units of sharpstone: The Basal Sharpstone lies on the Knob Hill Formation or on the Rawhide Shale, consists predominantly of larger very angular fragments, and is for the most part devoid of alluvial sorting. Aeolian quartzites are often associated. This unit is believed to have been deposited as outwash fans in a desert. The Upper Sharpstone is generally finer grained, of a greenish or mauvish hue, and has evidence of alluvial sorting of the fragments. Each sharpstone unit was followed by a period of limestone deposition. The two limestones are not easily distinguished from one another.

10. GEOLOGY OF QUEEN CLAIMS (Figure 4)

The Queen claims are underlain by limestones and sharpstones of the Anarchist group mostly covered by a sheet of Tertiary volcanic rocks of variable thickness. The rocks best exposed by natural outcrop and by excavation are those lying on the southeast flank of the ridge forming Copper Mountain where a dip slope is formed by Upper Brooklyn Limestone. Underlying this unit, but poorly exposed is Upper Sharpstone. Beneath the Upper Sharpstone the presence to the northwest of Basal Brooklyn Limestone is deduced from its position in the regional stratigraphic sequence, from a small outcrop of limestone (not itself significant), and from an intersection of limestone in a diamond drill hole (M-4) drilled by McIntyre Porcupine Mines in 1967. The entire sequence strikes in a NE-SW direction and dips at approximately 50^{o} to the southeast.

A dip fault trending northwest-southeast with a left lateral displacement separates the sequence into two.

DDH77-1 (described in Section 16 below) indicates that the basal part of the Upper Sharpstone is attenuated by hypabyssal intrusives of the Tertiary suite.

The section on Line 19 incorporating DDH 77-1, (Figure 5) indicates that the Basal limestone is now inferred to lie further to the northwest than previously thought (see figure 8, Queen Claims report, February 1977).

The area of the old workings on Lot 387 drilled by Consolidated Mining and Smelting Company and by Noranda may not be as stratigraphically high in the Upper Limestone as appears from the map and sections. Two observations prompt this conclusion: First a considerable quantity of sharpstone was intersected in holes drilled by The Consolidated Mining & Smelting Co. and second, a limestone found among the old workings on Lot 387 appears very similar to Stemwinder Limestone, a rock characteristic of the base of the Upper Brooklyn Limestone.

11. EXPOSED MINERALIZATION

As they do not constitute the main target little time has been spent examining the old workings developed at the beginning of the century. During a cursory examination in 1976, no sulphide minerals were seen. The following description is based on accounts published in the B.C. Dept. of Mines Annual Reports between 1894 and 1913.

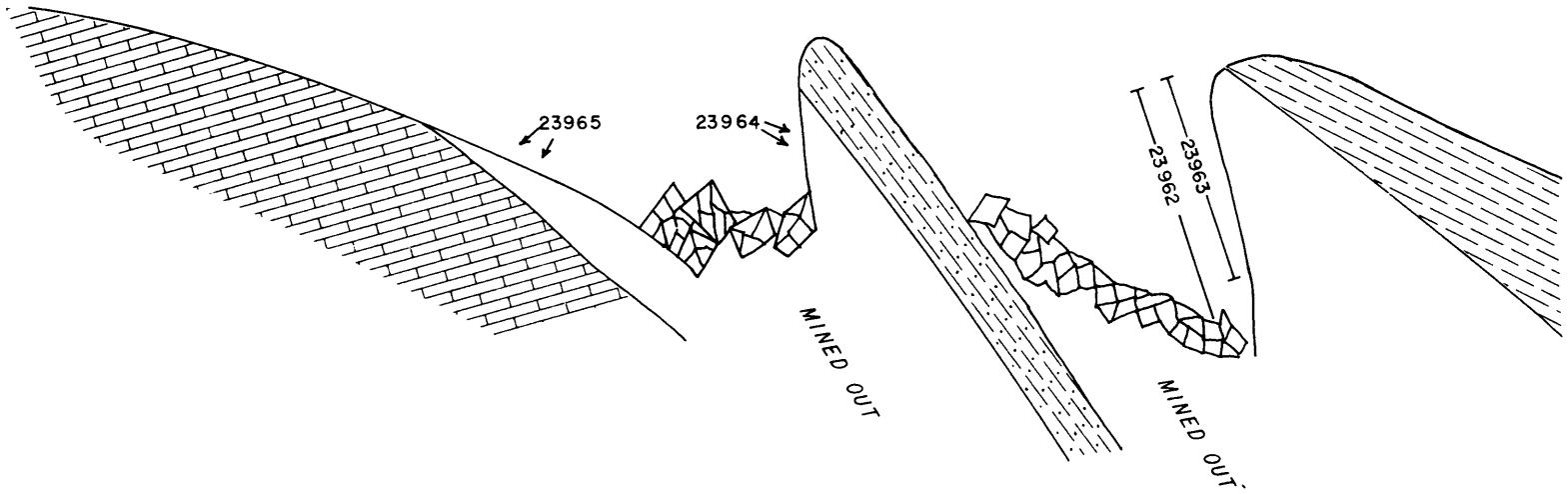
The workings fall into two groups: Near the top of the hill is the Copper Mine claim (also known as "Big Copper") where the ore appears to have consisted of an oxidized cap with native copper, chalcocite and hematite lying as a ledge, presumably sub-horizontal, underneath Tertiary volcanics. Reported grades are improbably high (in one case 8% Cu was described as "low grade"). The width in 1894 was described as 26 feet, the strike length 750 feet.

This showing was re-examined and sampled by Riocanex in 1977. The copper-bearing rock is a red grit containing quartz fragments in a matrix of quartz, hematite, and lime with disseminations of native copper. Sulphides were not seen except for an unidentified black mineral which may be chalcocite.

The showing was sampled in the manner shown in Figure 6. Grades range between 0.64% and 2.75% Cu. Because of gaps caused by earlier mining operations it is not possible to measure true grade and width. The width is probably in excess of 4 metres while the grades lie in the range indicated. In general, the base of the bed appears to contain the better grades.

BIG COPPER CROWN GRANT (1456)
SECTION THROUGH MINE WORKINGS EXPOSED AT SURFACE

S.W. N.E.



LEGEND

- RUBBLE
- TERTIARY VOLCANICS
- TERTIARY SILL
- REDBED (? REGOLITH)
- BROOKLYN LIMESTONE

Sample No.	% Cu	Width
23962	0.64	3.5 m.
23963	1.20	3.0 m.
23964	2.75	RANDOM FRAGMENTS
23965	2.10	RANDOM FRAGMENTS

SCALE IN METRES
2 1 0 1 2 3

FIGURE 6

RIO TINTO CANADIAN EXPLORATION LTD.

QUEEN CLAIMS

BIG COPPER
MINE WORKINGS

R.L. /altair	Oct.-1977	G-6469

The copper bearing unit is believed by the writer to be a Tertiary, pre-volcanic, sediment formed by weathering of the limestone with possibly some transportation of the products of weathering. It does not seem likely that this kind of formation will yield economically significant tonnage. Nevertheless, its extent should be investigated, probably by I.P. followed by some shallow drill holes.

To the southeast, at the foot of the hill, lie the Copper Queen and King Solomon claims. A description in the B.C. Dept. of Mines Annual Report for 1955 suggests that the main orebody here was a conformable or subconformable body lying in limestone and having a width of 10-15 feet. This ore too was oxidized. Most probably, earlier development was on an enriched zone of chalcocite; malachite; azurite and native copper. No description of unoxidized ore is available.

Elsewhere on the claims, particularly to the east of the Copper Queen camp, splashes of copper stain in limestone are not uncommon. Skarn minerals are often associated. A prime example is the Pasco showing where limestone is fractured, altered to a skarn mineral assemblage along fractures, and mineralized with chalcopyrite, chalcocite and bornite. Evidently introduction of sulphide took place after lithification. To the East of the Pasco showing a quartz-filled breccia is further evidence of hydrothermal activity as is the (reported) presence of fluorite (B.C. Assessment Report No. 2453).

13. 1977 DRILL PROGRAMME

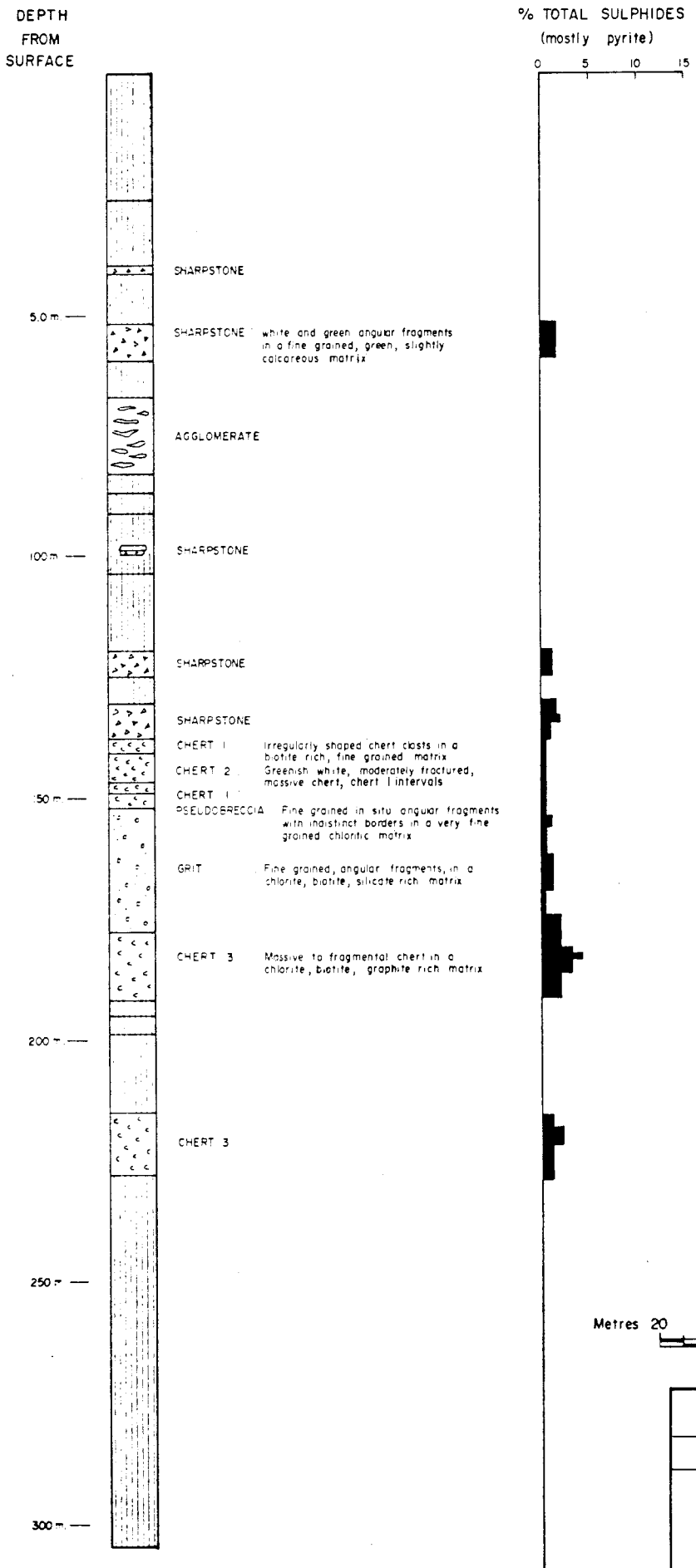
The drill hole, collared at 600 metres E on Line 19 south (see Figures 4 & 5), was drilled at an angle 55^{o} on an azimuth of 320^{o}. The hole was drilled to a depth of 304 metres.

Three types of rock were intersected: Tertiary hypabyssal intrusives (with possibly an extrusive near the top of the succession), sharpstone and cherty rocks of the Triassic Upper Sharpstone formation and an agglomerate also believed to be of Triassic age. Sulphides average between 1% and 2% in the sharpstone and related cherts and are most abundant between 175 metres and 190 metres, providing what is probably an adequate explanation for the I.P. anomaly (see Figure 9).

The Triassic sequence is seen to represent, first, a shallow water, mainly chemical type of deposition (the cherty rocks between 228 and 128 metres) followed by siliceous rocks of progressively increasing grain size from the "grit" (178 to 150 m) through to the sharpstones which lie above 138 metres.

The agglomerate lying between 84 and 68 metres is assumed to belong to the Triassic sequence for two reasons: first, nothing similar to it has been seen among the Tertiary volcanics, and second, if it were to be a Tertiary volcanic rock, the overlying sharpstone could only be a raft or xenolith in the Tertiary volcanics. This explanation seems much less likely than one which treats the sharpstone as merely displaced by dykes and sills.

D.D.H. 77 - 1



LEGEND

- Tertiary volcanics and hypabyssal intrusives
- Agglomerate
- Sharpstone
- Grit
- Chert

SCALE 1:2000

Metres 20 10 0 20 40 60

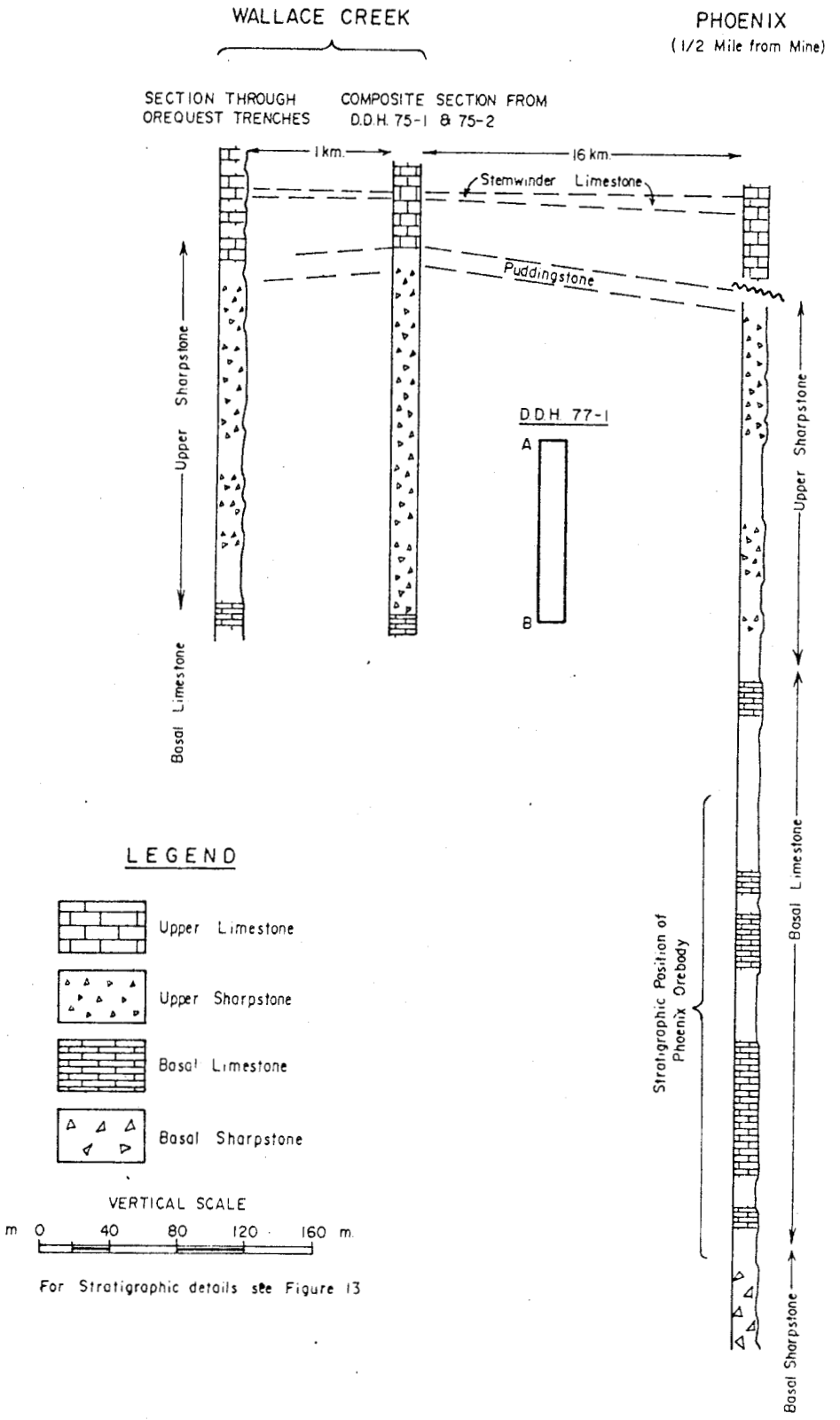
FIGURE 10

RIO TINTO CANADIAN EXPLORATION LTD.

QUEEN CLAIMS

D.D.H. 77-1
LINE 19, 600 m. E.
AZIMUTH 320°; DIP - 55°

R.W. /altair	Oct.-1977	D-6468



For Stratigraphic details see Figure 13

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QUEEN CLAIMS

POSITION OF D.D.H. 77-1 IN STRATIGRAPHIC SECTIONS

Figure 11

When the Triassic sedimentary sequence (i.e. excluding the intrusives) is plotted separately, the width of the Triassic sequence penetrated by the drill hole can be compared with stratigraphic sections of the same succession measured elsewhere (Figures 11 and 13). It then becomes apparent that despite the hole being drilled to 300 metres, only a comparatively short section of the Upper Sharpstone (and related cherts) was penetrated.

The nature and origin of the pyritiferous cherts remain in some doubt. In the single thin section examined at the time of writing (see Appendix 6) there is evidence of veining and dioritization of the original sediment. Hornblende and actinolite provide evidence of metamorphism while the veining, the sulphides (including chalcopyrite and sphalerite) and chlorite suggest some degree of metasomatism. The presence of up to 10% ilmenite and titanium oxide in a cherty sediment is not readily explained.

14. RESULTS OF GEOCHEMICAL ANALYSIS

Results of analysis of samples of core for copper, iron and gold are shown in Appendix 3. Copper values are low, none exceeding 660 ppm. Two samples (7723071 and 7723074) have high values in gold. At the time of writing only one sample (7723071) had been tested for zinc. It was found to be anomalous and subsequently assayed at 3.16% zinc. Both samples with fairly high gold values (the first of which has the 3.16% zinc) are in pyritiferous cherts.

In order to determine the Cu/Fe ratio, the percentage of iron in each sample was determined by atomic absorption. This figure, apart from two high values at the top of the hole is consistently higher below 180 metres. The only conclusion drawn from these values is that the Cu/Fe ratio is higher where pyrite is most abundant.

15. DISCUSSION

Although DDH 77-1 was drilled to a depth of 304 metres, it intersected only 140 metres of the Triassic sediments it was designed to test. The remainder of the hole penetrated Tertiary intrusive, in the form of dykes or sills, which appear to have expanded the thickness of the Triassic sediments more than twofold.

The geophysical anomaly was accounted for by the sediments which below a depth of 130 metres contained in excess of 1% pyrite with patches of graphite.

The drill hole stopped in a pyritiferous zone at least some of which contained significant values in zinc and gold. The last 125 metres of the hole intersected a Tertiary intrusive. Had this intrusive not been present the hole would have most probably penetrated older Triassic sediments and it would have determined the nature of the sediments beneath the pyrite zone. The hole was not deepened because, in the event that the intrusive at the bottom of the hole is a dike, (as opposed to a sill), much of the sedimentary sequence would have been skipped before the hole drilled back into sediments.

There are three reasons for requiring an intersection stratigraphically beneath the sediments already reached:

First, the pyritiferous cherts represent part of a sulphide system. 60 metres of these sulphide-bearing rocks were intersected but the hole (so long as it was sediments) did not go beyond them.

Second, the Phoenix ore body is surrounded by a large area of pyrite which is sometimes described as a "pyrite halo".

Third, sediments beneath those already intersected are expected to belong to the Basal Brooklyn Limestone, host of the Phoenix and ore bodies and the objective of the 1977 drilling.

The possibility that the cherts intersected in DDH 77-1 belong not to the Triasic Brooklyn-Sharpstone sequence but to the underlying Knob Hill was considered seriously. However, the cherts came to be accepted as part of the sharpstone for the following reasons.

1) cherts identical to those found deeper in the hole were also found at 140 - 150 metres overlying a "grit" of evident sharpstone affinities.

2) In a roadside section east of Midway, cherts can be seen underlying Upper Sharpstone.

3) The presence of limestone reported by McIntyre Mines in their DDH M4, a short distance to the north, strongly suggests the presence of Basal Brooklyn Limestone in this vicinity. Such a situation is not easily reconciled with Upper Sharpstone lying on Knob Hill nearby.

4) Cherts are a likely type of rock to occupy the transition phase from the (Marine or lacustrine) carbonates, to the (subaerial) sharpstones.

Having concluded that it is necessary to reach the stratigraphic levels beneath those intersected by DDH 77-1 it then becomes necessary to select drill holes.

For reasons already explained deepening of DDH 77-1 is not proposed. The following drill sites are under consideration:

1) Deepening of McIntyre's hole DDH M4 This hole has the advantage of being cheap (approximately $5 per foot for reaming to 616 feet). A minor disadvantage is that much information might be lost if the stratigraphic level intersected is significatnly lower than the lowest level reached in DDH 77-1.

2) A hole on Line 19 South at 340 m east dipping -55^{o} on an azimuth of 320^{o}. Such a hole, on the same line as 77-1 would be expected, after penetrating volcanics to intersect stratigraphic levels beneath those reached by 77-1.

3) A hole on Line 18 south at 480 m east dipping -70^{o} on an azimuth of 320^{o}. This hole would be directed at the I.P. anomaly on Line 18 south. Unlike the I.P. anomaly on Line 19 tested by DDH 77-1, that on Line 18 gives the impression of being open at depth. The disadvantage of such a hole is that 200 metres would be spent drilling rock above the stratigraphic level required.

16. CONCLUSIONS

1. The anomaly on Line 19 S was shown to be due to pyrite and graphite in cherty rocks believed to belong to the basal part of the Upper Sharpstone sequence.

2. The 100 m of pyrite-bearing rocks, together with the two samples with significant values of gold, one of which contains significant zinc, indicate that the rocks intersected at the bottom of DDH 77-1 are within part of a sulphide system of some magnitude.

3. The Basal Brooklyn Limestone was not intersected but is believed to be present at a lower stratigraphic level than that reached by drilling.

4. In terms of the model on which the 1977 drill programme was based, the Basal Brooklyn Limestone inferred to be beneath the sulphide-bearing rocks of the Upper Sharpstone sequence still deserves testing.

5. The copper-bearing regolith described in section 11 should be investigated by an I.P. survey.

6. Possible locations for drill holes to test the Basal Brooklyn Limestone are:

   a) the location of McIntyre Hole DDH M4.

   b) Line 19 S, 340 m E at -55° at an azimuth at 320°.

   c) Line 18 S, 480 m E at -70° at an azimuth of 320°.

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Geology and Copper Deposits of the
Boundary District, B.C.
C.I.M.M. Transaction Vol. IX pp. 384-394.

Riocanex Reports:
Forshaw Option, Proposal for
1976 Programme, April 1976

Forshaw Option
Geology, Geochemistry and Reasons for
Terminating Option
February 1977

Queen Claims
Proposal for 1977 Programme, February 1977

APPENDIX NO. 1

DRILL LOG, DDH 77-1

APPENDIX NO. 6

DESCRIPTION OF THIN SECTION BY J. G. PAYNE

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph. D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
VOX 1JO

PHONE (604) 533-1155

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SEP 2 1 1977

Report for: Robert Longe,
Rio Canex

Sample Q-1

The rock consists of a fine grained andesitic sediment cut by an andesite porphyry or fine porphyritic diorite, and subsequently cut and altered by two main vein sets.

The sediment contains scattered quartz grains (5%) up to 0.15 mm across in a very fine grained matrix (0.002-0.050mm) composed of quartz (30%), chlorite (40%), actinolite (10%), and Ti-oxide (20%). Actinolite forms prismatic to acicular crystals up to 0.06 mm long. Ti-oxide occurs in irregular rounded grains (0.01-0.02 mm across) and in clusters of grains. Opaque minerals are minor in the sediment. The sediment occupies about 20% of the thin section.

The andesite-diorite occupies about 65-70% of the rock. It consists of the following mineralogy:

plagioclase (mainly 0.5-1.0 mm, but up to 1.5 mm)	55%
chlorite (interstitial grains, unoriented)	25%
actinolite (laths and fibrous aggregates, mainly 0.08 mm long, but up to 0.3 mm)	10%
Ti-oxide (commonly in patches and lenses, and surrounding ilmenite, 0.01-0.04 mm)	5%
Opaque=Ilmenite with minor pyrite (ilmenite surrounded by Ti-oxides)	5%

Plagioclase is moderately altered to patches and grains of actinolite and chlorite. Ilmenite forms irregular grains and also subhedral laths up to 1.5 mm long. Pyrite forms irregular grains commonly associated with ilmenite and Ti-oxide.

The oldest vein is a narrow quartz vein which is offset by later veins.

The second vein set consists of medium hornblende-actinolite (0.08-0.25 mm) in aggregates of prismatic to irregular grains, locally fibrous and radiating; with medium grained quartz commonly occupying central parts of larger veins. Chalcopyrite grains (up to 0.15 mm)occur mainly in quartz in the central parts of the veins. The total chalcopyrite content of the sample is about 0.2%. Pyrite occurs with chalcopyrite, and one grain of sphalerite was identified.

The youngest vein set consists of very fine grained biotite with quartz and calcite common in centers of veins; and locally comprise the entire vein. (quartz or calcite)

The vein sets occupy the following percentages of the sample: Set 1 (0.2%), set 2 (10%), set 3 (3-5%).

John Payne

John Payne,
September, 1977

RR -> Quick Claim

Vancouver Petrographics Ltd.

RECEIVED

SEP 19 1977

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph. D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
VOX 1JO

PHONE (604) 533-1155

128 4655

Report for: Rio Canex (R.V.Longe)

Sample Q-1: Identification of black mineral

The dark green (black) mineral in the vein is hornblende. It forms a medium grained (0.08-0.25 mm) aggregate of prismatic to irregular equant crystals, locally radiating. Crystals are sub- to euhedral against quartz in the centers of parts of the vein. As well the vein contains pyrite, very fine grained aggregates of biotite, and Ti-oxide in very fine grained aggregates and rimming pyrite. Chalcopyrite and very minor sphalerite also are present in the vein and in the host rock.

In the rock the opaque mineral is probably ilmenite with very fine grained intergrown hematite and Ti-oxides.

John Payne

John Payne,
September, 1977

APPENDIX NO. 7

STATEMENTS OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS:

Robert George Wilson

Education:

BSc. (Geology) 1976 University of British Columbia

Experience:

1976 Rio Tinto Canadian Exploration Limited
- Mapping and geochemical sampling in south and central B.C.

1975 Cominco Limited (temporary)
- Mapping and prospecting in carbonates, MacKenzie Mountains, N.W.T.

1974 Cominco Limited (temporary)
- Mapping and prospecting in carbonates, MacKenzie Mountains, N.W.T.

1973 Texas Gulf Incorporated (temporary)
- Sampling and prospecting in south and central B.C. and Yukon

STATEMENT OF QUALIFICATIONS

R. V. Longe

ACADEMIC

1961 B.A.	Natural Sciences Tripos, (Geological Sciences)	Cambridge University
1965 M.Sc.	Geology	McGill University

PRACTICAL

1969-present	Rio Tinto Canadian Exploration Ltd. Vancouver BC Geologist involved in various aspects of mineral exploration in B.C., Yukon, and Alaska.
1967 (summer)	Amax Exploration Geological mapping of Guichon Batholith, B. C.
1965-1966 (summers)	Selco Exploration Ltd., Geological Mapping of Archean Greenstone belt south of James Bay, Ontario
1964	West African Selection Trust Diamond exploration in Ivory Coast and Mali, West Africa
1962-1963	Consolidated African Selection Trust Ltd., Mine Geologist, Akwatia, Ghana
1961	Serra Leone Selection Trust Ltd., Geologist, reserve development department Yangema Mine, Sierra Leone

APPENDIX NO. 8

DRILL CONTRACT

A G R E E M E N T

This A G R E E M E N T made this 16th day of July 1977.

BETWEEN: Rio Tinto Canadian Exploration Limited
615 - 555 Burrard Street
Vancouver, B. C. V7X 1M8

(hereinafter referred to as the "COMPANY")

AND: BERGERON DRILLING, MINING & EXPLORATION LTD.
Box 461
Greenwood, B.C. V0H 1J0

(hereinafter referred to as the "CONTRACTOR")

WHEREAS the COMPANY hereby requests that the CONTRACTOR carry out certain surface diamond drilling and other services, on the COMPANY'S property, 8 km northwest of Greenwood, B.C.

AND WHEREAS the CONTRACTOR hereby agrees to perform said diamond drilling and other services requested, under the terms and conditions hereinafter contained.

1. SCOPE OF WORK

The work is to consist of series of drill holes, drilled at locations specified by the COMPANY. A total minimum footage of 984 feet (300 metres) shall be drilled, subject to the COMPANY'S right to terminate for non-compliance by the CONTRACTOR of the terms and conditions of this agreement. Total footage may be extended beyond the minimum amount, by mutual consent. Holes shall be drilled with BQ tools producing 1 7/16" diameter core, as far as is reasonably practical. Except by mutual consent maximum depth of any hole shall not exceed 984 feet (300 metres).

2. COMMENCEMENT AND EXECUTION OF WORK

Work shall be commenced on August 8, 1977 and be carried out with one 12 hour shift working seven days per week or as near such schedule as possible.

3. THE CONTRACTOR HEREBY COVENANTS AND AGREES:

a) To provide all of the required drilling machinery and associated tools including, but not limited to: Boyles 35A Drill outfit complete with rods, casing, diamond set items, fuel, oil and grease etc.

b) That drilling crews will follow good drilling practice and shall use due care and diligence as shall enable them to recover as high a percentage of core as the nature of the ground being drilled shall permit. All cores shall be delivered to the COMPANY, in boxes provided by the CONTRACTOR at the drill sites.

c) That it shall be responsible for, and will pay promptly all costs and charges, incurred by itself for labor, machinery, tools, and supplies used in completing the work hereunder so that no lien or other such charge relative to the CONTRACTOR, may be registered against the COMPANY or the property. The CONTRACTOR shall be responsible for the payment of all assessments for Workmen's Compensation, Holiday Pay, Canada Pension, Unemployment Insurance, Sales Tax, or other such applicable charges relative to its own labor and supplies purchased.

d) The CONTRACTOR shall, at all times enforce strict discipline and maintain good order among its employees and shall not retain on the work any unfit person or anyone not skilled in the work assigned to him. Any employee who is objectionable or unsatisfactory to the COMPANY shall be removed from the work and replaced by an employee satisfactory to the COMPANY.

e) The CONTRACTOR shall keep his camp and drill sites free from waste and rubbish, and at the completion of his work he shall leave the camp area and all drill sites as clean as possible.

f) The CONTRACTOR shall observe and comply with all applicable federal and provincial laws, regulations and orders relating to the performance of this contract.

g) The CONTRACTOR or its personnel shall not divulge any information concerning drilling results, or permit access to, or examination of the drill core by any person not specifically authorized by the COMPANY.

4. THE COMPANY HEREBY AGREES

a) Should cavities, loose or caving ground or excessive water flows be encountered in a hole so that further drilling in that hole is deemed impracticable, that hole may by mutual consent, be

abandoned, and the CONTRACTOR be paid at rates so specified herein for all footage completed in that hole. However, should the COMPANY request that further work be carried out in the hole beyond this point, then the CONTRACTOR shall continue work in the hole but such continuing work shall be at FIELD COST rates.

b) The COMPANY shall provide, at no cost to the CONTRACTOR, all rights of way of ingress and egress to all lands that may be required to enable the CONTRACTOR to carry out the work as specified. The CONTRACTOR shall be permitted to cut and fell any timber on the COMPANY'S property as may be required in the course of the work hereunder, and the COMPANY shall indemnify and save harmless the CONTRACTOR from any assessment for stumpage or other related fees.

5. THE COMPANY HEREBY AGREES to pay the CONTRACTOR for footage drilled and other services performed as follows:

a) Mobilization and Demobilization: to and from truck unloading point, nil.

b)

		BQ
Drilling:	0 - 500 feet	$14.00 per foot
	500 - 1000 feet	$15.00 per foot
	1000 - 1500 feet	$16.00 per foot

c) Overburden penetration and setting casing:

0 -	20 feet at $14.00 per foot
20 -	50 feet at $15.00 per foot
50 -	100 feet at $16.00 per foot

d) Reaming hole: If required, at Field Cost.

e) Casing of hole, if required: At Field Cost.

f) Dip-testing, or delay time, or other time during which the CONTRACTOR'S crews are performing services, for the COMPANY not otherwise covered herein: At Field Cost.

g) Cementing of drill holes, and redrilling of cemented section of hole: If required, at Field Cost.

h) Water supply: The CONTRACTOR will supply 2500 feet, of water line and pump for a maximum vertical lift of 600 feet. Installation and removal shall be at Field Cost, maintenance at $15.00 per day.

i) Moving of drill and equipment from truck unloading point, setting up on first hole, tearing down of last hole and moving to truck loading point and moving between holes at Field Cost.

j) Drilling mud and additives if required: At cost plus 10%.

k) Mud mixing time, if drilling is interrupted due to lost circulation etc. shall be at Field Cost.

l) Standby: If requested by the COMPANY, at $30.00 per hour. Chargeable for eight hours per shift only.

m) Field costs, where applicable, shall be: $10.00 per man-hour plus 10%.

6. THE CONTRACTOR AGREES:

a) Transportation: To provide transportation for its personnel to and from the job site.

b) Core boxes: To supply for $4.00 a box, lids at $1.00 each.

c) Board and lodging: To supply at no cost to the COMPANY the accommodation and board for its personnel.

d) That delays caused by breakdowns, the failure of equipment, the absence of fuel, spare parts, bits and other items of equipment necessary for the effective operation of the drill, shall be at no cost to the COMPANY.

7. GENERAL

a) The CONTRACTOR shall save and hold harmless the COMPANY from and against all suits or claims alleging damage or injury (including death) to any person or property that may occur or that may be alleged to have occurred, in the course of the performance of this Agreement by the CONTRACTOR whether such claim shall be made by an employee of the CONTRACTOR or by a third party and whether or not it shall be claimed that the alleged damage or injury (including death) was caused through willful or negligent act or omission of the CONTRACTOR, its officers, servants, agents or employees or a willful or negligent act or omission of any of its sub-contractors or any of their officers, servants, agents or employees; and, at its own expense, the CONTRACTOR shall defend any and all such actions and pay all legal charges in connection therewith together with all costs and other expenses arising therefrom.

b) The CONTRACTOR shall not be held liable for any loss or damage suffered by reason of any cause beyond its active control such as riots, strikes, lockouts, Acts of God, or failure of transportation.

c) Under the foregoing terms and conditions the CONTRACTOR does not guarantee to drill any hole to any specified depth. The CONTRACTOR will however, expend every reasonable effort to complete all holes to the satisfaction of the COMPANY.

d) The CONTRACTOR shall invoice the COMPANY for $2000 when the drill is set up and thereafter semi-monthly for footage drilled and other services performed. Such invoices shall be due and payable within 30 days of the invoice date.

e) The CONTRACTOR will along with the final invoice, forward to the COMPANY certification by the Workmen's Compensation Board that the CONTRACTOR is in good standing with the Board.

f) This contract may not be assigned or sublet without the written consent of the COMPANY.

IN WITNESS WHEREOF the COMPANY and the CONTRACTOR set their hands this day of 1977.

RIO TINTO CANADIAN EXPLORATION LTD.

_____

_____

BERGERON DRILLING, MINING AND EXPLORATION LT

Gerard Bergeron

President

RECEIVED

To: R' Tinto Canadian Exploration

REPORT No A - 839

PAGE No. 1

DATE: September 26 1977

615 - 555 Burrard Street
V ncouver, B.C.
V7X 1M8

BONDAR-CLEGG & COMPANY LTD.

CERTIFICATE OF ASSAY

Samples submitted: September 16, 1977
Results completed: September 26, 1977

I hereby certify that the following are the results of assays made by us upon the herein described pulp samples.

MARKED	GOLD		SILVER	Cu	Zn	Fe					TOTAL VALUE PER TON (2000 LBS.)
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
772301	0.31			0.07	3.16	13.01					

Registered Assayer, Province of British Columbia

Fuse Claim

To: R Tinto Exploration

REPORT No A - 678

PAGE No. 1

DATE: August 30, 1977

BONDAR-CLEGG & COMPANY LTD.

615 - 555 Burrard Street
Vancouver, B. C.
V7X 1M8

CERTIFICATE OF ASSAY

REC'D SEP 0 1 1977

Samples Submitted: August 24, 1977
Results Completed: August 30, 1977

PROJECT: 8612 - 51

I hereby certify that the following are the results of assays made by us upon the herein described pulp samples.

MARKED	GOLD		SILVER								TOTAL VALUE PER TON (2000 LBS.)
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
C 23962	0.004										
23963	0.003										
23964	<0.002										
23965	0.003										

Registered Assayer, Province of British Columbia

File : Queen Claims

To: Ri Tinto Canadian Exploration Ltd.

REPORT No A2 - 667

PAGE No. 1

DATE: August 29, 1977

615 - 555 Burrard Street
Vancouver, B.C.
V7X 1M8

RECEIVED
AUG 31 1977

BONDAR-CLEGG & COMPANY LTD.

CERTIFICATE OF ASSAY

Samples submitted: August 23 1977
Results completed: August 29, 1977

PROJECT: 8613

I hereby certify that the following are the results of assays made by us upon the herein described core samples.

MARKED	GOLD		SILVER	Cu							TOTAL VALUE PER TON (2000 LBS.)
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
C 301757	<0.002			<0.01							

Registered Assayer, Province of British Columbia

Fee Queen Claims

To: Rio Tinto Canadian Exploration Ltd.

PAGE No. 1

615 - 555 Burrard Street
Vancouver, B.C.
V7X 1M8

REPORT No A. - 580

DATE: August 18, 1977

BONDAR-CLEGG & COMPANY LTD.

RECEIVED

AUG 23 1977

CERTIFICATE OF ASSAY

Samples submitted: August 11, 1977
Results completed: August 18, 1977

PROJECT: 8606

I hereby certify that the following are the results of assays made by us upon the herein described ore samples.

MARKED	GOLD		SILVER	Cu	U						TOTAL VALUE PER TON (2000 LBS.)
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
C 23962				0.64	0.001						
23963				1.20	0.001						
23964				2.75	0.001						
23965				2.10	0.001						

Registered Assayer, Province of British Columbia

APPENDIX NO. 3

GEOPHYSICAL INTERPRETATION: MEMORANDUM

BY J. McCANCE

Inter-Office Memorandum File No. Queen Claims

To: C. Spence
R. Longe
From: J. McCance

Date July 15, 1977

RECEIVED
JUL 21 1977

Subject: Queen Claims -- Geophysics

After a complete review of all reports on hand relating to the Forshaw and Queen claims, I definitely agree that the results of this recent IP survey support those of McIntyre's earlier work on our Queen claims. It is quite permissable to assume from these IP results that both disseminated and massive sulphide mineralization as tabular bodies and intermittent lenses are present near both the upper and lower contacts of a basal (Brooklyn) Limestone unit and the surrounding Sharpstone lithologies. Unfortulately the evidence is complex and alternatives to the following interpretation such as mineralized zones in the overlying volcanic rocks should not be dismissed lightly. Certainly drilling is warranted to test both the geological hypothesis and geophysical anomalies as a next and perhaps final stage of exploration.

PHYSICAL PROPERTIES DATA - REVIEW

As an aid towards defining anomalies from the three lines of IP data reference was made to the physical property data acquired for the Forshaw claims. However, after a short statistical analysis it was concluded that no apparent I.P. time decay effect was indicated by any of these analyses and consequently I must conclude that the laboratory operation was not completed satisfactorily. No further inferences regarding the physical properties of this geological environment should be attempted from this data set.

DATA PRESENTATION

On the attached sheets (scale 1:1000) I have replotted all anomalous IP data for line 18s and 19s by using the various pseudosection presentations corrected for the effect of topography on the expansion of the dipole-dipole array. This correction although tedious is particularly important in this instance when narrow bodies are suspected and accurate drill sites are necessary. A quick check of the pseudosection prepared by Marsh and Sexsmith, 1977 from the Phoenix data and by F. Scott, 1967 from the McIntyre survey data will reveal all omissions in the replotted data. Data omitted during this correction process because of space requirements would not have affected the definition of anomalies or the location of the various recommended drill sites. Slope corrections were not completed for line 9s.

. . . . 2

Together with xerox'd reproductions of these slope corrected pseudosections a xerox'd segment of Robert Longes Dwg. G-8511-Geology, Queens claims has been used as a base map for discussion purposes.

DATA INTERPRETATION

The 1977 Phoenix survey was designed to relocate and detail an anomalous locale identified from IP surveying completed for McIntyre in 1967. For these purposes it was successful. However, this near surface information has shown the original target anomalies to be more complex than anticipated between 1150'E (350mE) and 1950'E (600mE) on line 18s and line 19s. An additional anomaly recognized between 1950'E (600mE) and 2350'E (720mE) on these lines does appear to relate to a single although somewhat intermittent source. This anomaly was undetected on line 18s and the current coverage must be considered incomplete over this latter feature.

Line 19s

Four potential drill targets were identified on this line.

Anomaly A:

The source is interpreted as a semi-massive to massive sulphide lens at or near a change in lithology. It is believed to be our best target and is identified as extending between lines 17s and 20s. The anomaly on line 19s is indicated by a 2 to 5 times background frequency effect response associated with the 300 ohm-metre resistivity contour. The gradient in resistivity values from values greater than 500 ohm-metres to less than 200 ohm metres is interpreted as a lithologic boundary which has been arbitrarily identified as the 300 ohm-metre contour line. If Longe's model of the stratigraphy in this area is correct then these higher resistivity zones would indicate sharpstone and volcanic rock units, while the lower resistivity values may be interpreted as a limestone unit. However, this zone may equally represent a more conductive horizon within the volcanics. This latter possibility is considered remote as it would require a much greater thickness of volcanic material than currently recognized or postulated. The source is interpreted as existing below 100 metres and does not appear to approach surface.

Anomaly B:

The source of this anomaly appears to be narrow and relatively shallow. It is interpreted as lying at or near the same lithologic boundary as does the source of anomaly A. However, a zone of 'NR' values immediately underlying anomaly B on this line is taken to imply conditions so conductive that expansion of the survey array could not increase the current penetration. Such conditions are anomalous

. . . . 3

and present a challenge to any follow-up drill program for explanation. As currently interpreted this target would remain separate from that interpreted as the source of anomaly A.

Anomaly C:

The source appears to be narrow, at a shallow depth with the up-dip end located in the interval between 420mE and 450mE. The association with higher resistivity is interpreted as indicating mineralization within either volcanic orsharpstone host lithologies. Drill tests of anomalies A and B will substantially contribute towards an explanation of the source for this anomaly.

Anomaly D:

This feature was previously recognized on the McIntyre survey and is interpreted to extend to within 30M of the surface. It is interpreted as a steeply dipping (approximately60^{O}) tabular source of narrow width. Correlating high resistivities may suggest a dike as the source or mineralization along a contact. With reference to Longe's model this anomaly is spatially located at or near the upper contact of the basal limestone unit.

Line 18s

One complex anomaly is recognized on this line. Labelled 'AB' the sources are believed to be similar to those described on line 19s, although a much closer spatial relationship exists on line 18s.

A narrow, near surface tabular body with associated resistivities greater than 500 ohm metres overlies a larger source below 100 metres, associated with lower resistivities. Sulphide mineralization in favourable lithologies are suspected as these source features.

Line 9s

This reconnaissance line was completed in the vicinity of the Pasco showing to test for the presence of a deeper source. No definitely anomalous conditions are indicated. However, an isolated response in excess of 3% frequency effect associated with an unusual resistivity zone is located on the pseudosection presentation at 6W. A rule-of-thumb estimate of the depth to top would place the top of the source at 250 metres below surface. A preferred drill

. . . . 4

collar co-ordinate has been given to test this feature although such a hole is not recommended based on this interpretation of the IP results. The Pasco showing area does not appear to produce an anomalous electrical response.

DISCUSSIONS AND RECOMMENDATIONS

McIntyre Zone 15E

From data obtained during detail traverses on lines 18s and 19s, several source bodies have been interpreted. All anomalous responses indicate weak sulphide mineralization nowhere approaching the 5% Cu grades of the B.C. mine. Probable grades around 1% Cu are anticipated if copper sulphide mineralization is encountered. Other sources for this IP effect such as clay minerals, magnetite etc. do not seem to present as satisfactory an explanationto these observations as does sulphide mineralization or graphite.Disseminated sulphides and semi-massive to massive sulphide lenses and tabular bodies present between and within separate lithologies present the most satisfactory explanation for these IP anomalies. The plan view provided with this discussion illustrates an attempt at geophysical extrapolation using all the available Riocanex and McIntyre geological and geophysical data.

Several anomalous IP responses further south originally recognized by McCance from McIntyre data have been erroneously represented on this map and will require revision at a later date.

Drill testing of the IP anomalies recognized on line 18s and 19s is definitely recommended. Preferred drill collar positions for diamond drilling as indicated below have been located, keeping in mind that several sources may be narrow and will require accurately positioned collars and down hole tests to ensure a satisfactory explanation of potentially sulphide bearing sources. A progressive sequence for the drill operations is suggested from the hole numbers.

Hole #1 Line 19s/518mE -80^{o} grid W 137 metres
objective: source of anomaly A- primary test

Hole #2 Line 18s/495mE vertical to slope 137 metres
objective: confirmation test of source to anomally A

Hole #3 Line 18s/457mE vertical to slope 91.5 metres
objective: confirmation test on anomaly B on line 18s

Hole#4 Line 19s/375mE vertical to sea level 91.5 metres
objective: primary test of anomaly B

. . . . 5

Hole #5 (tentative) Line 19s/440mE vertical to slope 50 metres
objective: source of anomaly C

Hole #6 Line 19s/645mE vertical to sea level 50 metres
objective: source of anomaly D-primary test

NOTE: Angles are relative to horizontal being the sea level surface.

Line 9E

Although no definite geophysical target exists drilling for geological purposes could be of assistance in geophysical interpretation by using the following drill collar position.

L9E, 710MW -70° to slope drilling towards grid E 350m.

J. McCance
July 18, 1977

JM/jd

APPENDIX NO. 4

RESULTS OF ROCK GEOCHEMICAL ANALYSIS ON CORE FROM DDH 77-1

1500 PEMBERTON AVE., NORTH VANCOUVER, B.C. PHONE: 985-0681 TELEX: 04-54554

Geochemical Lab Report

Fraction: As, Perchloric Nitric; Cu,Fe,Zn, Hot Aqua Regia; Au, Fire Assay & Hot Aqua Regia: As, Colourimetric;

Method: Au,Cu,Fe Zn, Atomic Absorption:

Report No. 27 - 1173 PROJECT: 8606

From Rio Tinto Canadian Exploration Ltd.

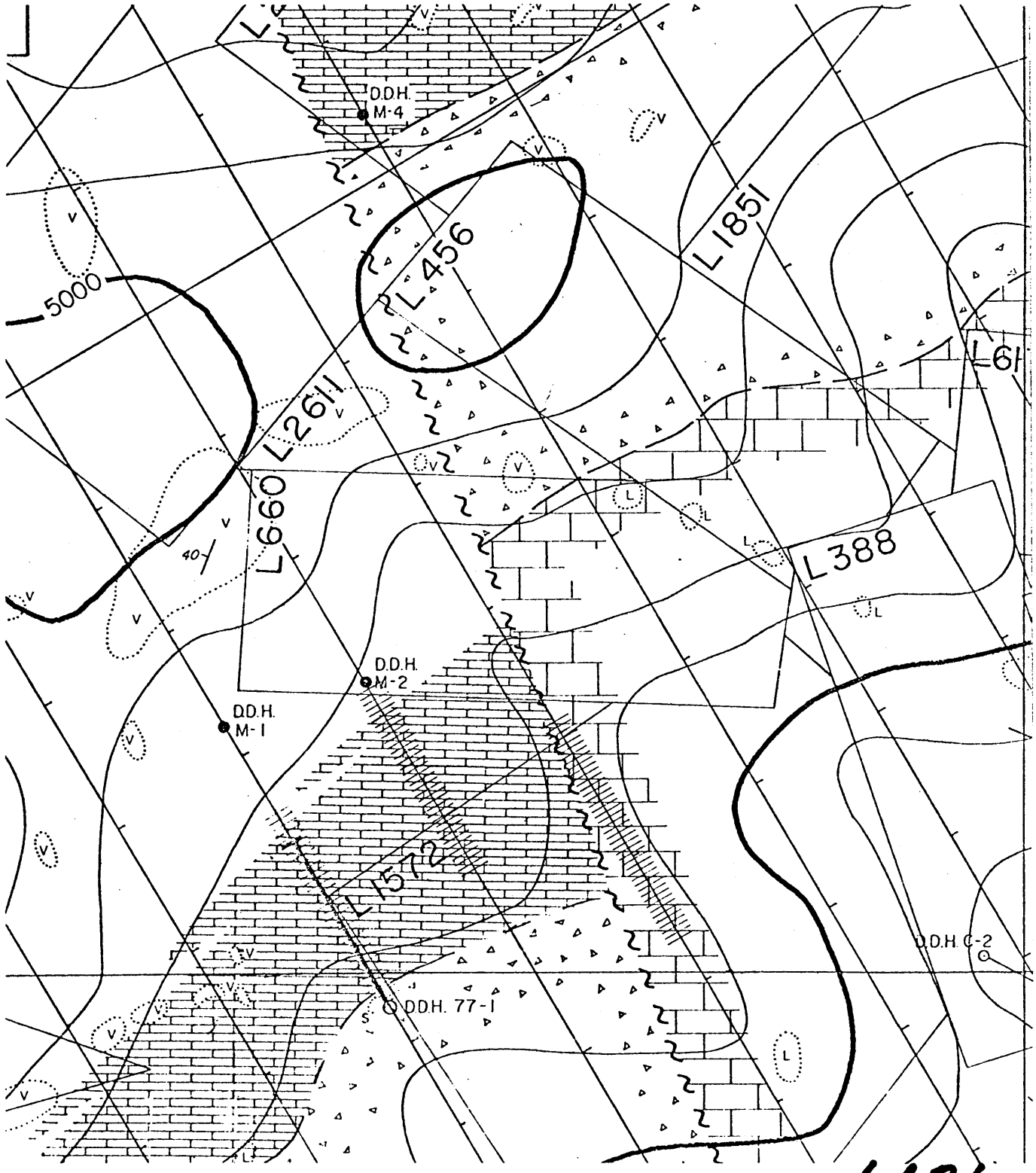
Fraction Used

Date September 19, 1977

SAMPLE NO.	Cu ppm	Zn ppm	Fe %	Au ppb	As ppm			REMARKS
7723060	41	-	6.4	25	-			
7723061	13	-	5.7	5	-			
7723062	300	-	1.62	40	-			
7723063	136	-	1.93	20	-			
7723064	40	-	5.6	10	-			
7723065	44	-	3.00	5	-			
7723066	24	-	9.1	<15*	-			
7723067	7	-	4.05	5	-			
7723068	4	-	4.8	5	-			
7723069	8	-	7.1	<5	-			
7723070	20	-	4.01	15	-			
7723071	660	>20000	12.4	3600	>1000			
7723072	83	-	2.95	35	-			
7723073	100	-	6.4	95	-			
7723074	156	-	6.7	3550	-			
7723075	90	-	3.98	45	-			
7723076	47	-	2.40	30	-			
7723077	84	-	2.52	15	-			
7723078	70	-	2.60	10	-			
7723079	27	-	2.75	5	-			
7723080	54	-	2.87	5	-			
								* detection limit to

12. GEOPHYSICS

In 1976 McIntyre Mines Ltd. developed the I.P. anomaly shown in outline in Figure 7. (For further details see B.C. Department of Mines assessment report number 1082). This anomaly was confirmed along two lines (19S and 18S) by Phoenix Geophysics Ltd. for Riocanex during June 1977, (B.C. Department of Mines assessment report filed Sept. 2, 1977). The results of these two surveys were combined by J. McCance in 1977 (Figure 8 & 9 and Appendix 2). McCance's interpretation suggested a number of sulphide bearing sources, the most significant of which lies at approximately 150 m depth on both lines.



QUEEN CLAIMS

6436

I. P. Anomaly

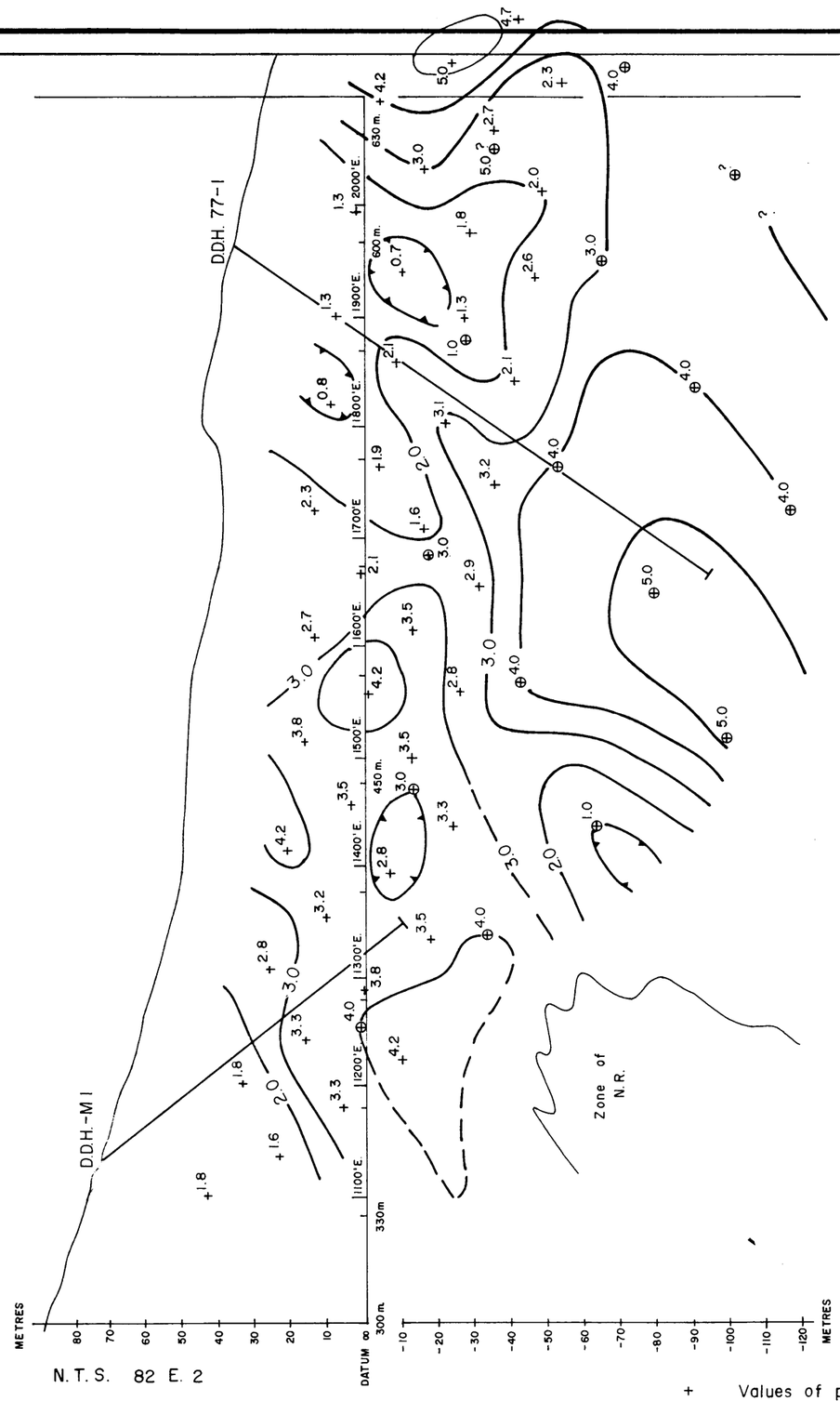
DDH Diamond Drill Hole

Part of Geologic Map showing I.P. Anomalies and Drill Hole Locations.

Scale 1:5000

See Figure 4 (in pocket) for complete map

PERCENT FREQUENCY EFFECT

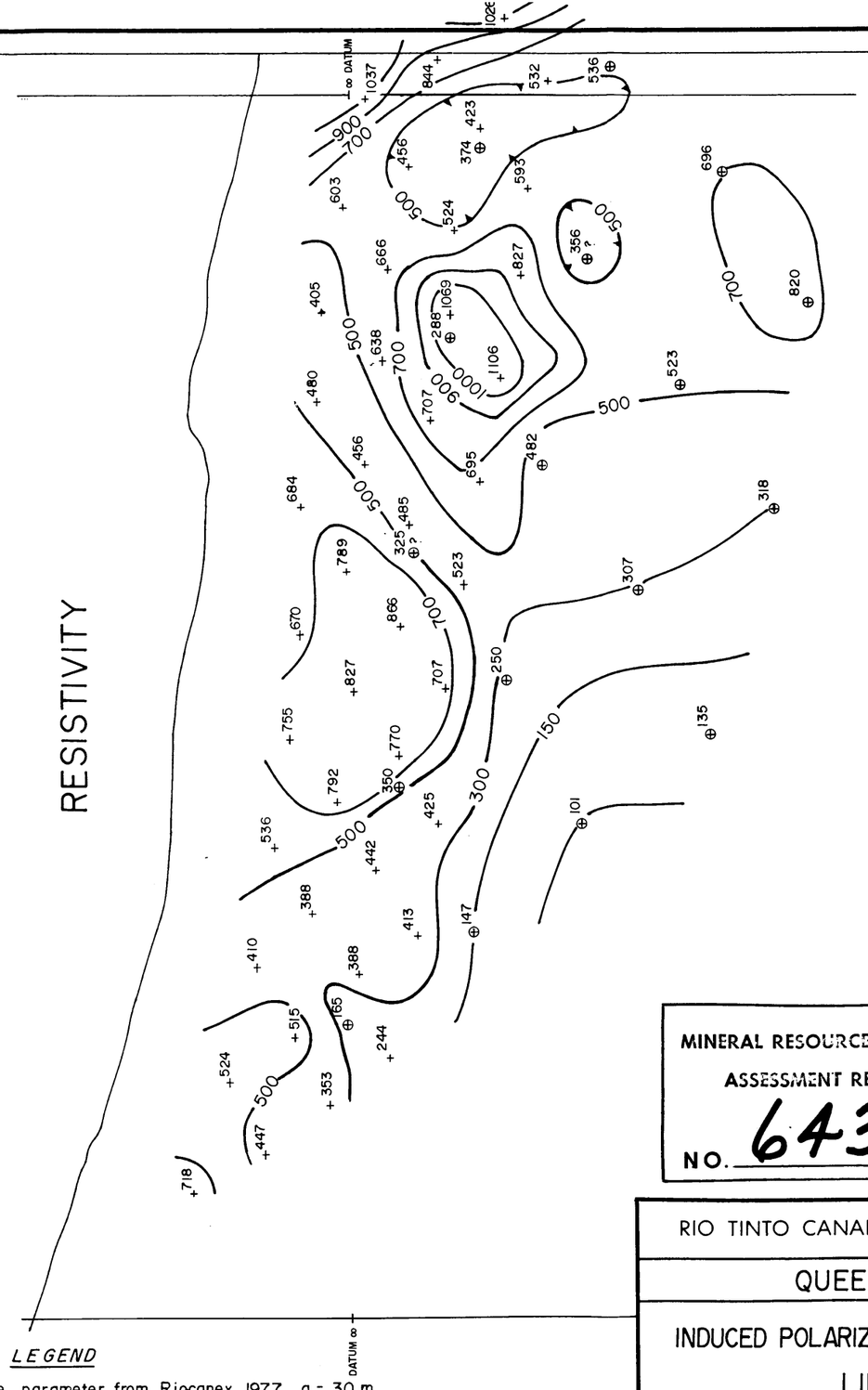


N.T.S. 82 E. 2

SCALE: 1:1500

metres 0 10 20 30 40 50 100 metres

RESISTIVITY



LEGEND

\+ Values of p.f.e. parameter from Riocanex 1977, a = 30 m.

⊕ Data by McIntyre (1967), a = 200'

All data plot points are compensated for slope effects.

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6436

FIGURE 9

RIO TINTO CANADIAN EXPLORATION LTD.

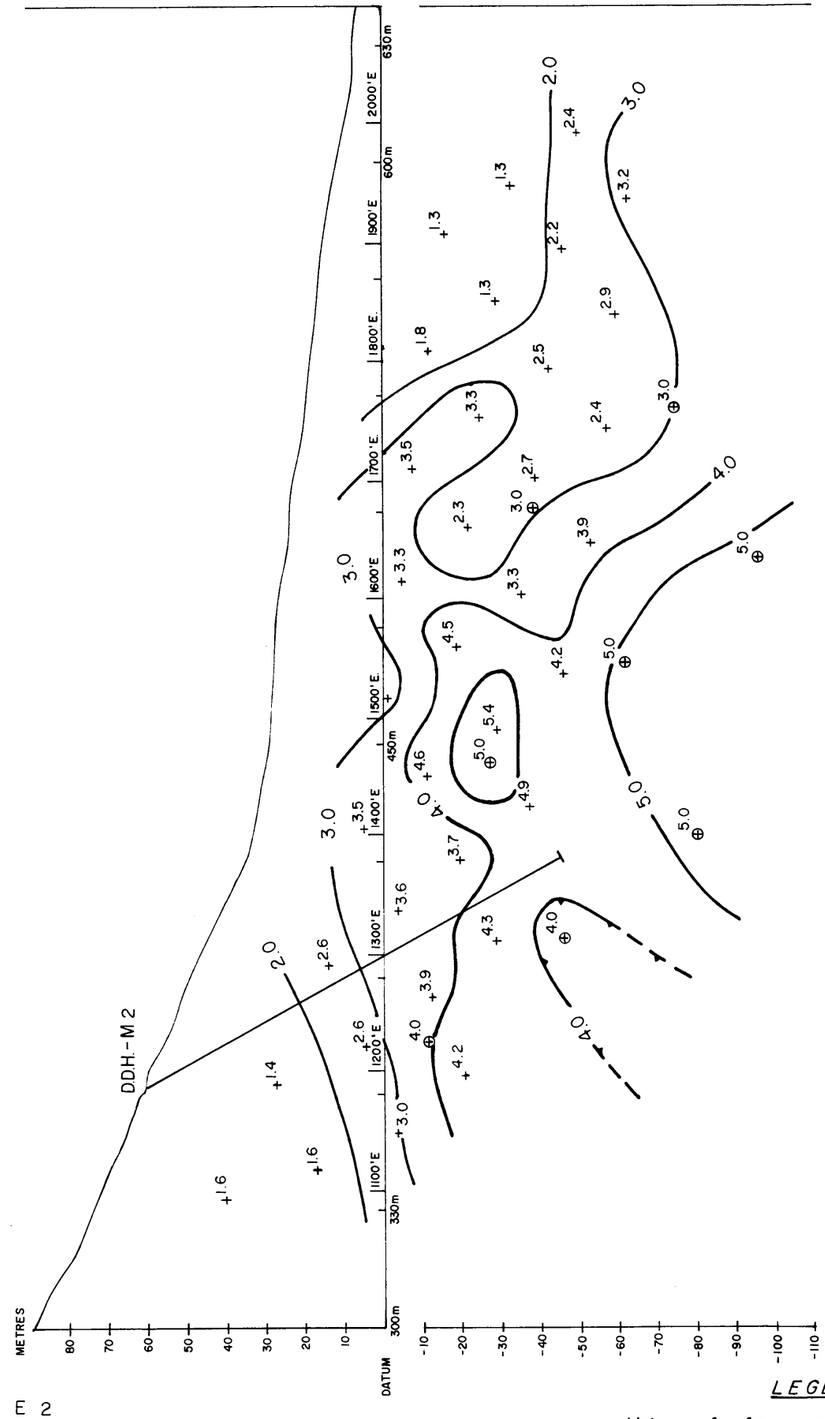
QUEEN CLAIMS

INDUCED POLARIZATION PSEUDOSECTION

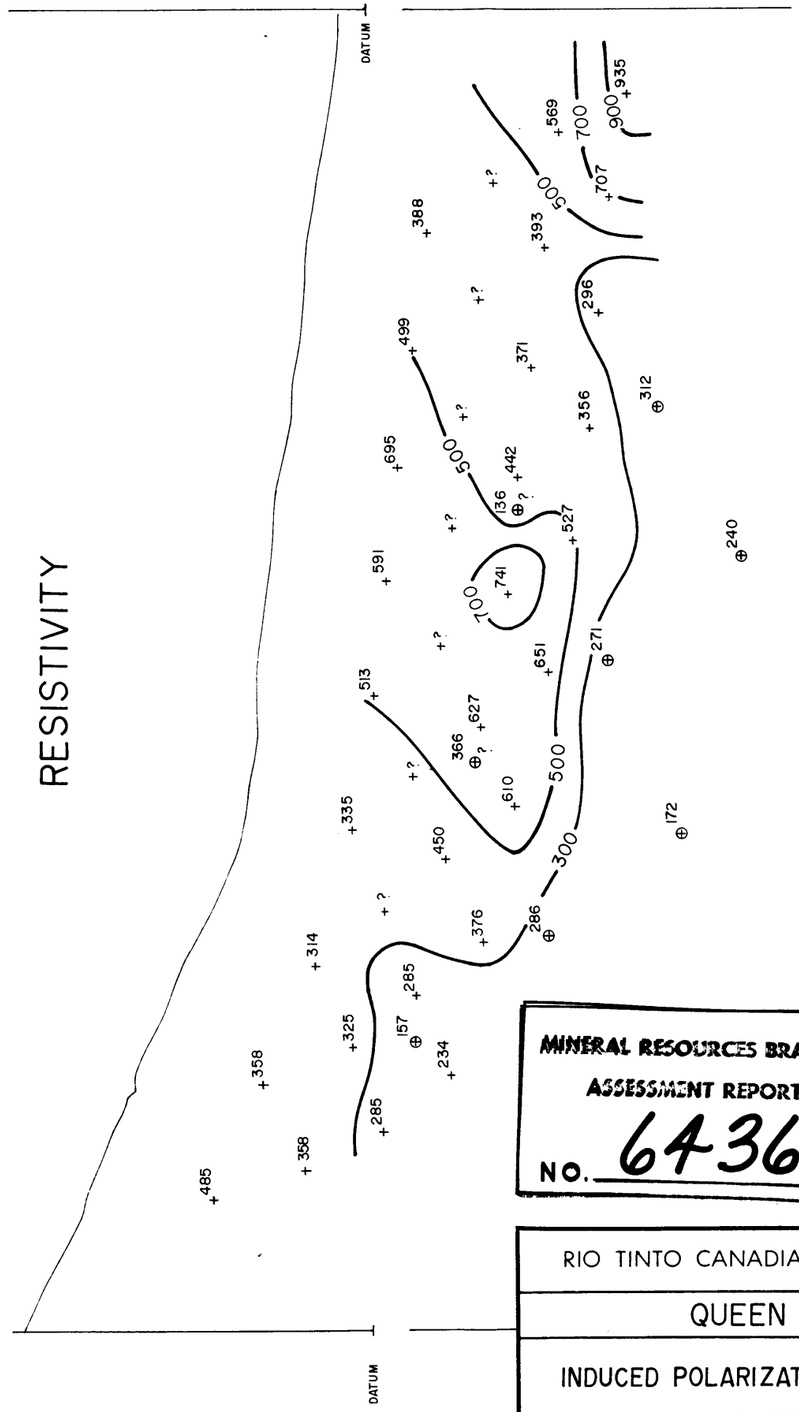
LINE 19S.

J.M. / Altair	OCT. 1977	DWG. G-6471

PERCENT FREQUENCY EFFECT



RESISTIVITY



N.T.S. 82 E 2

SCALE: 1 : 1,500

metres 0 10 20 30 40 50 100 metres

LEGEND

+ Values of p.f.e. parameter from Riocanex 1977, a = 30 m.

⊕ Data by McIntyre (1967), a = 200'

All data plot points are compensated for slope effects.

FIGURE 8

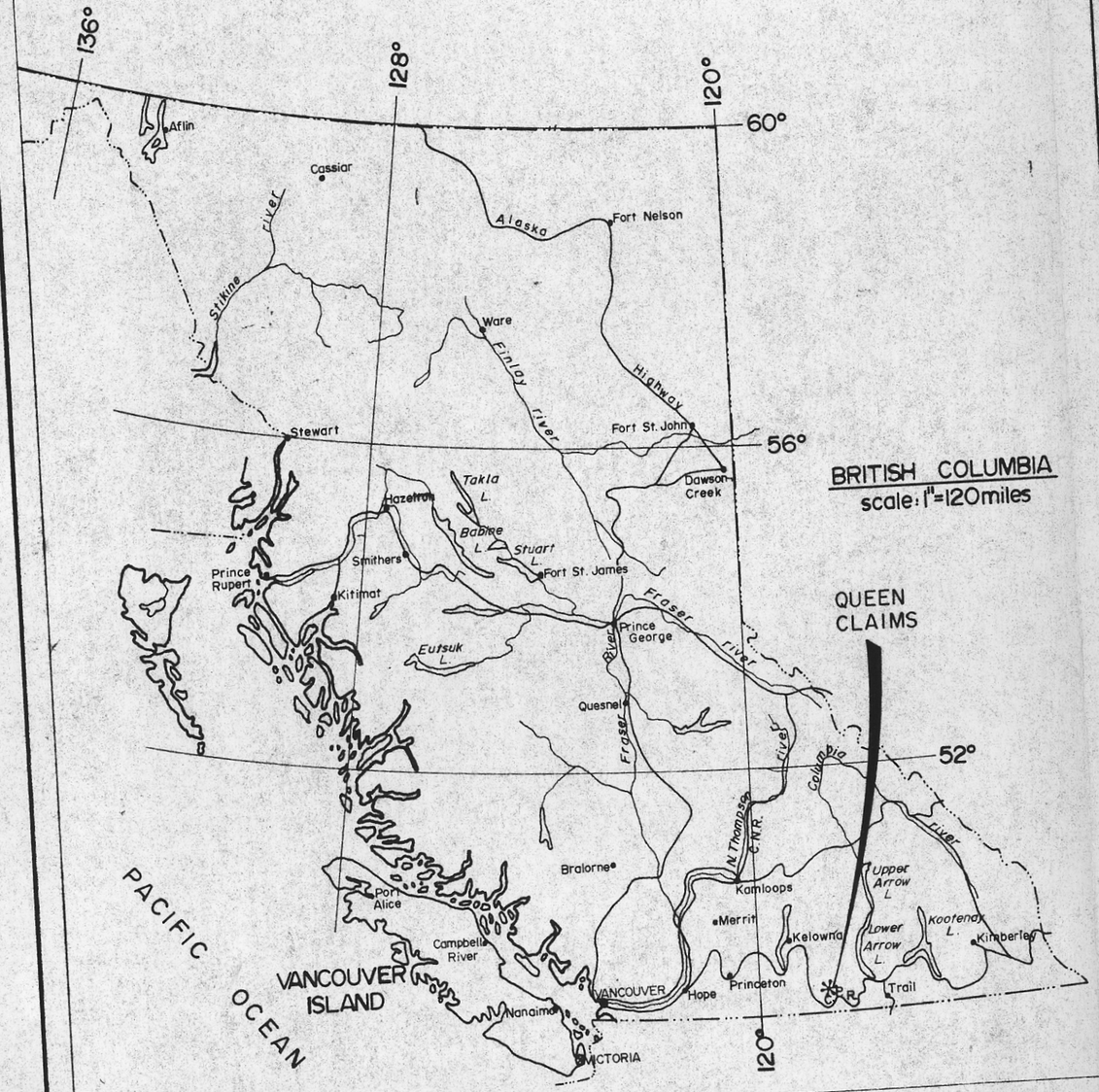
RIO TINTO CANADIAN EXPLORATION LTD.

QUEEN CLAIMS

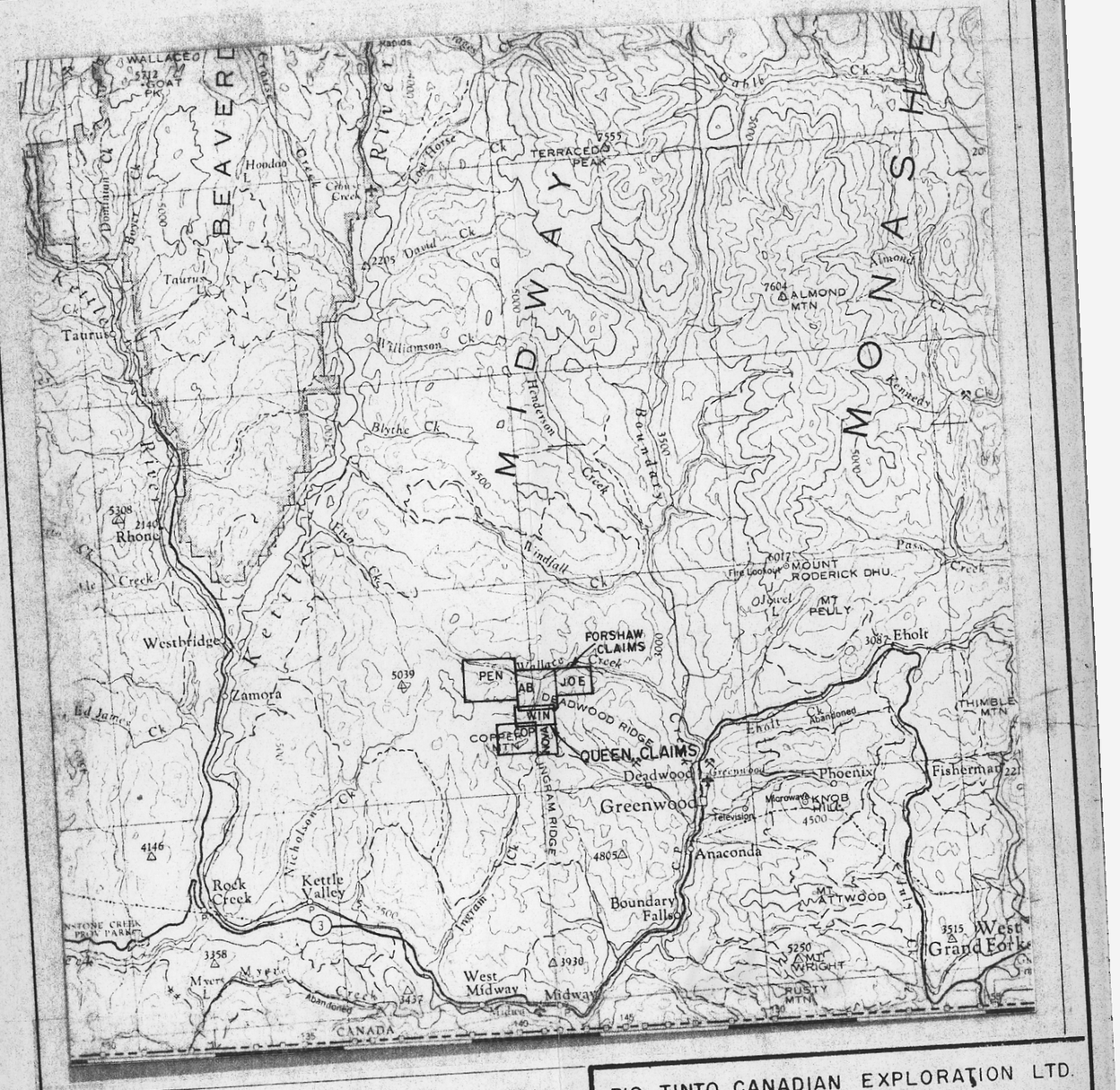
INDUCED POLARIZATION PSEUDOSECTION

LINE 18S.

J.M. / Altair | OCT. 1977 | DWG. G.-6470



BRITISH COLUMBIA
scale: 1"=120miles



SCALE 1: 250,000

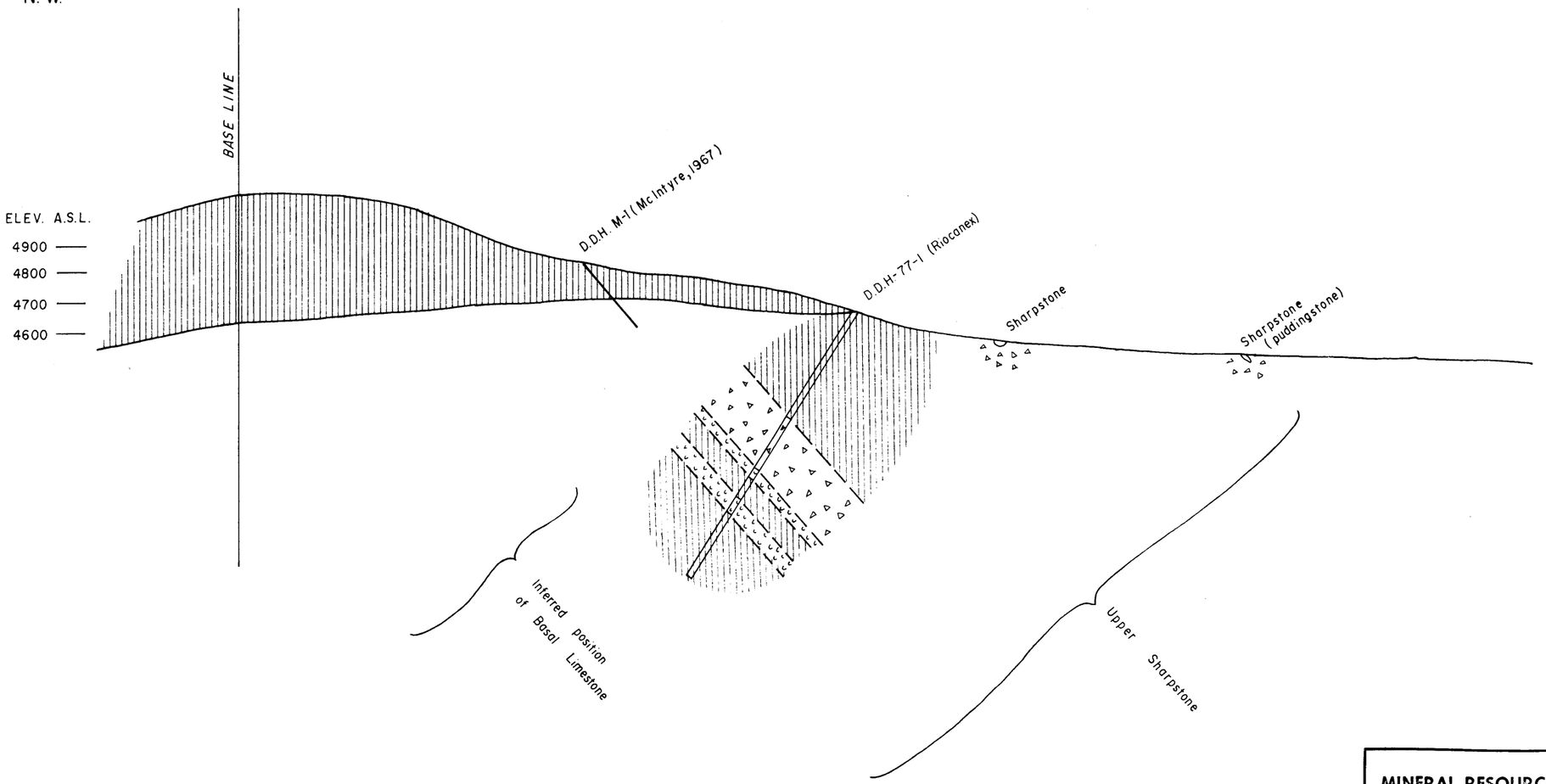
One Inch = 4 Miles (approx.)

RIO TINTO CANADIAN EXPLORATION LTD.

QUEEN CLAIMS

LOCATION MAP

R.L. Altair | NOV. 1976 | DWG. L.-6437



N. T. S. 82 E / 2

Tertiary volcanic or hypabyssal intrusives

Sharpstone (conglomerate)

Sharpstone (chert)

SCALE

METRES 100 50 0 100 200 300 METRES

MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6436

FIGURE 5

RIO TINTO CANADIAN EXPLORATION LTD.

QUEEN CLAIMS

SECTION ON LINE 19 S.

INCORPORATING RESULTS FROM 1977 DRILLING

RW / altair | SEPT 1977 | DWG. D-6467

RIO TINTO CANADIAN EXPLORATION LIMITED

LOCATION : GREENWOOD, B.C. LINE 19 600mE — DIAMOND DRILL RECORD — HOLE NO : DDH 77-1

AZIMUTH : 320° — PROPERTY : QUEEN/KING CLAIMS

DIP : 55° — LENGTH : 304.19m — ELEVATION : 4300' — Claim No.:

STARTED : August 8th, 1977 — CORE SIZE : BQ — DATE LOGGED : Aug. 9-29 — SECTION :

COMPLETED : August 30, 1977 — DIP TESTS : 154.69m (51°) — LOGGED BY : R.G. WILSON

PURPOSE : TEST IP ANOMALY RELATED TO PHOENIX STRATIGRAPHIC MODEL — CONTRACTOR: C. BERGERON

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
0	.92	CASING				
.92	26.05	TERTIARY VOLCANIC:				
		Light brown to green matrix, rectangu-				
		lar, fine grained, phenocrysts,				
		(feldspar). Slight fizzing with acid.				
		Frequent rusty fractures, probably				
		pyrite. Phenocrysts 1-2mm.				
		.92-1.83 Core highly broken to				
		rubbled.				
		1.83-3.82 Core highly to moderately				
		broken.				
		3.82+ Core lightly to moderately				
		broken.				
		Many of the white phenocrysts are				
		calcite, fairly large to .25cm. Thin				
		strung-out mafics.				
		9.53-11.88: Phenocrysts increase in				
		size to .5cm diameter mostly calcite.				
		Fine grained greenish matrix.				
		25.66-25.76: Calcite strung out at				
		35° to core axis.				

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
		Contact with below sharp at 30° to core axis.				
26.05	39.95	TERTIARY DYKE: Brown matrix, feldspar and biotite phenocrysts some calcite and minor hornblende. Phenocrysts coarse grained to 4mm. 26.05-26.45m: Mixed volcanic and sharpstone. Some pyrite in sharpstone. 28.56 - 28.96 } short sections of 31.21 - 32.21 } volcanic as .92-26.05, ie: fine grained green matrix and fine grained white feldspar and calcite phenocrysts. Contact with below sharp and irregular at 90° core axis.				
39.95	40.65	SHARPSTONE: 2mm-2cm white angular chert fragments in a fine grained, green slightly limy matrix. Considerable pyrite in matrix. Some thin hematite fracture fillings. Contact with below sharp, at 20° to core axis.				
40.65	57.52	TERTIARY DYKE: Contact with above sharp at 30° to core axis. Very fine grained, green, slightly limy matrix, with fine grained phenocrysts at 35° to core axis. Some fine grained mafics. Contact with below sharp between 2 broken pieces.				

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

PAGE Nº: 3

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
51.52	59.18	SHARPSTONE:				
		White to green, angular to sub-angular				
		fragments of chert and quartz, .1 -				
		2.5cm diameter, average .5cm. Matrix				
		is fine grained, green, slightly limy				
		Thin calcite veins. Core is moderately				
		broken. Matrix contains considerable				
		pyrite (3%). 51.85 thin hematite?				
		fracture filling. 54.26 ground up				
		sharpstone and mud:fault? Contact				
		with below sharp between two broken				
		pieces.				
59.18	66.78	TERTIARY DYKE:				
		Light green to green, very fine				
		grained matrix, white and green				
		phenocrysts of calcite, feldspar and				
		hornblende. Several rusty fractures				
		present. Some fractures calcite healed				
		Contact with below sharp, in rock at				
		25° to core axis.				
66.78	83.24	AGGLOMERATE:				
		Different from above, fragments same				
		size range .1 - 2.5 but most are 1cm				
		diameter. Fragments are green, white,				
		black and brown. Many compositions,				
		mostly cherts some calcite, especially				
		as very fine grained fragments. Also				
		present are fragments of volcanic				
		rock, similar to that starting at				
		86.98m. It has large (.5cm) phenocrysts				
		of feldspar and also contains biotite				
		and hornblende. Frequency of fragments				
		varies quickly and often, from nil				

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

PAGE Nº: 4

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
		to lots. Matrix is brownish, very fine grained often wavy bedded (soft sediment deformation?) Bedding 45° to core axis at 68.00m. Bedding 10-35° to core axis at 75.2m. This unit contains very little pyrite as compared to sharpstone. Final 30cm contains a large abundance of volcanic fragments. Contact with below sharp, in rock at 15° to core axis.				
83.24	86.98	TERTIARY DYKE: Fine grained, white calcite and a medium green mafic, too small to distinguish in a very fine grained, greenish (when wet)matrix. Contact with below sharp in rock at 80° to core axis.				
86.98	90.69	TERTIARY DYKE: Coarse grained feldspar and calcite phenocrysts (.5cm) also biotite magnetite and hornblende mafics in a brown, fine grained matrix. Contact with below sharp; in rock at 75° to core axis.				
90.69	103.75	TERTIARY DYKE: As 83.24 - 86.98m - Possible bedding 30° to core axis at 96.63m. Pyrite noted near contact with below.				
		98.13 - 98.86 Tertiary Dyke: Coarse grained phenocrysts, as 86.98 - 90.69.				
		98.86 - 99.43 Tertiary Dyke: Fine grained.				

R.A.M.L. 269

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
		99.43 - 99.62 Sharpstone: As 51.52 - 59.18, some pyrite. Contact with below sharp, in rock at 45° to core axis.				
103.75	119.44	TERTIARY DYKE: As 86.98 - 90.69. Contains some magnetite. Contact with below sharp in rock. Dyke has chilled margin at contact with below. Contact at 45° to core axis.				
119.44	124.91	SHARPSTONE: Light green to white, angular, .1 - 1.5cm (.5) diameter chert + quartz fragments set in a green, slightly limy matrix. Minor pyrite mostly in fractures along with calcite. Some fracture zones with slightly altered envelopes. Contact with below sharp between 2 broken pieces. Possible reaction rim. Contact at 50° to core axis.				
124.91	130.30	TERTIARY DYKE: As 86.98 - 90.69: First 68cm has slight green color, possibly from sharpstone digestion. Core highly broken to rubbled 129.25cm to 130.20. Solid core bits show fragments cemented with calcite. Probable fault zone. Contact with below sharp in rock. Possible reaction rim. Contact with below at 50° to core axis.				

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

PAGE Nº: 6

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm	
130.30	138.02	SHARPSTONE:										
		As 119.44 - 124.91. More calcite										
		veining and calcite healed fractures.										
		Frequently these are partially pyrite										
		filled, especially 131.10 to 132.41.										
		Often pyrite has red spots, possible										
		oxidation. Frequent fragments with a										
		bluish color At 133.30 near vertical										
		(with respect to core axis) fracture.										
		Nearby, considerable pyrite and small	7723060	137.69			41	6.4	25	-	-	
		specs of chalcopyrite. Chalcopyrite										
		also at 133.95, 135.88, 136.07, 136.24										
		and 136.66. Contact with below sharp										
		at 53° to core axis.										
138.02	141.14	CHERT 1:										
		Irregularly occuring, white and green,										
		angular to sub-angular clasts of chert										
		and quartz together with 'swirled'										
		chert (deformed chert in swirled	7723061	138.80			13	5.7	5	-	-	
		shapes). This is set in a biotite rich										
		(mudstone) matrix. Possible very										
		fine grained sulphides 139.30-140.00.										
		Limy fractures. Chalcopyrite specs										
		at 138.16, 138.53, 139.38, and 139.63.										
		138.90 - 139.30: Massive chert interbed										
		Greenish white with very fine grained										
		fracture fillings of pyrite and										
		mudstone. Chalcopyrite specs (in										
		chert and fractures) at 138.93,										
		139.07 and 139.20m. Silica healed										
		fractures in CHERT 1 at 140.70m.										
		Chalcopyrite specs at 140.74 and										
		140.92m, in chert fragments.										

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
		Contact with below arbitrary over 10 cms.									
141.14	147.24	CHERT 2: Greenish white, moderately to lightly fractured, massive chert. Minor fracture fillings by above unit and pyrite. Some CHERT 1 with possible sharpstone fragments as interbeds. Also very fine grained green ?fragments in the chert. Chalcopyrite specs at 146.57,146.65 and 146.77. Contact with below sharp at 47° to core axis	7723062	146.53			300	1.62	40	-	-
147.24	149.27	CHERT 1: As 138.02 - 141.14m. Irregularly occuring, white and green, angular to sub-angular clasts of chert and quartz, together with 'swirled' chert, in a fine grained, biotite rich brown matrix. Chalcopyrite specs at 147.57, 147.82, 148.00,148.39, and 148.56m. Contact with below arbitrary over 10cms.									

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

PAGE Nº: 8

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
149.27	152.33	PSEUDOBRECCA:									
		Green, fine grained, pseudobrecca.									
		(i.e.: small angular insitu fragments									
		having fuzzy borders). Probably a									
		silicate rich composition with chlorite									
		imparting a green color. 'Matrix' is									
		slightly darker, but too fine grained									
		to define. At 150.27 fractures become	7723063	152.60			136	1.93	20	-	-
		more silica rich and whiter. Some									
		calcite fractures. 152.30 possible									
		chert fragments, very fine grained.									
		Chert fragments infrequent but increase									
		in size downhole. Pyrite present, but									
		very minor. Contact with below arbrit-									
		rary over 10cms.									
153.33	178.20	GRIT:									
		As above, except chert fragments									
		visible and more frequent. Unknown									
		black mineral (ilmenite ?) occurring									
		as a matrix and as small needlelike									
		forms. Maybe up to 5% over short									
		sections. Occasional chalcopyrite									
		specs. Total sulphides, trace.									
		152.33 - 153.89: Average sulphide	7723064	153.60			40	5.6	10	-	-
		trace. Unknown black mineral	C301757	154.81			<.01%		<.002 oz/T		
		(ilmenite ?) shorter sections to 5%									
		Also 153.36 - 153.63 is massive chert.									
		153.89 - 154.69: Fewer fragments									
		visible, and decrease in sulphides to									
		a trace.									
		154.69 - 155.10: Fragments increase									
		in frequency but not in size.									
		Unknown black mineral (ilmenite ?)									
		present as a matrix, maybe to 5%.									

R.A.M.L. 269

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
		Sulphides 1%.									
		155.10 - 156.21: Chert increases to a massive chert at 155.45m. Chalcopyrite specs visible. Sulphides 1%.									
		156.21 - 157.70: Probable bedding 40° to core axis. Moderately altered grit containing some chert fragments and lots of chorite. Occasional specs of chalcopyrite and unknown black mineral (ilmenite ?) , Total only a trace sulphides.									
		157.70 - 158.69: As 156.21 - 157.70 but fewer calcite healed fractures.									
		158.69 - 160.60: As 156.21 - 157.70, slightly more biotite rich, green material (and darker biotite rich material) is deformed into 'squiggles' Trace sulphides.									
		160.60 - 162.62: As above, mostly matrix, lacking in fractures and 'squiggles' Trace sulphides.									
		162.62 - 169.20: As above 156.21 - 157.70 calcite healed fractures, blobs and strung out biotite rich areas. Chalcopyrite specs. 167.66 - Pyrrhotite blob. 167.50 - 168.00 - 2%. Bedding 50° to core axis at 168.51. Sulphide 1% average.	7723065	168.04			44	3.00	5		
		169.20 - 170.90: Biotite, chert fragments and calcite healed fractures become near nil. Mostly matrix material, some chalcopyrite, unknown black mineral (ilmenite ?) and few									

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
		pyrrhotite specs. Sulphide less than 1%.									
		170.90 - 174.30: Biotite, calcite healed fractures, and chert fragments increase but are variable. Total sulphide trace. Unknown black mineral 1½%, but locally may be near 5% as at 171.50 - 171.60. Pseudo oolite structure 171.97 - 171.99. Chert lens 172.10 - 172.20. Pyrite, chalcopyrite, ilmenite specs throughout. Calcite (limestone) at 172.56 - 172.60. Matrix material has a paler green color. After 172.30 unknown black mineral (ilmenite?) is finer grained. At 174.26m possible bedding to core axis 40°.	7723066	171.44			24	9.1	< 15	-	-
			7723067	173.83			7	4.05	5	-	-
		174.30 - 176.70: Matrix becomes brownish, biotite rich, with zones of green matrix. Chalcopyrite specs throughout. Unknown black mineral (ilmenite ?) occurs as very fine grained matrix in green areas. Pyrite abundant. Total sulphides 2%, with unknown black mineral 3%.	7723068	176.67			4	4.8	5	-	-
		176.70 - 178.20: Green matrix dominates, minor chert areas, some limestone (calcite) zones, usually with unknown black mineral (ilmenite ?) Biotite minor, chalcopyrite minor, unknown black mineral, (ilmenite?) very fine grained + pervasive. Total sulphides 1%, with black mineral	7723069	177.26			8	7.1	< 5	-	-

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
		2%. Contact with below arbitrary									
		over 20cm.									
178.20	192.00	CHERT 3:									
		178.20 - 182.15: Massive white to									
		greenish chert and quartz fragments									
		.1 - 1cm in a strung out matrix of	7723070	181.60			20	4.01	15	-	-
		the above units' matrix. i.e. Green	7723071	182.08			660	12.4	3600	>20,000	>1000
		and brown, fine grained, and minor	above assayed				0.07%	13.01%	0.31 oz/T	3.16%	
		calcite. Specs of chalcopyrite and									
		pyrite throughout to average 2%.									
		Last 15cm contains 10% sulphides.									
		Pyrite, chalcopyrite, arsenopyrite?									
		and hematite?									
		182.15 - 184.26: Massive and minor									
		fragmental white chert, plus a high	7723072	183.00			83	2.95	35	-	-
		degree of graphite matrix, stringers,									
		and fracture surfaces. Sulphides,									
		pyrite and chalcopyrite to 3½% over									
		short sections. Average 1½%. Short									
		sections (184.06 - 184.20) have a									
		maze of fine calcite stringers.									
		184.26 - 187.66: As 178.20 - 182.15,									
		higher degree of matrix, minor to	7723073	185.25			100	6.4	95	-	-
		moderate graphite Sulphides, pyrite	7723074	187.08			156	6.7	3550	-	-
		chalcopyrite and hematite to 5% as									
		at 187.15 - 187.25. Average 3%									
		187.66 - 189.10: Massive chert with									
		nil to moderate graphite. Sulphides									
		1-2%.									
		189.10 - 189.83: Chert fragments plus									
		a high degree of graphite matrix.									
		Sulphides 3%. Contact with below									
		gradual over 10cms.									

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

PAGE Nº: 14

METRES from	METRES to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
227.72	304.19	TERTIARY DYKE:				
		Coarse grained, white (some with				
		pinkish reaction rims), feldspar and				
		biotite phenocrysts in a greenish				
		(slightly brown past 231m) fine grained				
		matrix. First 15cm is very fine grained.				
		Possible reaction rim?				
304.19		END OF HOLE				

R.A.M.L. 269

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
		189.83 - 191.00: Partially fragmental									
		chert, plus some matrix. Minor	7723075	190.23			90	3.98	45	-	-
		short zones of massive chert.									
		Sulphides 2% Calcite veining and									
		filling. Contact with below sharp									
		in rock.									
		191.00 - 192.00: Fragmental grey chert									
		(sharpstone). Some calcite filling.									
		Limy open space fillings. Contact									
		with below sharp in rock at 55° to									
		core axis. Sulphides less than 1%.									
192.00	195.25	TERTIARY DYKE:									
		Coarse grained feldspar,biotite,hornblende,									
		phenocrysts in a brown fine grained									
		matrix. Also coarse grained green									
		mineral with and without pink reaction									
		rims. Matrix is greenish near top									
		contact, possibly a reaction rim .									
		Contact with below sharp and irregular									
		in rock at 10° to core axis. Minor									
		calcite plus magnetite.									
195.25	198.82	TERTIARY DYKE:									
		Medium grained,green olivine? and									
		hornblende? phenocrysts. Calcite									
		fracture fillings and crystals. Dark									
		green,fine grained matrix, slightly									
		limy in spots. Contact with below									
		sharp in rock at 25° to core axis.									
198.82	215.15	TERTIARY DYKE:									
		As 192.00 - 195.25. 4 pyrite filled									
		slickensided fracture surfaces at									
		211.88m, 212.76m, 213.96m, 214.63m.									

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: DDH 77-1

METRES from	METRES to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH	Cu ppm	Fe %	Au ppb	Zn ppm	As ppm
		Last 3m has frequent very fine grained green'veins'. Volcanic matrix becomes green and very fine grained near contact. Reaction rim? Contact with below sharp in rock at 20° to core axis.									
215.15	227.72	CHERT 3:									
		215.15 - 216.03m:As 191.00 - 192.00, white and grey angular fragments (Sharpstone?). Fragments angular and elongated, not a true fragmental Matrix grey to black, very fine grained, non limy. Minor calcite. Core rough. Sulphides are pyrite and chalcopyrite?, 1%.	7723076	215.50			47	2.40	30	-	-
		216.03 - 227.72: Chert fragments, possible bedding 70-80° to core axis at 216.60. Fractured, in-place grey chert, showing bedding marks. Some minor black matrix and calcite.	7723077	220.20			84	2.52	15	-	-
			7723078	223.27			70	2.60	10	-	-
			7723079	224.37			27	2.75	5	-	-
			7723080	227.30			54	2.87	5	-	-
		Sulphides pyrite and chalcopyrite 1% to 217.47. 220.62 possible bedding 40° to core axis, ranges to 0° to core axis. Sulphides, pyrite and chalcopyrite 2%, 217.47 to 221.00m. 221.00 - 227.72m sulphides 1%. Silica (white and black) veining (thin) throughout. Bedding 10° to core axis at 223.30m, bedding 30° to core axis at 225.85m. 227.28 - 227. 36 irregular tertiary sill/dyke. Contact with below sharp, in rock at 80° to core axis.									

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

LOCATION : LINE 19 350mE

HOLE NO : M-1

AZIMUTH : 140°

PROPERTY : QUEEN/KING CLAIMS

DIP : 50°

LENGTH : 106.98 m

ELEVATION :

Claim No.:

STARTED :

CORE SIZE : BQ

DATE LOGGED : Aug. 15, 1977

SECTION :

COMPLETED : 1967

DIP TESTS :

LOGGED BY : R.G. WILSON 1977

PURPOSE : NOTE: 1) ALL LENGTHS APPROXIMATE. CORE MARKERS HAVE NO FOOTAGE NUMBERS 2) ALL ESTIMATES METRIC 3) TOP AND BOTTOM OF HOLE UNKNOWN

CONTRACTOR: DRILLED FOR 1967 MACINTYRE -PORCUPINE

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
0	2.5	TERTIARY VOLCANIC:				
		Coarse grained phenocrysts to .7 cm				
		diameter of feldspar and biotite. Green				
		weathering matrix.				
2.5	5.3	TERTIARY VOLCANIC:				
		Very fine grained phenocrysts ,brown to				
		green weathering, occasional clots of				
		white feldspar? phenocrysts.				
5.3	29.1	TERTIARY VOLCANIC:				
		Interlayered green ,brown and purple				
		matrix, medium grained phenocrysts.				
		Phenocrysts much more abundant than				
		volcanic 1 above. Average size .2 cm.				
		Mafics more prevalent, mainly hornblende				
		and biotite.				
29.1	54.6	SHARPSTONE:				
		White and green mainly angular fragment				
		.2 to 2 cm diameter, average .5 cm of				
		chert and quartz composition set in a				
		green, fine grained, slightly limy				
		matrix. First 4.3m in box extremely				

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: M-1

PAGE Nº: 2

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
		crumbled, may be weathering feature				
		due to excess lime. Contact with				
		below gradual over 1 m.				
54.6	67.8	CHERT AND"SWIRLSTONE!"(chert 2&1 of DDH 77-1)				
		White, angular, "in place" fragments.				
		In places slightly limy. In places				
		brownish colored with white swirls				
		throughout.				
		60.5-61.0 Tertiary Volcanic as 0-2.5m.				
		63.0-67.4 Tertiary Volcanic as 0-2.5m.				
67.8	82	TERTIARY DYKE:				
		Similar to 0-2.5m				
82		END OF AVAILABLE CORE				
		End only very approximate, core dumped				
		from 1 box.				

R.A.M.L. 269

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

LOCATION : LINE 18 390mE | HOLE NO : M-2

AZIMUTH : 140°

PROPERTY : QUEEN/KING CLAIMS

DIP : 50° | LENGTH : 122.53 m | ELEVATION : | Claim No.:

STARTED : | CORE SIZE : BQ | DATE LOGGED : AUG. 15,1977 | SECTION :

COMPLETED : 1967 | DIP TESTS : | LOGGED BY : R.G. WILSON

PURPOSE : NOTE: 1) ALL LENGTHS APPROXIMATE. CORE MARKERS HAVE NO FOOTAGE NUMBERS 2) ALL ESTIMATES METRIC 3) TOP AND BOTTOM OF HOLE UNKNOWN | CONTRACTOR: DRILLED FOR MACINTYRE - PORCUPINE

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
0	.5	VOLCANIC:				
		Little core left in box				
.5	60.5	SHARPSTONE:				
		White and greenish white angular				
		fragments of chert and quartz				
		composition set in a green,fine grained				
		slightly limy matrix. First 6.5m				
		highly broken. May correspond with				
		hole on line 19 at 350mE. Occasional				
		(10cm) short section similar to chert				
		and"swirlstone"(chert 1 or DDH 77-1)				
		28.5 increase in Py content over short				
		distance.				
		21.5-27.5 Tertiary Dyke. Coarse				
		grained phenocrysts of feldspar and				
		biotite to.7cm, average .5 cm diameter.				
		Matrix green to brown weathering.				
60.5	82.0	CHERT AND"SWIRLSTONE"(chert 2 & 1 or DDH 77-1)				
		White to green;in place'angular				
		fragments of chert and quartz. Brown				
		and green,fine grained,silicate rich				
		matrix with white, irregular, veins.				

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

HOLE Nº: M-2

PAGE Nº: 2

METERS from	METERS to	DESCRIPTION	SAMPLE Nº	FOOTAGE from	FOOTAGE to	LENGTH
		These occur mostly at top of sequence.				
82.0	93.5	TERTIARY DYKE:				
		As 21.5 - 27.5m				
93.5		END OF AVAILABLE CORE				

APPENDIX NO. 2

DRILL LOGS: RELOGGING OF McINTYRE DRILL HOLES M1 AND M2

6436

COST STATEMENT
QUEEN CLAIMS (COP)
DIAMOND DRILLING
AUGUST 13-29, 1977

SALARIES & WAGES			
R.G. Wilson (13-30 Aug)	18 days @$45/day	$ 810.00	
R.V. Longe (16-22,27-29 Aug)	10 days @$88/day	880.00	$ 1690.00
EMPLOYEE BENEFITS			338.00
RIOCANEX CAMP EQUIPMENT			
28 man days @ $3.00/man day			84.00
DIAMOND DRILLING			
Bergeron Drilling Ltd.			16612.45
FOOD & ACCOMMODATION			806.90
ASSAYS: BONDAR-CLEGG & COMPANY			
1 @ $0.60 each		$ .60	
21 @ $1.90 each		39.90	
1 @ $2.50 each		2.50	
21 @ $3.50 each		73.50	
5 @ $4.50 each		22.50	
1 @ $5.00 each		5.00	
1 @ $5.50 each		5.50	
1 @ $6.50 each		6.50	
4 @$12.00 each		48.00	
21 Sample Preps @ $1.25 each		26.25	230.25
SUPPLIES			366.99
TRAVEL			
Fixed Wing		$ 71.45	
Budget Rent-A-Car		723.55	
Other		84.05	879.05
FUEL			92.39
REPORT PREPARATION			1149.09
TOTAL			$22249.12

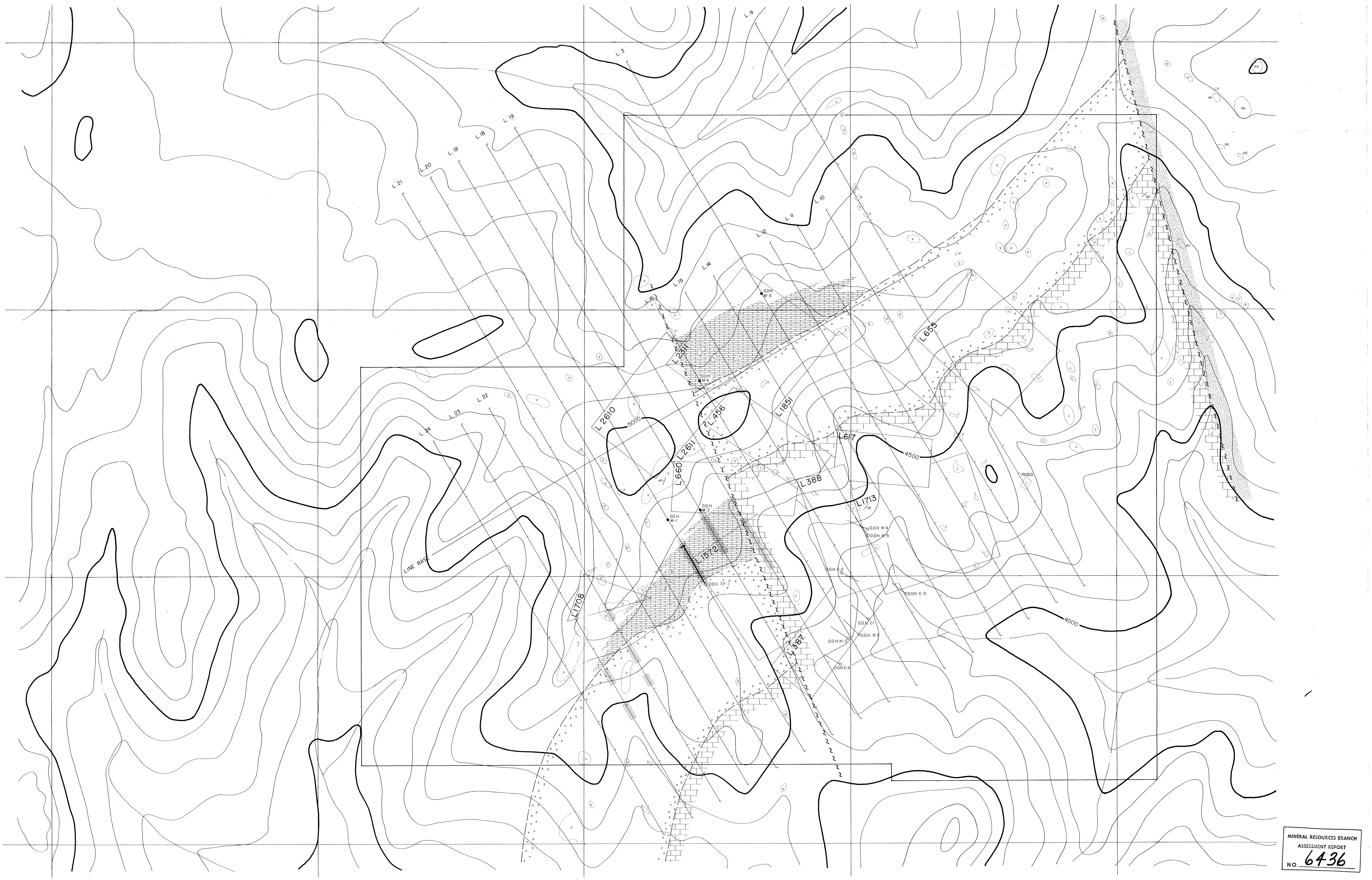


FIGURE 4

LITHOLOGY

- v Volcanics
- s Sharpstone
- L Limestone

STRATIGRAPHIC UNIT

- Upper Limestone
- Upper Sharpstone
- Basal Limestone (Inferred)
- Knob Hill

SYMBOLS

- Outcrop
- Stratigraphic Contact
- Fault
- Outline of Claim Block
- Drill Hole by McIntyre
- Drill Hole by C.M. & S. or Noranda
- I.P. Anomaly, probable or definite. J. McCance

N.T.S. 82 - E

SCALE 1:5000

Metres 0 50 100 200 300 400 500 Metres

RIO TINTO CANADIAN EXPLORATION LIMITED

QUEEN CLAIMS

GEOLOGY

McINTYRE GRID, I.P. ANOMALY
& LOCATIONS OF HOLES DRILLED BY
McINTYRE, NORANDA, C.M. & S.

R.L. /altair	JAN - 1977 Revised Sept. - 1977	DWG. G - 8511

SAMPLE No.	DEPTH	Cu p.p.m.	Zn %	Fe %	Au p.p.b.
7723060	137.69	16		6.4	25
7723061	138.80	13		5.7	5
7723062	146.53	300		1.62	40
7723063	152.60	136		1.93	20
7723064	153.60	40		5.8	10
C 301757	154.81				
7723065	168.04	44		3.00	5
7723066	171.44	24		9.1	<5
7723067	173.84	7		4.05	5
7723068	176.67	4		4.8	5
7723069	177.26	8		7.1	<5
7723070	181.60	20		4.01	15
7723071	182.08	700	3.16 %	13.01	0.31oz/ton *
7723072	183.00	83		2.95	35
7723073	185.25	100		6.4	65
7723074	187.08	156		6.7	3550
7723075	190.23	90		3.98	45
7723076	215.50	47		2.40	30
7723077	220.80	84		2.52	15
7723078	223.27	70		2.60	10
7723079	224.37	27		2.75	5
7723080	227.30	54		2.87	5

CHARACTER SAMPLES

DEPTH FROM SURFACE

5.0 m.
100 m.
150 m.
200 m.
250 m.
300 m.

SHARPSTONE

SHARPSTONE : white and green angular fragments in a fine grained, green, slightly calcareous matrax

AGGLOMERATE

SHARPSTONE

SHARPSTONE

SHARPSTONE

CHERT 1 : Irregularly shaped chert clasts in a biotite rich, fine grained matrix

CHERT 2 : Greenish white, moderately fractured, massive chert.

CHERT 1 :

PSEUDOBRECCIA : Fine grained in situ angular fragments with indistinct borders in a very fine grained chloritic matrix

GRIT : Fine grained, angular fragments, in a chlorite, biotite, silicate rich matrix.

CHERT 3 : Massive to fragmental chert in a chlorite, biotite, graphite rich matrix

CHERT 3

% TOTAL SULPHIDES (mostly pyrite)

0 5 10 15

* ASSAY

FIGURE 12

LEGEND

- Tertiary volcanic or hypabyssal intrusive
- Sharpstone
- Grit (a fine grained sharpstone)
- Chert

N.T.S 82 E 2

SCALE 1:1000

Metres 20 10 0 20 40 60 80 Metres

RIO TINTO CANADIAN EXPLORATION LIMITED

QUEEN CLAIMS

D.D.H. 77-1
LITHOLOGY, SULPHIDE PERCENTAGES & ROCK GEOCHEMICAL VALUES

RW/ altair | OCT. - 1977 | DWG. G.S.-7444

PHOENIX
(1/2 mile from mine)

PHOENIX LOOK-OUT SECTION

PHOENIX ROAD SECTION

16 km.

STEMWINDER LIMESTONE

PUDDINGSTONE

UPPER SHARPSTONE

BASAL LIMESTONE

BASAL SHARPSTONE

MAIN ORE ZONE

STRATIGRAPHIC POSITION OF PHOENIX OREBODY.

DDH 77-1

Range, metres	
40-41	Sharpstone
52-60	Agglomerate
67-83	Sharpstone
120-126	Cherts, contorted with occasional sharpstone fragments
132-138	Chert
138-142	Cherts, contorted with occasional sharpstone fragments
142-148	Cherts and very fine grained grit (a type of sharpstone) with pyrite
148-150	
150-178	Cherts, chloritic with pyrite and graphite
178-182	Cherts, chloritic with pyrite and graphite
214-228	

END OF D.D.H. 75-2

WALLACE CREEK

COMPOSITE SECTION D.D.H. 75-1 & D.D.H. 75-2

SECTION THROUGH OREQUEST TRENCHES NORTH OF WALLACE CREEK

1 km.

UPPER SHARPSTONE

? BASAL LIMESTONE

LEGEND

- SILTSTONE, Usually cherty and dolomitic
- LIMESTONE
- DOLOSTONE
- SHARPSTONE
- PUDDINGSTONE (A sharp stone including large rounded limestone clasts)
- NODULAR LIMESTONE, Usually with evidence of slumping and brecciation
- "STEMWINDER LIMESTONE" (A fragmental limestone with distinctive, angular, limestone clasts)
- CARBONATE With sharpstone fragments

SCALE 1:1000

METRES 20 10 0 20 40 60 80 100 METRES

FIGURE 13

RIO TINTO CANADIAN EXPLORATION LIMITED

FORSHAW OPTION AND QUEEN CLAIMS

CORRELATION OF STRATIGRAPHIC SECTIONS
INCLUDING POSITION OF DDH 77-1

R.L. / altair | JAN. - 1977 Revised Sept 1977 - R.V.L. | DWG. G. - 7437