

Geological and Rock Geochemical
Report on Pioneer #1 and #2,
Jura area, 92 H 9/W.
Similkameen M.D.

6292

MINERAL RESOURCES BRANCH ASSESSMENT REPORT NO. _____
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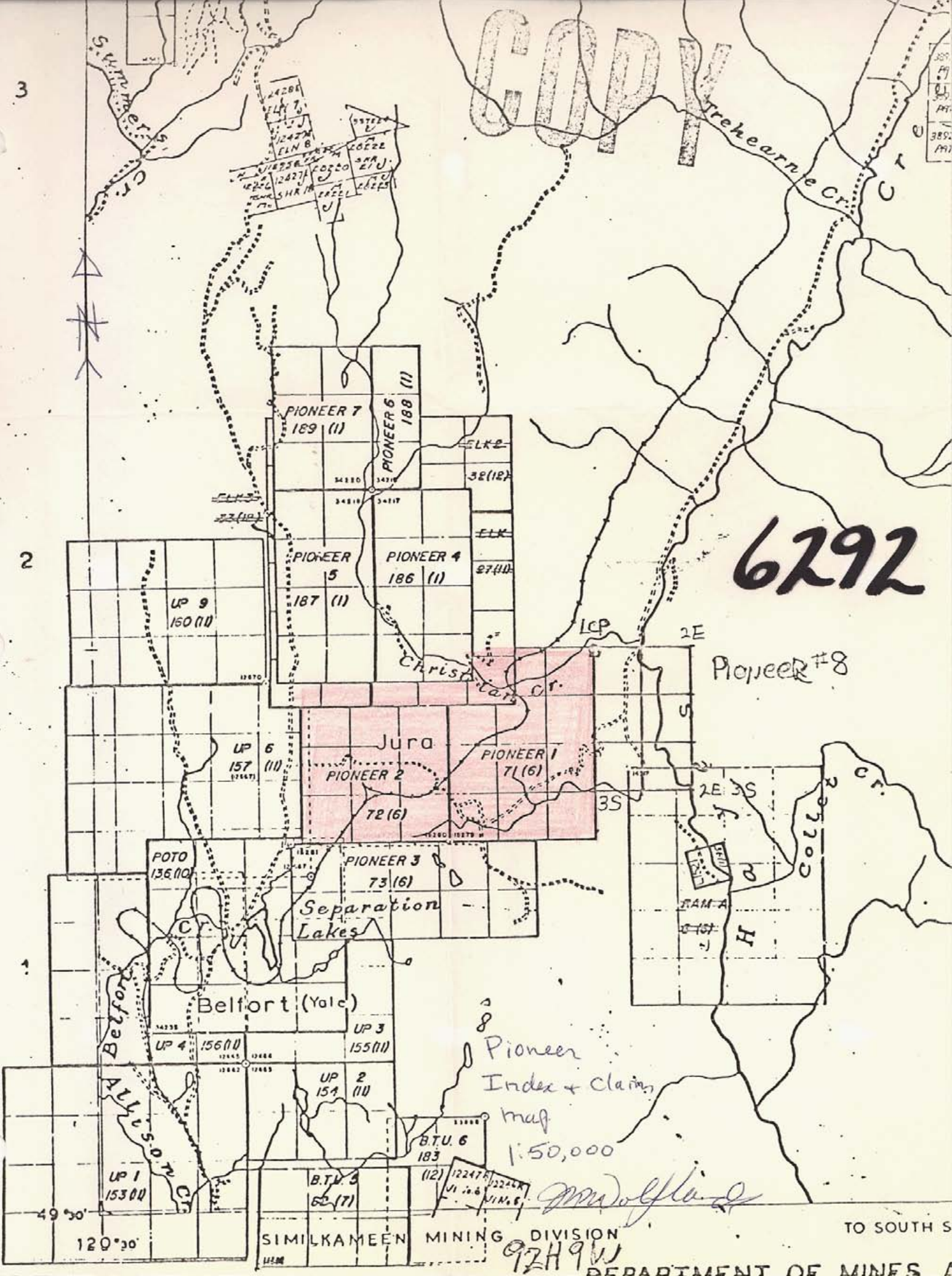
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COPY

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8
Pioneer
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map
1:50,000

M. Wolf

INTRODUCTION

Summary: Pioneer 1 is underlain by a ^Ufaulted copper gold porphyry alteration zone that appears to be exposed near the original top of significant mineralization. Outcrop is sparse; grades up to 0.4% Cu have been found. The well defined portion of the mineralized zone appears to be not larger than 250 m x 400 m in plan. This area, while small, is sufficient to contain a surface minerable deposit if above average porphyry grades exist. The potential of the fault offset portion of the zone is unⁿknown, but appears to be as good as or better than that of the well defined portion.

The surface minerable potential should be tested, by percussion drilling if possible. Very careful consideration should also be given to deeper drilling to test the possibility that grades will increase downward, towards a postulated potassic and/or porphyry intrusive core.

Location and access: Pioneer #1 and #2 are located adjacent to the Osprey Lake road and the C.P.R., 10 km N 25⁰ E of Princeton, in the vicinity of Christian Creek, NTS 92 H 9/W. Elevation is about 1000m; the property lies mainly in open grasslands. Access is by auto from Princeton. A 4 x 4 is useful on the property.

Work done: Geological mapping and rock geochemical sampling was conducted from May 9 - 19, 1977, on Pioneer #1, owned by Cord^bin J. Robertson. Operator was Quintana Minerals Corp. All rock, alteration, and mineral names are based only on hand specimen examination with a 20x lens.

GEOLOGY

Regional geology is portrayed in G.S.C. Memoir 243, Princeton Area, Rice, 1947. In this report, the Pioneer area is shown to be underlain by Nicola Group rocks and Summers Creek intrusives.

Rock Units: Eight igneous rock units, seven of which are intrusive, have been identified on Pioneer 1.

The oldest rock unit (Unit 1) on the property includes green (minor red) andesite flows and breccias of the Nicola Group. Remote from areas of strong alteration, in the southeast corner of the claim, breccias predominate. Within areas of strong

alteration, rocks mapped as andesite include some breccia, as well as probable plagioclase porphyry flows. Andesite shown on the geology map is likely to include some microdiorite (Unit 2) and felsite (Unit 5). Only one bedding attitude was obtained, in the southeast corner of Pioneer 1, where a thin bedded tuff unit about 0.2 m thick trends 065/65 SE.

Microdiorite was mapped in the central portion of the outcrop area. This unit was defined wherever a substantial area seemed to be underlain by a uniform textured rock, dark green in color, with 50% to 75% of stubby euhedral plagioclase grains about $1 \times 1\frac{1}{2}$ mm in size, interstitial chlorite and rare chloritized hornblende phenocrysts about 1×3 mm. Although field relationships, plan distribution, and uniformity of texture all indicate that most microdiorite is intrusive into andesite, possibly as hypabyssal dikes and sills, some rocks mapped as microdiorite are probably thick flows.

Monzodiorite, which forms a large, probably continuous, body in the northeast part of Pioneer 1 is not seen in contact with microdiorite or andesite, but one small outcrop of meta^{and}andesite between the new road and the railroad, north of Christian Creek, is probably an inclusion of Nicola rocks in monzodiorite. Typically, monzodiorite (Unit 3) contains 50% euhedral plagioclase ranging from $\frac{1}{2} \times 1\frac{1}{2}$ mm to $1\frac{1}{2} \times 3$ mm, average about 2 mm long; 15% subhedral to anhedral pink feldspar average 1 mm in diameter, set in a fine grain matrix which is now about half chlorite. There is 1-2% disseminated magnetite, and a trace of disseminated pyrite. Fabric is random.

On the new road, south of Christian Creek, at sample site 45, a dark green aphanitic rock with 20% pink feldspar phenocrysts 1 x 3mm, oriented randomly is cut by younger (quartz) monzonite porphyry. This pink feldspar porphyry (Unit 4) may be a chilled or marginal phase of monzodiorite.

A mass of felsite (Unit 5) is exposed in scattered outcrops at the eastern limit of exposures, north of the Alfalfa fault. This light colored very fine grained rock with pink mottling almost certainly intrudes diorite. Some felsite is probably present in the area shown as strongly altered andesite south of the Alfalfa fault.

(Quartz) monzonite porphyry (Unit 6) is comprized of 20% to 30% stubby to equant plagioclase crystals ranging from $\frac{1}{2}$ mm to 2 mm in large dimension, in a fine grain pink matrix. The matrix contains chlorite and, locally, up to 5% quartz as $\frac{1}{2}$ mm grains. Remote from contacts, this rock type contains 5% to 10% pink feldspar phenocrysts up to 3 x 6mm in size. Near contacts, there is 1 to 2% disseminated pyrite, and a trace of disseminated chalcopyrite.

One small outcrop of quartz - pink feldspar porphyry was noted north of Switchback Creek.

North of the Alfalfa fault, on the west edge of exposures and on the new road, a granodiorite (Unit 8) dike is exposed. This intrudes diorite. Age relations to other rock types are not clear, but apparent age relationships to alteration, and the absence of sulphides suggest that granodiorite is younger than other major rock types. Granodiorite is an hypidiomorphic granular rock with about 20% pink feldspar, 50% plagioclase, 20% quartz, and 10% biotite.

Structure:

Pre-mineral structures are difficult to map; the linear nature of the alteration zone suggests structural control, and a narrow zone of alteration trending easterly and dipping $20^{\circ} \pm$ to the north, exposed in a road cut north of Christian Creek, is clearly structurally controlled. Premineral diorite dikes trend north at the south end of the alteration zone. Post mineral crushing and shearing are abundant in a zone trending roughly west to just north of west in Switchback Creek. Individual shear planes trend north and dip steeply west, or are flat and undulating. Although there is massive evidence of faulting in this zone, it is questionable whether the altered and mineralized zone has been offset laterally. Perhaps the most likely explanation for this zone is that it is a steeply dipping? structure, trending westerly, with only dip slip movement.

Fault gouge and breccia exists in new road cuts south of Christian Creek, at the contact between Unit 6 and Unit 4. However, dikes of 6 clearly cut 4 south of the fault, making major displacement unlikely.

The most westerly exposures of unit 3, on the railroad north of Christian Creek, are crushed and sheared. A connection between this obvious fault zone, and the one in the new road cut, as shown on the geology map, is conjectural.

The most important structure on the claim is that shown as the Alfalfa fault on the geology map. The presence of this fault is indicated by the juxtaposition of the most strongly altered and best mineralized outcrop on the property at sample 29, with very weakly altered and mineralized rock at sample 38. Although other explanations could account for these factors, the apparent offset of the west limit of epidote and the west limit of 1% sulphides adds to the credibility of the fault hypothesis. The apparent movement of the alteration zone is at least 400m right lateral. The existence of more feldspar, and more quartz rich alteration north of the fault suggests the possibility of substantial vertical movement also.

The I.P. results shown in assessment report # 318 are consistent with the Alfalfa fault as postulated.

Alteration and mineralization:

With the possible exception of a quartz - pink feldspar dike, there are no un-altered rocks on the claim. However, andesite east and southeast of the southeast corner of the claim, as well as andesite in Christian Creek towards the northwest corner, have only been subjected to pervasive propylitization, without any significant concentration of sulphides. Similarly, most monzodiorite in the northeast, most (quartz) monzonite porphyry, and all exposures of granodiorite have been subjected to alteration which has chloritized mafics and softened (sericitized?) plagioclase without developing significant sulphide mineralization.

It was found useful to define three alteration/mineralization boundaries in the vicinity of the better copper mineralization. One of these boundaries, the outer limit of estimated one percent total sulphide, encloses all significant sulphide mineralization. The second boundary, mainly coincident with the first, is the inner limit of pervasive epidote alteration. Interior to these, and enclosing all rock geochemical samples containing more than 1500 ppm cu, is a boundary defined by the inner limit of chlorite.

Sulphides, mainly pyrite, increase northerly from 1% by volume to a maximum of about 5% by volume in exposures south of the Alfalfa fault along the new road. The only sulphide other than pyrite occurring in any significant quantity is chalcopyrite. Pyrite/chalcopyrite ratios appear to vary fairly systematically from 100 to 1 or so in the zone where epidote is present to about 5/1 in the best mineralized outcrop. Careful mapping of this ratio was not possible because of weathering, and because of the very fine grain size and somewhat erratic distribution of chalcopyrite.

A weak, but real, trend in the percentage of total sulphide controlled by fractures is defined from an estimated 5% to 10% fracture control near the limit of pervasive epidote, to 20% fracture control near samples 29 and 30. Chalcopyrite is more strongly fracture controlled than pyrite, but even near sample 29 or 30, not more than 50% is fracture controlled.

In addition to pyrite and chalcopyrite, wide spread but minor amounts of supergene "chalcocite" and covellite, and a few grains of hypogene bornite near sample 29, were noted. Iron oxides, mainly or entirely of syngenetic origin, include magnetite outside, and hematite (after magnetite) inside, the inner limit of chlorite.

Although poorly exposed, the offset portion of the alteration zone north of the Alfalfa fault seems to exhibit similar zoning. It is interesting to note that the epidote boundary transgresses the felsite contact on the north, and that pink mottling (K-spar?) inside the boundary is soft, while that outside is fresh.

All strongly altered rock has a post sulphide stockwork of 1-5mm gypsum veinlets, accounting for up to 5% of rock volume.

In summary, all rocks on the property have been subjected to an alteration event which produced hydrous minerals. The weakest effects include pervasive chloritization of mafics, and softening (phylosilicate alteration?) of plagioclase. Epidote was developed in more calcic rocks. Stronger alteration zones exhibit characteristic porphyry copper zoning in silicate mineralogy, and in pyrite/chalcopyrite ratios. The strongest alteration exposed has a high pyrite/chalcopyrite ratio, and is probably K-feldspar destructive rather than constructive. No secondary biotite was observed.

There is no obvious, central, genetically important porphyry intrusive. Disseminate, as opposed to fracture mode of occurrence of sulphides dominates.

Taken together, these observations suggest that 1) this is a porphyry copper alteration zone, perhaps imposed on weak, pre-existing hydrous alteration and 2) the level of exposure may be nearer the original top than the bottom of the mineralized zone.

GEOCHEMISTRY

A bedrock geochemical survey was undertaken concurrently with the geological survey, to confirm copper values in areas of interest, to assist in interpreting zoning, and to assist in determining the significance of leached or oxidized outcrops.

Sampling: Chips from 1/2 to 2 cm in size were collected within 5m of the sample site indicated on the geology and geochemistry map. About 500 g of the least oxidized material available, including only the rock type indicated on the map, was collected at each site, bagged in paper or plastic, and delivered to the laboratory.

Sample preparation: Sample preparation and analyses were carried out by Min-En Laboratories Ltd., 705 W. 15th Street, North Vancouver, B.C. All samples were crushed to minus 1/4", and split down to a 200 g. to 250 g. sub-sample. The sub-sample was pulverized to minus 100 mesh, and re-sampled for analysis.

Analytical samples of about 10 grams were digested in concentrated nitric-perchloric acid for Cu, Mo, and As determination. Cu and Mo were analyzed on an atomic absorption spectrophotometer; As on a spectrophotometer (colorimeter). Samples analysed for gold were digested in aqua regia, extracted with MIBK, and analysed on an atomic absorption spectrophotometer.

Results and discussion: Results are attached as Appendix I.

Copper values, with the exception of sample 22, vary consistently with alteration intensity. The best values are found just south of the Alfalfa fault on the new road, and along the eastern limit of exposures north of the Alfalfa fault. These latter samples (40,41,42) are all oxidized; there is no sulphide. The presence of malachite suggests that there may be enough calcite present to sharply limit transport of copper in solution. The values are probably roughly representative of unoxidized rock. Copper values are consistent with observed copper mineralization, with the exception of sample 22, which has no sulphide or blue/green oxide. No field test for acid soluble copper was performed on this sample.

Gold values show a fair to good correlation with copper values. In general, samples containing both copper in excess of 200 ppm and gold in excess of 0.03 ppm lie within or just outside the inner limit of chlorite, and these values are arbitrarily called anomalous. Almost all samples within the limit of chlorite exceed these limits.

The presence of anomalous to strongly anomalous gold in oxidized samples 40, 41, and 42 lends weight to the conclusion that the present oxidized copper content is roughly comparable to the original sulphide copper content. Sample 43, from a seemingly isolated occurrence of altered rock, has all the geological and geochemical characteristics of exposures to the south and east in apparently more extensive areas of alteration. Sample 44 is of sericite-chlorite altered (quartz) monzonite porphyry. The presence of anomalous copper and gold in this rock type near the contact suggests that there may be some relationship between the main area of mineralization and the porphyry.

A few samples anomalous for only one of Cu or Au deserve discussion. Sample 22, which contains no obvious copper mineralization but 1060 ppm Cu is weakly altered and contains less than 0.005 ppm Au. The copper is probably exotic. Sample 24 is an unoxidized one. There is no ready explanation for the lack of gold accompanying the 820 ppm of copper in well altered rock. However, copper here was observed to accompany minor amounts of fracture controlled epidote. Samples 12 to 15, taken north of most faulting in Switchback Creek, are erratically and weakly anomalous in copper but carry no anomalous gold. This pattern is consistent with the geological interpretation of decreasing alteration and mineralization intensity to the south, again suggesting that the Switchback Creek faulting need not represent any significant strike slip movement.

Molybdenum values vary approximately with copper, but are more erratic than gold values. Molybdenum is not particularly useful in interpretation of important geological or geochemical patterns.

Arsenic values are low and erratic. This element is sometimes concentrated in the upper parts of porphyry deposits. There is no suggestion of such concentration here.

Conclusions

Pioneer 1 is underlain by a complex assemblage of volcanic and plutonic rocks. The intrusives, with the exception of a large grandodiorite dike, are probably co-magmatic with the volcanics, and are therefore presumably of late Triassic to early Jurassic age. The volcanics, and some of the more hypabyssal appearing intrusives are involved in a porphyry copper type alteration zone. This zone is characterized by high pyrite-chalcopyrite ratios, anomalous gold, dominantly disseminated sulphides, strong sericite, negative correlation between epidote and copper, and by the absence of both a potassic core and a central porphyry intrusive. This zone trends north, and the area which might contain 0.2% to 0.5% Cu widens northerly from 75 m to about 250 m over 400 m of strike length. At this point, the alteration zone is offset at least 400 m by an apparent right lateral fault. Only the west edge of the northern, offset, part of the alteration zone

crops out. The remainder, with unknown but most interesting potential, lies under cover to the east. The zone is probably the upper part of a porphyry copper alteration system.

The following exploration should be carried out.

Stage I: Test, by percussion drilling if possible, the near surface grade of the zone south of the Alfalfa fault, the limits and near surface grade of the zone north of the Alfalfa fault, and the limits and near surface grade of the zone exposed at sample 43.

If no economic deposit is discovered by this program, then careful consideration should be given to one or two deep (say greater than 500 m) holes to test the possibility of an increase in grade with depth.

M. J. Gland

June 6/77

ITEMIZED COST STATEMENTField Costs

M. Wolfhard May 9-13, 16-19 9 days @ \$130/day	\$ 1,170.00
Motel 9 days @ \$18/day	162.00
Meals 9 days @ \$15/day	135.00
4 x 4, Rental, Gas 9 days @ \$40/day	360.00

Geochemical Analyses

47 analyses @ 10.75	505.25
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Report Preparation

M. Wolfhard May 23 1 day @ \$130/day	130.00
Typing and drafting estimate	<u>100.00</u>
	<u>\$ 2,562.25</u>




QUINTANA MINERALS CORPORATION
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STATEMENT OF QUALIFICATIONS

- 1) My name is Michael Wolfhard, of 3980 West 17th Avenue, Vancouver, B.C.
- 2) I have worked in exploration as a technician, prospector and geologist since 1961; most of this time has been spent in the Cordillera of northwestern North America.
- 3) I graduated with the degree of B.Sc (Honours Geology) from U.B.C. in 1969.
- 4) I have extensive mapping experience in porphyry type mineralization, from 1968 to the present.


Michael Wolfhard.

MIN - EN Laboratories Ltd.

DATE: May 19, 1977.

705 WEST 15th ST. NORTH VANCOUVER, B.C. V7M 1T3
PHONE (604) 980-5814

M. Wolfhard

	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Mo	Cu	Pb	Zn	Ni	Co	Ag	Fe	Hg	As	Mn	Au				
ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb				
90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	
77W1	0.7	82					•			1		5			
2	1.1	60					•			3		10			
3	6.7	78					•			7		20			
(4)	2.8	865					•			13		30			
(5)	0.7	440					•			7		30			
(6)	48.0	295					•			10		80			
(7)	30.0	205					•			13		35			
(8)	8.0	245					•			7		50			
9	0.9	330					•			2		5			
(10)	4.3	2850					•			2		170			
11	2.1	66					•			5		10			
12	5.8	188					•			5		20			
13	1.4	355					•			5		5			
14	1.2	103					•			5		5			
15	1.1	290					•			2		45			
16	0.4	12					•			4		45			
17	1.3	200					•			10		25			
18A	24.0	95					•			2		10			
18B	1.0	31					•			2		5			
19	1.2	52					•			5		45			
20	0.9	390					•			2		5			
21	1.9	143					•			2		5			
22	2.4	1060					•			6		45			
23	1.3	136					•			18		30			
24	1.6	820					•			3		45			
(25)	1.1	1890					•			7		35			
(26)	0.5	3600					•			2		100			
(27)	3.7	440					•			18		85			
28	3.6	205					•			14		15			
77W29	25.0	4100					•			18		260			

Ag. I

CERTIFIED BY *Daph Oliver*

MIN - EN Laboratories Ltd.

DATE: May 26,

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7P 1T4
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1977.

M. Wolfhard

	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Mo	Cu	Pb	Zn	Ni	Co	Ag	Fe	Hg	As	Mn	Au				
ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppb	ppm	ppm	ppb				
90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	
77W 38	0.2	41					.			3		5			
39	0.7	100					.			3		20			
(40)	8.1	242					.			4		35			
(41)	5.9	3400					.			9		365			
(42)	10.2	1975					.			3		420			
(43)	2.9	675					.			5		55			
(44)	2.0	246					.			3		75			
45	5.4	228					.			4		5			
46	1.4	61					.			4		15			
77W 47	0.7	57					.			10		25			
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CERTIFIED BY *[Signature]*

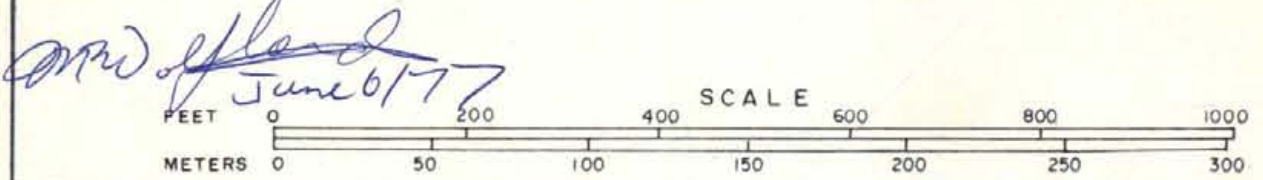
M. Wolfhard

Sample No.	Al ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb			
	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
77W30	5.6	181.0					•			7		45			
31	3.7	44.5					•			10		15			
32	1.5	22.0					•			10		10			
33	6.1	139					•			10		45			
34	4.3	130					•			10		20			
35	0.8	74					•			19		10			
36	0.9	126					•			4		5			
77W37	no sample						•								
							•								
							•								
							•								
							•								
							•								
							•								
							•								
							•								
							•								
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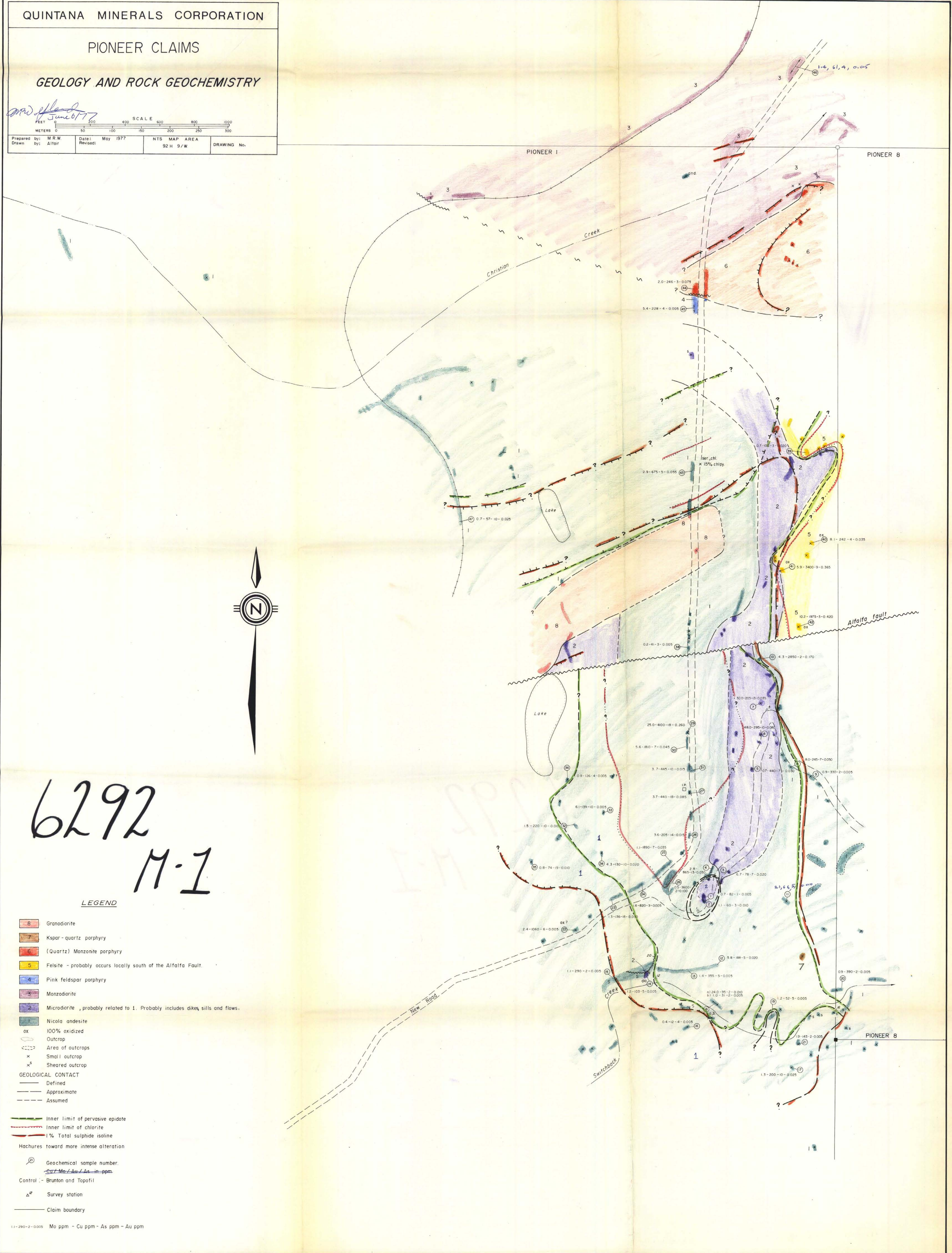
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PIONEER CLAIMS

GEOLOGY AND ROCK GEOCHEMISTRY



Prepared by: M.R.W.	Date: May 1977	NTS MAP AREA: 92 H 9/W	DRAWING No.:
Drawn by: Altair	Revised:		



6292
M-1

LEGEND

- 8 Granodiorite
- 7 Kspar-quartz porphyry
- 6 (Quartz) Monzonite porphyry
- 5 Felsite - probably occurs locally south of the Alfalfa Fault.
- 4 Pink feldspar porphyry
- 3 Monzodiorite
- 2 Microdiorite, probably related to 1. Probably includes dikes, sills and flows.
- Nicola andesite
- ox 100% oxidized
- Outcrop
- Area of outcrops
- x Small outcrop
- x^s Sheared outcrop
- GEOLOGICAL CONTACT
- Defined
- Approximate
- Assumed
- Inner limit of pervasive epidote
- Inner limit of chlorite
- 1% Total sulphide isoline
- Hachures toward more intense alteration
- Geochemical sample number.
- Control - Brunton and Topofil
- Survey station
- Claim boundary

1.1-290-2-0.005 Mo ppm - Cu ppm - As ppm - Au ppm