Assessment Report

Rock Geochemistry and Petrography on the Iron Mountain Mineral Claims Nicola Mining Division, B.C.

92I/02

UTM Zone 10 NAD83
602600E 6367500N

50^0 03' North Latitude
120^0 48' West Longitude

For

West Range Exploration Ltd.

By

John Bradford
P.Geo

December 2006

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Rock Geochemistry and Petrography on the Iron Mountain Mineral Claims

Introduction

The Iron Mountain Property was examined by the author in September 12, 2006. The purpose of the visit was to evaluate the economic potential of the claims by validating the location, style and potential of known mineralization as presented by previous workers in the area, and to evaluate the applicability of the Iron Oxide Copper-Gold Model to the mineralization on the property. The main occurrences were visited, representative rock samples collected and a suite of samples were submitted for petrographic study. The author was assisted in the field by John Fleishman, prospector.

The work described above successfully identified structurally controlled iron oxide copper-gold mineralization hosted by mafic to intermediate volcanics. A petrographic report appended to this report described strong brecciation, silcification and sericite-chlorite alteration associated with this mineralization. Further mapping and rock sampling as well as trenching over a soil anomaly is recommended.

Location and Access

The Iron Mountain Gold-Copper Project is located east of the Coquihalla Highway (B.C. Highway 5) just 7.5 kilometres south of the town of Merritt (NTS 092I/2W). The Property consists of two claims totalling 519 Hectares. The property covers several zones of iron oxide-gold-copper mineralzation on Iron Mountain, including the Diane and Charmer occurrences. The central Diane Zone is 250 metres south of Stirling Creek, 2.5 kilometres west-southwest of the summit of Iron Mountain.

Physiography, Climate and Vegetation

The property is located in the intermontane belt with moderate annual precipitation, cool summers and cold winters. The area consists of a broad erosional plateau with extensive glacial cover incised by gentle drainages. Elevations range from 1500 to 1800 metres above sea level. Tree line is at roughly 1600m. Below tree line the forest is dominated by short subalpine fir and willow while above tree line vegetation is dominantly lichen short grasses and minor clumps of dwarf birch and willow. The claims are largely covered by extensive glacial till although several of the higher areas have distinct areas of good outcrop.

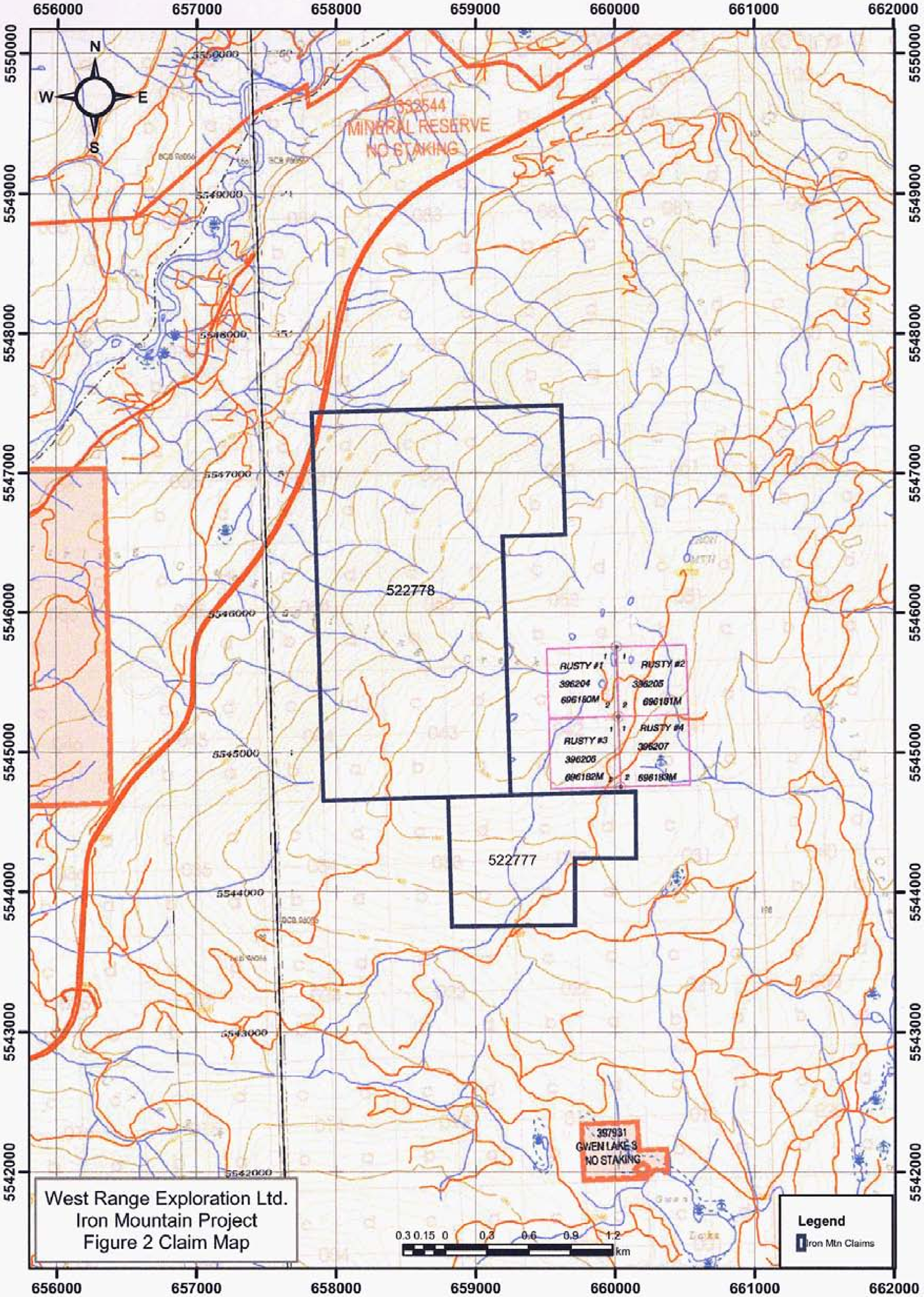
West Range Exploration
Iron Mountain Property
Figure 1 Location

Claims and Ownership

The Iron Mountain property consists of 2 claims in good standing covering 518.8 Hectares as indicated on Figure 2. They are owned 100% by Nigel Bruce Luckman, acting as agent for West Range Exploration Ltd.. The claims are currently valid until November 25, 2006.

Table 1: Claim Status

Tenure Number	Owner	Map Number	Good To Date	Status	Area
522778	116129 (100%)	092I	2006/NOV/25	GOOD	415.002
522777	116129 (100%)	092I	2008/NOV/25	GOOD	103.7857



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5544000
5543000
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N
S
W
E
332544
MINERAL RESERVE
NO STAKING
522778
522777
RUSTY #1
396204
696180M
RUSTY #2
396205
696181M
RUSTY #3
396206
696182M
RUSTY #4
396207
696183M
397931
GWEN LAKE 3
NO STAKING
West Range Exploration Ltd.
Iron Mountain Project
Figure 2 Claim Map
0.3 0.15 0 0.3 0.6 0.9 1.2
km
Legend
Iron Mtn Claims

Exploration History

The earliest exploration reported in the Iron Mountain area took place around the turn of the century. This work focused on base metal mineralization occurring as stringers and blebs in andesitic flows and pyroclastics and culminated in the sinking of three shafts, the Charmer, the Islander and the Victoria in 1896. Subsequent development in the area does not appear to have occurred until 1927 when Emmitt Todd located a galena-sphalerite-barite vein along a sediment/rhyolite contact 1.1 kilometers northeast of the Charmer shaft. Local silver and copper mineralization was also reported. A 32 meter shaft known as the Leadville was sunk in the following year, but it was not until 1947 that any production occurred. In that year, 36 tons of ore containing 67 ounces of silver, 11,810 pounds of lead and 484 pounds of zinc was shipped to Trail.

In 1951, Granby Consolidated Mining and Smelting Power Company Limited optioned the Leadville property and dewatered the shaft. No further work was undertaken until 1958 when diamond drilling was performed north of the Leadville by New Jersey Zinc. By 1961, local interests began development around the Charmer and Islander shafts. This work included extensive trenching, stripping and sampling. Five years later, Manor Mines drilled two holes near the Leadville shaft.

Between 1968 and 1974, Acoplomo Mining and Development Company Ltd. of Merritt staked the Makelstin claims over the south slopes of Iron Mountain and conducted a program of linecutting, geophysics, geochemistry, geological mapping, prospecting, trenching and approximately 200 meters of diamond drilling. The claims were subsequently allowed to lapse. The ground was again staked two years later by Quintana Mineral Corp. who conducted a short program of geochemistry and geology. Between 1979 and 1981, JMT restaked the area surrounding the original workings as the Gyproc Group and conducted an exploration program for Chevron Minerals Ltd., who subsequently relinquished their option.

In 1983, Aberford Resources Ltd. located the Diane 1-5 claims west of the Gyproc Group based on anomalous results from a regional reconnaissance geochemical program. Subsequent work, including prospecting, geological mapping and geoclicmistry was successful in outlining seven areas of mineralization. The 1984 exploration program on the Diane claims (Stirling Group) was conducted by Kidd Creek Mines Ltd. and included ground geophysics and soil and rock geochemistry.

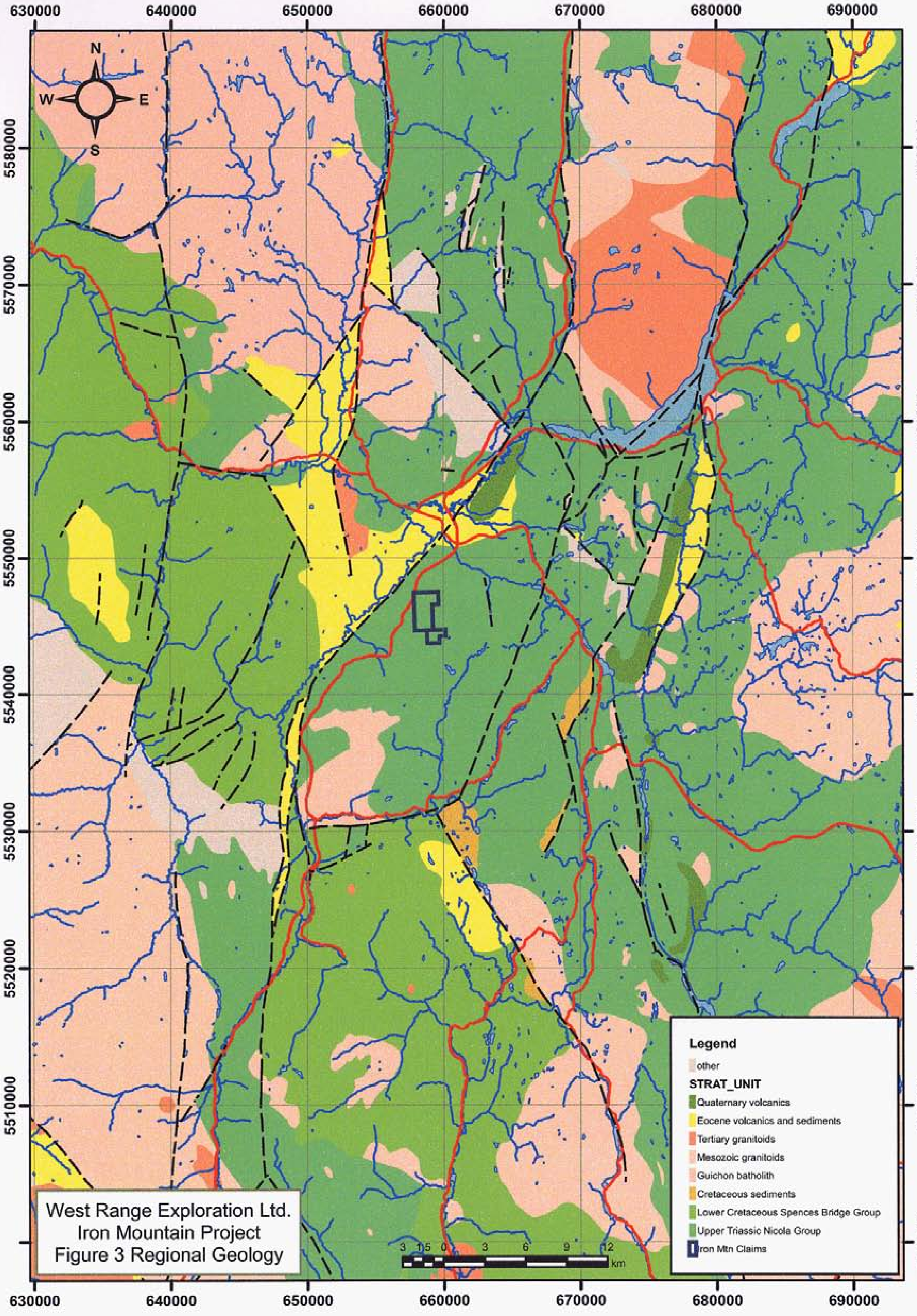
In 1986, International Maple Leaf Resource Corp. entered into an option agreement with Abermin Corporation (formerly Aberford Resources Ltd.) and undertook a program of soil and rock geochemistry, geological mapping, prospecting and trenching, carried out by Orequest Consultants Ltd. of Vancouver. An airborne geophysical survey was also conducted by Aerodat Ltd. of Mississauga, Ontario.

In 1987-1988, the Aberford road was up-graded and several new sections added in order to provide better all-weather access. In addition, limited cat trenching was undertaken in order to locate extensions of the mineralization. In order to test the mineralized trend within the Original Zone, nine diamond drill holes were completed from four pads established west of the trenches excavated in 1986.

Regional Geological Setting

The Iron Mountain area is underlain by a northeast trending belt of Upper Triassic volcanic and sedimentary rocks of the Nicola Group. Iron Mountain is located within a northeast-trending fault-bounded segment of the Nicola Group which represents the southern structural extension of the Nicola Horst. Evidence of Proterozoic basement has been documented in the core of the Nicola Horst northeast of the property (Erdmer, 2002). The Nicola Horst is bounded by northeast trending faults which were active during regional Eocene extension. Nicola Group within the horst is bounded on its west side by Lower Cretaceous andesites of the Spences Bridge Group and Eocene andesites of the Princeton Group.

The western Nicola belt, in which the Iron Mountain Project is situated, comprises an east to southeast facing sequence of calc-alkaline andesitic flows that grade upward into pyroclastic rocks, epiclastic sediments and abundant limestone. Intrusive rocks of probable Late Triassic – Early Jurassic age crop out about four kilometers southwest of the property.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Legend
other
STRAT_UNIT
Quaternary volcanics
Eocene volcanics and sediments
Tertiary granitoids
Mesozoic granitoids
Guichon batholith
Cretaceous sediments
Lower Cretaceous Spences Bridge Group
Upper Triassic Nicola Group
Iron Mtn Claims
3 1.5 0 3 6 9 12
km
West Range Exploration Ltd.
Iron Mountain Project
Figure 3 Regional Geology

Property Geology

The lower western slopes of Iron Mountain are underlain mainly by intermediate to mafic volcanics of the Upper Triassic Nicola Group (lower andesite, Figure 4). This east-facing volcanic unit is about 1500 metres thick, and is conformably overlain by rhyolite flows and flow breccias which occupy the top of the mountain (rhyolite, Figure 4). The overall trend of these units is about 030, dipping steeply to the east. The felsic succession hosts silver-lead-zinc-barite mineralization of possible volcanogenic origin (Leadville occurrence), and lies mainly east of the property. The felsic unit trends onto the property but is largely overburden covered on tenure 522777. The felsic volcanics are overlain by red and green lapilli tuffs and intermediate flows (upper andesite, Figure 4), which in turn are overlain by a sedimentary unit consisting of limestones and shales (limestone, Figure 4). This unit crops out in a few places in the southeastern corner of the property.

The lower andesitic volcanic sequence which underlies most of the property is heterogeneous, and includes massive aphanitic to amygdaloidal flows and flow breccias, minor andesitic tuff and tuff breccia, and feldspar phyric andesitic flows or sills. Rare argillaceous interflow sedimentary units are also present. A dacitic unit mapped by previous workers (e.g. Nelles, 1988) was not seen. No intrusive rocks other than possible hypabyssal dykes and sills, were identified. Lensoid beds of banded jasper are present (Cavey et al., 1986). In thin section the jasper is reported to consist of an intergrowth of minutely spherulitic hematite and cherty silica with delicate 1-4 mm laminations.

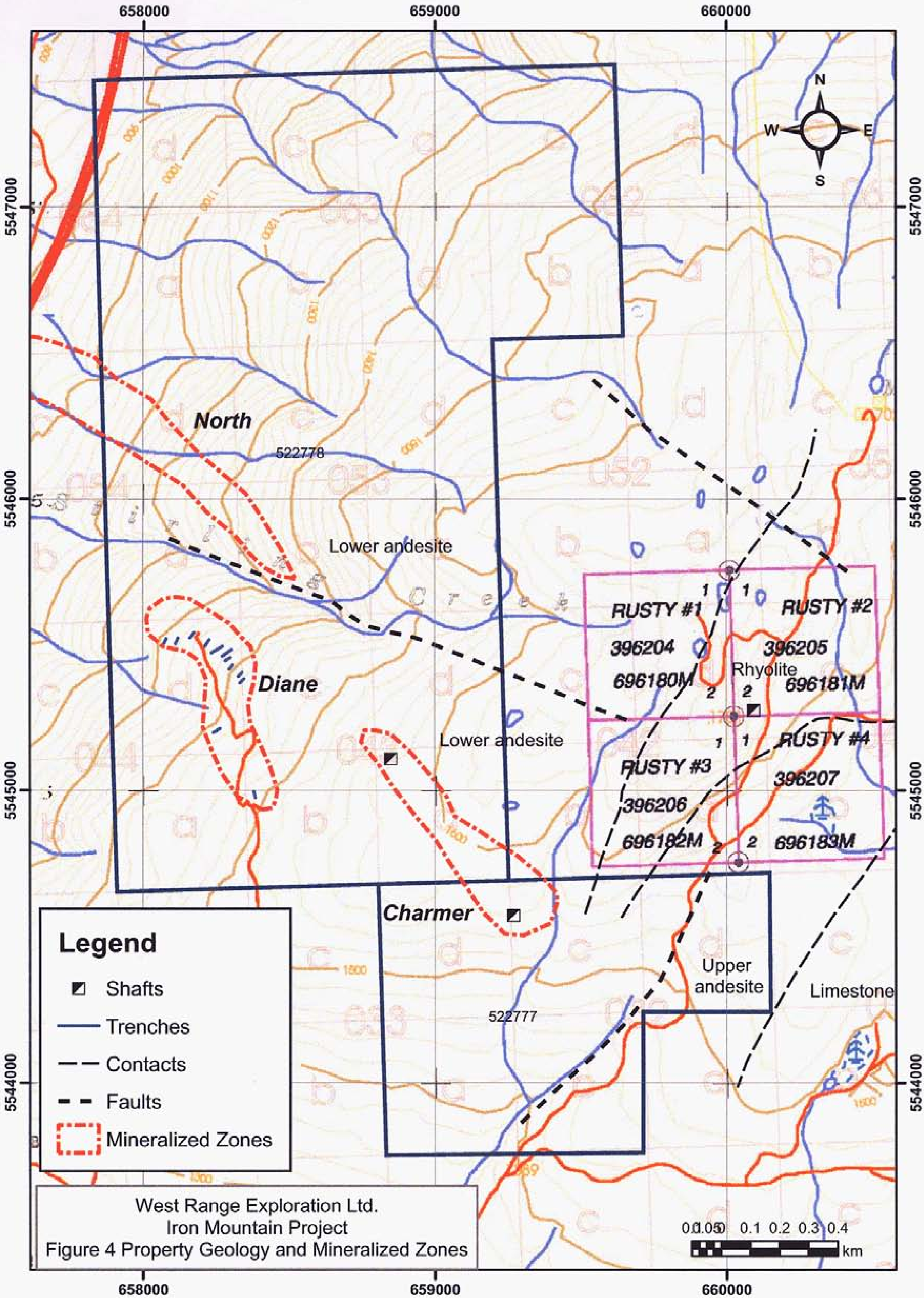
Mineralization and Alteration

Two mineralized zones were examined in 2006, the so-called Original or Diane Zone and the Charmer or Number Two Shaft zone (Figure 4). A third zone (North Zone) located north of Stirling Creek at lower elevations was not examined.

Both zones are well exposed in outcrop and trenches and stripped areas. The Diane Zone is more or less continuously exposed over a strike length of 200 metres, with discontinuously exposed mineralization over an additional 200+ metres. It should be possible to trace mineralization beyond the areas observed in 2006. The zone consists of structurally controlled brittle to brittle-ductile shearing with associated silicification, sericite-chlorite alteration, and multistage hematite, hematite-quartz and hematite-quartz-chalcopyrite veining. The mineralized zone attains widths of up to 20 metres, averaging 5-10 metres. The overall trend of the zone is about 140°, with local segments trending closer to 180°. Veining is commonly of stockwork style, and intensity varies from sparse stockwork to local zones of intense microbrecciation. Veins are accompanied by silicified envelopes, and interconnected silicified envelopes produce broader zones of pervasive silica in areas of intense vein development. Chalcopyrite is seldom seen, with most copper occurring as malachite on fracture surfaces and copper pitch in veins.

The Charmer zone is well exposed in stripped, trenched and blasted outcrop next to the Number Two Shaft, and and is discontinuously exposed over a strike length of at least 350 metres. The zone has a similar trend to the Diane Zone (about 140°), but does not line up with it. It may represent the same structure offset by a fault, or there may be two parallel structures. The latter interpretation is supported by the apparent continuation of the Number Two Shaft zone on the same trend north of Stirling Creek.

Mineralization at the Number Two shaft exposures consists of multistage quartz-hematite and quartz-hematite-chalcopyrite stockworks in silicified, irregularly bleached feldspar-phyric mafic volcanics. Chalcopyrite is more abundant than in the Diane zone, occurring as blebs in breccia interstices and quartz-chalcopyrite veins.



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5547000
5546000
5545000
5544000
N
W
E
S
North
522778
Lower andesite
Creek
Diane
Lower andesite
Charmer
522777
RUSTY #1
396204
696180M
RUSTY #2
396205
696181M
Rhyolite
RUSTY #3
396206
696182M
RUSTY #4
396207
696183M
Upper andesite
Limestone
Legend
Shafts
Trenches
Contacts
Faults
Mineralized Zones
West Range Exploration Ltd.
Iron Mountain Project
Figure 4 Property Geology and Mineralized Zones
0 0.05 0.1 0.2 0.3 0.4
km

Work Completed 2006

The Iron Mountain Property was examined by the author on September 12, 2006. The purpose of the visit was to evaluate the economic potential of the claims by validating the location, style and potential of known mineralization as presented by previous workers in the area, and to assess the applicability of the IOCG model. The main occurrences were visited, representative rock samples collected and a suite of samples were submitted for petrographic study. The author was assisted in the field by John Fleishman, prospector.

Mapping and rock sampling was completed on tenures 522777 and 522778: (Figure X).

Rock Geochemistry

Rock samples were collected from mineralized zones on the property in order to define the character and location of the mineralization. The samples types vary from selected grab samples of mineralized rock to continuous chip samples across a specific width. Samples were collected in plastic sample bags and sealed with plastic zip ties. Sample locations were recorded by GPS. Samples were taken to International Plasma Laboratories of Richmond, B.C. directly from the project area in sealed bags with security tags. Sample locations are marked with flagging tape and embossed aluminum tags.

At the laboratory, the samples were dried crushed and pulverized using standard rock preparation procedures. The pulps were then analyzed for Au using a 30 gram fire assay with AA finish and for 30 elements by ICP. Quality control at the laboratory is maintained by submitting blanks, standards and re-assaying duplicate samples from each analytical batch.

Rock sample descriptions and analyses are in Appendix C. Two distinct areas were sampled as indicated on Figure 5.

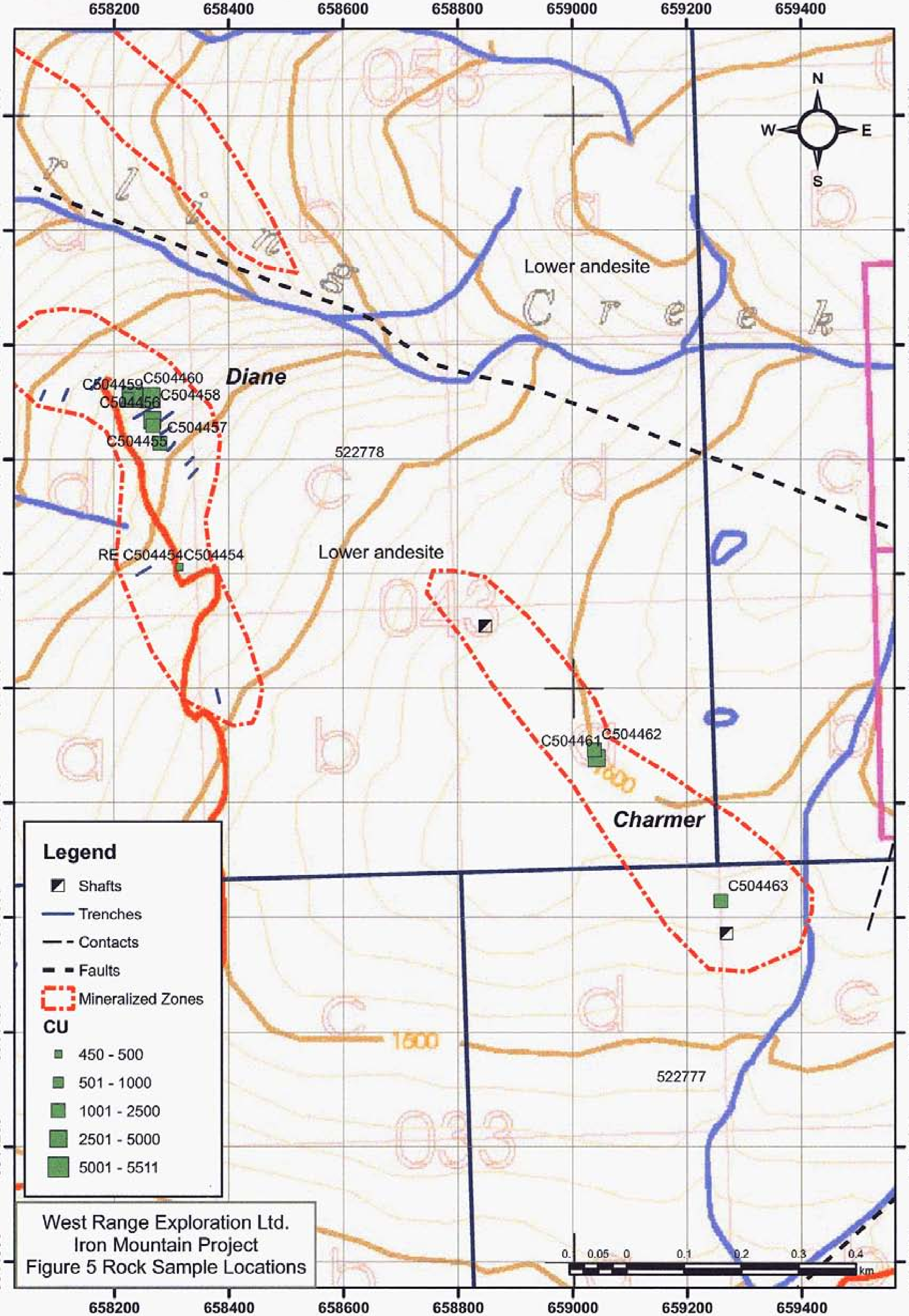
Diane Zone

Six samples were taken from the main trenched area of the Diane zone, averaging 0.86 g/T Au, 2999 ppm Cu and 3.0 g/T Ag (C504455-C504460). The best gold assay was from Trench 6 (2.69 g/T Au over 6 metres: C504455), while the best copper assay was from Trench 5 (5511 ppm over 5 metres: C504458). Gold and copper are not correlated, probably because most of the copper present consists of secondary copper oxides. Other base metals (Pb, Zn) and precious metal tracers (As, Sb, Hg) are generally very low.

A seventh sample (C504454) from an outcrop 200 metres south of the main trenched area contained strong hematite in veinlets, but copper and precious metal assays were significantly lower than the other samples.

Charmer Zone

Three samples were taken from mineralization in the Charmer zone, averaging 0.04 g/T Au, 0.3 g/T Ag and 2360 ppm Cu.



West Range Exploration Ltd.
Iron Mountain Project
Figure 5 Rock Sample Locations

Petrography

Six samples were thin sectioned and a petrographic report is attached as Appendix D. Four of the samples (455, 456, 459 and 460, corresponding to assay samples C504455, etc.) were from the Diane zone, and two were from the Number Two shaft area (462 and 462). All samples are believed to represent variably porphyritic or amygdaloidal mafic to intermediate volcanics, however, primary minerals are completely replaced by a fine grained assemblage of quartz, sericite and chlorite. Even a sample thought to represent a relatively unaltered volcanic (456, taken from wallrock to the main mineralized structure) consists entirely of secondary minerals, in part pseudomorphing relict feldspar and mafic phenocrysts. Veinlets and brecia matrix in all samples consists of quartz, hematite, rutile, and local pitch limonite after chalcopyrite. The suite ranges from nonmagnetic (460) to strongly magnetic (456). K-feldspar alteration is absent.

The IOCG Model

The mineralization in the lower mafic to intermediate volcanic sequence at Iron Mountain clearly displays some of the characteristics of iron oxide copper (-gold) (IOCG) deposits, which "consist of dominant magnetite or haematite, with one or more copper sulphides and pyrite, with associated K-feldspar or sericite or albite or biotite and chlorite predominant in the ore host rocks" (Haynes, 2002). These deposits tend to occur in "relatively oxidised" host rocks, which is "reflected in the 'magnetically active' signature that usually defines iron oxide copper (-gold) mineralised districts" (Haynes, 2002). On the other hand, the district-scale sodic or sodic-calcic alteration (albite, scapolite, actinolite) characteristic of many large IOCG deposits is not present at Iron Mountain; instead sericite-chorite alteration is widespread and abundant, reflecting a slightly more acid hydrothermal fluid and/or higher water-rock ratio.

Conclusions

The Iron Mountain property is underlain by a sequence of variably feldspar phyric to aphyric and amygdaloidal andesitic to basaltic volcanic rocks of the Early Jurassic Nicola Goup. The volcanic sequence hosts structurally controlled quartz – iron oxide alteration zones containing significant copper and gold mineralization. The overall trend of mineralization is about 140^{o}, at a high angle to the 030 trend of the host succession. There is no obvious association with intrusive rocks. Alteration is pervasive and intense proximal to the mineralized zone, consisting of fine grained quartz, sericite and chlorite.

The overall size of the Iron Mountain system is significant. Copper-bearing fracture-controlled mineralization extends from the Coquihalla Highway to the Number One shaft, a distance of over 2.8 kilometres (Cavey et al, 1986). Although the overall trend of mineralization is fairly consistent, it appears that there is more than one mineralized structure, and the zone may consist of multiple en echelon segments. Only a very small portion of this system has been tested by drilling, and to only shallow depths. Further definition of the zone is best accomplished by careful mapping and detailed rock sampling where there is exposure, supplemented either by ground magnetics and EM (e.g. max-min) or a detailed airborne magnetic-elctromagnetic survey.

Bibliography

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Appendix A Statement of Qualifications

STATEMENT OF QUALIFICATIONS

I, John Bradford, P.Geo., certify that:

1. I am a self employed consulting geologist with a business address located at:
11571 7th Ave.
Richmond, BC, Canada
V7E 3B7

2. I am a member in good standing of the Association of Professional Engineers and Geoscientists of B.C.

3. I graduated from the University of British Columbia in 1985 with a Bachelor of Science in Geology and from the University of British Columbia in 1988 with a Master of Science in Geology.

4. Since 1988 I have been continuously employed in exploration for base and precious metals in North America, South America and China.

5. I supervised and participated in the 2006 exploration program on September 12th, 2006 and am therefore personally familiar with the geology of the Iron Mountain Property and the work conducted in 2006. I have prepared all sections of this report.

Dated this 21st Day of December, 2006

Signature

John Bradford, M.Sc, PGeo

Appendix B Statement of Costs

Professional Fees and Wages

		Days	Rate/day		Total
	John Bradford	1	$ 600.00	$	600.00
	John Fleishman	1	$ 450.00	$	450.00
		2			
	Subtotal			$	1,050.00

Equipment Rental

	Truck, insurance	1	$ 200.00	$	200.00
	Subtotal				

Expenses

	Geochemical Analyses	10	$ 25.00	$	250.00
	Petrographic report			$	1,403.44
	Food			$	125.00
	Accomodation			$	173.28
	Automotive fuel			$	150.00
	Material and Supplies			$	25.00
	Report	1	$ 600.00	$	600.00
	Trim base data			$	212.00
Subtotal				***$***	***2,938.72***

Total				**$**	**4,188.72**

Appendix C Rock Sample Descriptions

sample	Zone	description	type	x_proj	y_proj	elev	Au	Ag	Cu	Pb	Zn
C504454	Diane	Drk grey, f.g., mass to wkly brxd magnetic int-mafic volc cut by ht-qtz vnlets, tr cp	grab	658314.59	5545211.58	1420	0.03	0.2	450	-2	32
RE C504454	Diane		grab	658314.59	5545211.58	1420	0.03	0.2	468	-2	31
C504455	Diane	Trench 6 - struct cont min zone 8-10 m wide, strong sil-ht alt, bleached, tr cp	chip 6 m	658267.39	5545458.83	1383	2.69	4.8	1446	-2	39
C504456	Diane	Trench 6 - blk, mod mag int-maf volc, strong frct, qtz-ht stringers, ht clots, mal on frcts trending 180/90	grab	658266.39	5545469.08	1382	0.12	0.8	3304	-2	70
C504457	Diane	Trench 7 - strong ht vns to 10 cm, abund irreg ht stringers cut by lam'd qtz vnlets to 1 cm	chip 1 m	658279.95	5545428.65	1396	0.14	0.8	1572	-2	35
C504458	Diane	Trench 5 - rusty weathg zone 7-8 m wide, variably frctd mafic volc, ht stringers and ht-qtz vns to 15 cm, mal on frcts	chip 5 m	658261.87	5545507.92	1374	1.10	5.0	5511	-2	104
C504459	Diane	Trench 4- qtz-ht stockwork and silicn in strongly mag mafic volc	grab	658225.15	5545506.82	1364	0.83	1.8	810	-2	50
C504460	Diane	v.f.g. mafic volc/tuff, strongly frctd and silicd, strong mal	chip 1 m	658231.97	5545508.87	1361	0.26	4.6	5353	-2	86
C504461	No. 2 Shaft	qtz-ht+qtz-cp stockwork in silicd, locally bleached mafic volc, v.f.g. green selvages (diop?)	chip 1 m	659042.38	5544877.95	1597	0.04	0.6	4154	-2	53
C504462	No. 2 Shaft	qtz-ht stkwk	chip 1 m	659038.34	5544892.40	1599	0.05	0.4	1678	-2	52
C504463	Charmer	ht-qtz stkwk in mafic fragmental volc, v. strong mag; qtz vn 185/55 W		659259.12	5544628.58	1583	0.04	-0.1	1248	-2	72

sample	As	Sb	Hg	Mo	Tl	Bi	Cd	Co	Ni	Ba	W	Cr	V	Mn	La	Sr	Zr	Sc	Ti	Al	Ca	Fe	Mg	K	Na	P
C504454	-5	-5	-3	7	-10	-2	0	7	5	68	-5	56	82	421	2	4	75	2	-0.01	1.48	0.11	5.82	0.41	0.11	0.01	0.04
RE C504454	-5	-5	-3	5	-10	-2	0	7	4	70	-5	55	85	429	-2	4	75	1	-0.01	1.48	0.11	5.98	0.41	0.12	0.01	0.04
C504455	52	-5	-3	4	-10	-2	0	24	2	29	12	32	14	228	4	3	78	1	0.01	0.93	0.12	5.85	0.22	0.20	0.01	0.10
C504456	-5	-5	-3	-1	-10	-2	0	8	2	24	8	24	33	444	-2	2	67	2	0.02	2.32	0.17	5.63	0.48	0.23	0.01	0.09
C504457	-5	-5	-3	-1	-10	-2	0	24	-1	24	28	32	40	385	-2	2	95	3	0.03	1.87	0.09	6.51	0.43	0.17	0.01	0.05
C504458	-5	-5	-3	-1	-10	-2	0	22	-1	34	-5	22	48	415	-2	3	105	4	-0.01	1.49	0.09	7.23	0.34	0.22	0.01	0.09
C504459	52	-5	-3	-1	-10	-2	0	28	-1	42	41	27	38	211	-2	2	100	2	0.01	0.84	0.05	7.36	0.21	0.17	0.01	0.04
C504460	-5	-5	-3	-1	-10	-2	0	23	3	77	-5	16	5	284	5	2	59	2	-0.01	2.13	0.05	4.73	0.46	0.16	0.01	0.05
C504461	-5	-5	-3	-1	-10	-2	0	31	4	91	-5	29	-1	192	8	2	64	2	-0.01	0.81	0.04	5.11	0.18	0.22	-0.01	0.04
C504462	-5	-5	-3	-1	-10	-2	0	10	-1	36	-5	38	4	315	6	2	53	1	-0.01	1.15	0.09	4.28	0.24	0.23	-0.01	0.05
C504463	-5	-5	-3	-1	-10	-2	0	19	-1	137	-5	20	31	354	-2	2	99	2	0.02	1.51	0.08	6.68	0.32	0.17	-0.01	0.10

Appendix D Petrographic Report

PETROGRAPHIC REPORT ON 6 SAMPLES FROM POSSIBLE "IOCG" PROSPECT

Report for: John Bradford, M.Sc., P.Geo. — Invoice 060740
West Range Exploration Ltd.
11571 7th Avenue
Richmond, B.C. V7E 3B7 (604) 241-1765 — Oct. 10, 2006.

SUMMARY:

This is a suite of strongly to intensely quartz-sericite-chlorite (± rutile) altered, intermediate-mafic (?), porphyritic to fragmental volcanic rocks cut by a veinlet network to locally breccia matrix of quartz-minor sericite, chlorite, variable specular hematite (rare magnetite), limonite (partly pitch limonite, after chalcopyrite and lesser pyrite), malachite. Capsule descriptions are as follows:

455: breccia, of apparently porphyritic, possibly intermediate, volcanic rocks that have been completely sericite-quartz-minor limonite (possibly after pyrite?) altered, likely in conjunction with cementing by a hydrothermal matrix of quartz-specular hematite.

456: appears to represent a strongly sericite-quartz-chlorite-minor hematite, rutile, rare pyrite altered, possibly originally amygdular, basaltic (?) volcanic rock, cut by narrow irregular quartz veins containing hematite and minor "pitch" limonite, possibly after former chalcopyrite (?).

459: appears to represent an intensely quartz-sericite (phyllic) altered rock of uncertain, but possibly fragmental volcanic, derivation, with scattered limonite pseudomorphs possibly after pyrite, cut by sub-parallel, sheeted 1) quartz and 2) specular hematite-minor quartz veins.

460: strongly altered rock, composed of angular fragments of quartz-chlorite-sericite altered rock of uncertain derivation cut by an intense breccia matrix or stockwork of quartz-sericite-variable pitch limonite (after chalcopyrite, rare pyrite, trace specular hematite)-minor malachite.

461: intensely quartz-sericite-chlorite (trace rutile) altered porphyritic volcanic rock, cut by veins of quartz-sericite-specular hematite-limonite and possibly later veinlets of quartz-sericite-"pitch" limonite-malachite (after chalcopyrite), both with sericite (±pyrite, oxidized to limonite) envelopes.

462: appears to represent a highly quartz-chlorite-sericite (minor rutile, limonite) altered, likely originally porphyritic, possibly fragmental, intermediate-mafic (?) volcanic rock such as andesite-basalt (?), cut by veinlets of quartz, chlorite, minor sericite, local magnetite ± hematite, limonite (in part possibly after chalcopyrite) , unidentified mineral that might be allanite (?).

Detailed petrographic descriptions and photomicrographs are appended (on CD). If you have any questions regarding the petrography, please do not hesitate to contact me.

Craig H.B. Leitch, Ph.D., P. Eng. (250) 653-9158 craig.leitch@gmail.com
492 Isabella Point Road, Salt Spring Island, B.C. Canada V8K 1V4

455: BRECCIA: INTENSELY SERICITE-QUARTZ-MINOR LIMONITE ALTERED CLASTS IN MATRIX OF QUARTZ-SPECULAR HEMATITE

Hand specimen shows what appears to be a siliceous breccia, composed of pale grey-greenish angular fragments up to about 2 cm in diameter cemented by a vuggy matrix of specular hematite, oxidized on the outer surface and along fractures to orange-brown limonite. However, the clasts are mostly softer than steel (likely sericitized). The rock is weakly magnetic, shows no reaction to cold dilute HCl, and no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Quartz (mainly secondary)	65%
Sericite	30%
Hematite (specular)	3-5%
Limonite (possibly after pyrite?)	1%

In broad outline, this sample consists of about 35-40% strongly sericite-quartz-minor limonite altered clasts in a hydrothermal matrix of secondary quartz and minor specular hematite.

The clasts have generally angular to highly irregular, locally elongate, wispy outlines up to at least 2 cm long. They are mostly composed of sericite (subhedral flakes mostly <50 microns, but locally in aggregates up to 0.15 mm across) and lesser secondary quartz (subhedral crystals mostly <75 microns in diameter), plus minor hematitic limonite aggregates with generally euhedral (cubic) outlines <65 microns in diameter that look like pseudomorphs after pyrite (?). Relict phenocrysts, likely originally feldspar but possibly including mafic crystals, with sub- to euhedral outlines up to about 1.5 mm and almost entirely replaced by sericite, make up about 35% of some of the clasts. The clasts are cut by narrow veinlets of quartz-minor hematite mostly <0.25 mm thick and composed of interlocking quartz subhedra rarely over about 0.2 mm in size and mostly euhedral flakes of specular hematite up to 0.1 mm in diameter; local vugs are up to 0.5 mm long. These veinlets are likely extensions of the hydrothermal breccia matrix.

In the matrix, secondary quartz forms subhedral to bladed, euhedral interlocking crystals up to almost 1 mm long, locally with comb or cockade texture. Vugs up to almost 3 mm across are common. Specular hematite forms mainly euhedral laths or flakes mostly <0.25 mm in diameter, but commonly in irregular-shaped aggregates up to about 0.5 cm long.

In summary, this sample represents a breccia, of apparently porphyritic, possibly intermediate, volcanic rocks that have been completely sericite-quartz-minor limonite (possibly after pyrite?) altered, likely in conjunction with cementing by a hydrothermal matrix of quartz-specular hematite.

456: STRONGLY SERICITE-QUARTZ-CHLORITE-MINOR HEMATITE, RUTILE ALTERED, AMYGDULAR? BASALTIC ROCK, CUT BY QUARTZ-HEMATITE-LIMONITE VEINS

Hand specimen shows a fine-grained, dark grey, rock apparently composed of small relict phenocrysts or fragments (?) mostly <0.5 cm in diameter in a highly siliceous matrix containing minor hematite, cut by narrow veinlets containing bright green malachite (?). The rock is strongly magnetic, shows no reaction to cold dilute HCl, and no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Sericite (after feldspars, mafics?)	35%
Quartz (secondary; amygdules?, veins)	35%
Chlorite	25%
Hematite	3-5%
Limonite (possibly after chalcopyrite?)	<1%
Rutile	<1%
Pyrite	<1%

This sample consists of about 25-30% each of euhedral, sericite (minor quartz, chlorite) altered relict phenocrysts, and rounded, quartz (minor chlorite, hematite) aggregates in a groundmass of fine-grained sericite, chlorite and accessory hematite and rutile, cut by narrow irregular veins of quartz and minor hematite and limonite.

Relict phenocrysts have mostly rectangular to subhedral outlines up to about 2 mm long, mostly pseudomorphed by fine-grained sericite as subhedral flakes <50 microns in diameter, minor quartz as rounded subhedra to 75 microns in diameter, and local chlorite as subhedral flakes mostly <35 microns in diameter. These relict phenocrysts could have been either feldspar or locally mafic (?) minerals, or both; the alteration is too intense to be sure.

What may have been former amygdules have rounded or ellipsoid, irregular to amoeboid-shaped outlines up to about 2.5 mm in maximum dimension. They are composed of interlocking crystals of quartz (subhedra locally up to 0.7 mm long, with local radiating habit and narrow collomorphic-textured rims indicated by zones of inclusions), in places with cores of chlorite (subhedral flakes up to 0.1 mm in diameter, commonly in radiating aggregates to 0.25 mm) and rarely with hematite as euhedral flakes mostly <0.1 mm in size, trace euhedral pyrite to 0.2 mm. Chlorite optical properties (bright green pleochroism, first-order bluish grey, length-slow birefringence) indicate a somewhat ferriferous composition (F:M perhaps 0.5-0.6).

In the groundmass, flakes of sericite (subhedral, mostly <35 microns) and chlorite (subhedral, mostly <20 microns in diameter) are intimately mixed and contain minute particles of opaque (mostly hematite, possibly minor rutile?) mainly <2-3 microns in diameter. A faint echo of possible former lath-like plagioclase microlite texture is preserved locally, suggesting that this may have been a basaltic rock

Veins are mostly irregular rather than planar, up to 1 mm thick, and consist mainly of sub- to euhedral (bladed) quartz up to 1 mm long, locally with sub-comb texture, hematite and limonite. Hematite forms mostly bladed, lath-shaped euhedral crystals <0.25 mm in diameter, but locally in aggregates up to 2 mm long that are generally closely associated with the quartz veins. Locally, some veins also contain minor limonite (possibly "pitch" limonite) in irregular, locally botryoidal aggregates up to 0.5 mm across that could be after former chalcopyrite (?) to judge by the possible malachite (?) in hand specimen. Disseminated hematite, mostly <0.1 mm in diameter, is locally associated with rutile. Rutile forms aggregates to 0.1 mm of yellow to locally dark green subhedra mostly <25 microns long but up to 50 microns.

In summary, this appears to represent a strongly sericite-quartz-chlorite-minor hematite, rutile, rare pyrite altered, possibly originally amygdular, basaltic (?) volcanic rock, cut by narrow irregular quartz veins containing hematite and minor "pitch" limonite, possibly after former chalcopyrite (?).

459: INTENSELY PHYLLIC (QUARTZ-SERICITE, MINOR LIMONITE AFTER PYRITE?) ALTERED, POSSIBLY FRAGMENTAL VOLCANIC? ROCK CUT BY QUARTZ-HEMATITE VEINS

Hand specimen shows a pale greenish to buff-grey, very fine-grained, highly siliceous rock cut by a network of sub-parallel (sheeted) fractures and veinlets, locally vuggy, up to 0.5 cm thick and mostly filled with specular hematite (oxidized to orange-brown limonite on outer weathered surfaces). The rock is weakly magnetic, shows no reaction to cold dilute HCl, and no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Quartz (mainly secondary)	60%
Sericite	30%
Hematite (specular)	8-10%
Limonite (possibly after pyrite?)	<1%

This sample consists mainly of fine-grained secondary quartz and sericite (silicified, phyllic altered) rock, cut by narrow veinlets of quartz and (possibly later) specular hematite, minor quartz. Scattered cubic limonite pseudomorphs may be after pyrite (?). The texture of the original host rock is obscured by the alteration, but appears to have been fine-grained, possibly fragmental (?).

Quartz in the body of the altered rock is mostly sub- to anhedral, interlocking, and <50 microns in diameter; it is likely mainly secondary although this would be difficult to prove without knowing what the protolith was. Much of the quartz is distributed or concentrated along hairline veinlets or microveinlets <0.1 mm thick. Quartz in larger, more organized veinlets up to 0.6 mm thick forms sub- to euhedral, locally bladed crystals up to almost 1 mm long; these veinlets appear to be cut by hematite (minor quartz) veinlets.

Areas with irregular to subangular outlines up to about 3 mm across are somewhat enriched in sericite, suggestive of either former clasts (?) or phenocrysts. Sericite forms subhedral, randomly oriented flakes mostly <30 microns in diameter.

Scattered limonite aggregates with euhedral outlines up to about 0.3 mm in diameter appear likely to represent the sites of former pyrite (?) crystals, forming <1% of the sample. Locally they appear to be associated with the quartz veins (not the hematite-rich veins).

Hematite-rich veins, mainly <0.5 cm thick, consist of euhedral, bladed to lath-shaped, locally radiating crystals of hematite up to about 0.75 mm in diameter, and lesser quartz as sub- to euhedral, locally bladed crystals up to almost 1 mm long. Both quartz and hematite have more or less random orientations.

In summary, this appears to represent an intensely quartz-sericite (phyllic) altered rock of uncertain, but possibly fragmental volcanic, derivation, with scattered limonite pseudomorphs possibly after pyrite, cut by sub-parallel, sheeted 1) quartz-minor hematite and 2) specular hematite-minor quartz veins.

460: BRECCIA: INTENSELY QUARTZ-CHLORITE-SERICITE ALTERED FRAGMENTS IN MATRIX/STOCKWORK OF QUARTZ-SERICITE-VARIABLE LIMONITE (AFTER CHALCOPYRITE, TRACE PYRITE, SPECULAR HEMATITE), MALACHITE

Hand specimen shows a very fine-grained, dark greenish grey, highly siliceous rock (harder than steel) cut by a very close-spaced network of hairline fractures or locally vuggy veinlets, variably open or filled by a white hard mineral, limonite, or malachite. The rock is not magnetic, shows only trace reaction to cold dilute HCl along some of the fractures, and no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Quartz (partly to largely secondary)	45%
Chlorite	25%
Sericite	25%
"Pitch" limonite (after chalcopyrite)	3-5%
Malachite	<1%
Chalcopyrite	<1%
Rutile	<1%
Pyrite	trace
Specular hematite	rare

This sample is virtually a breccia, composed mainly of angular, "jigsaw"-like fragments mostly <3-4 mm in diameter, cut by a stockwork or breccia matrix of quartz, minor sericite, and variable limonite (after chalcopyrite, traces of which remain in relict cores) plus significant malachite and rare pyrite. Only portions of the vein system contain copper mineralization; other portions are barren.

Fragments are massive, very fine-grained and uniform, composed almost entirely of interlocking crystals of quartz (?), chlorite and sericite, plus traces of minute opaque oxides (limonite, rutile?). Quartz forms subhedra mostly <20 microns in diameter; chlorite and sericite are interstitial, both subhedral and mainly <15 microns in diameter, with random orientations. Chlorite is very pale green, virtually non-pleochroic, and with near-zero birefringence, suggesting F:M near 0.4-0.5 (?). Rutile and limonite are mostly <15 microns in diameter, except locally where rutile occurs as aggregates up to 40-50 microns across of euhedra up to 25 microns long, in what appear to be an early generation of quartz-rutile microveinlets (cut by later microveinlets). Microveinlets (mostly <0.1 mm thick) that are marked by enrichment in quartz (likely secondary) as subhedra to 0.2 mm long, and sericite as subhedral flakes to 35 microns, are common and grade to the stockwork veinlets defining the margins of the fragments.

The breccia matrix or stockwork is composed principally of secondary quartz as ragged, subhedral crystals either mostly >0.1 mm but rarely over 0.5 mm in diameter, or as fine-grained aggregates of interlocking anhedra mostly <50 microns in size. The quartz is mostly moderately to strongly strained as indicated by undulose extinction, and minor sub-grain development and suturing of grain boundaries, plus variable fracturing. The areas of finer-grained quartz appear to represent recrystallization of former larger crystals (?) with subhedral outlines up to 1.5 mm across. Minor sericite forms subhedral flakes mostly <0.1 mm in diameter.

Variable limonite, forming botryoidal-textured, reniform-shaped masses up to 3 mm across, is likely mostly "pitch" limonite, formed directly by the in-situ oxidation of chalcopyrite. Minor chalcopyrite remains as relics (<0.15 mm across) in the cores of some of the limonite masses, and the masses are locally surrounded by malachite as compact masses of minute pale green crystals rarely over 30 microns in diameter. Traces of pyrite, forming euhedral cubic crystals up to 0.15 mm across partly rimmed by or oxidized to limonite, are rarely found in the veinlets, as are traces of specular hematite as minute euhedral flakes mostly <40 microns in diameter.

In summary, this is a strongly altered rock, composed of angular fragments of quartz-chlorite-sericite altered rock of uncertain derivation cut by an intense breccia matrix or stockwork of quartz-sericite-variable pitch limonite (after chalcopyrite, rare pyrite, trace specular hematite)-minor malachite.

461: INTENSELY QUARTZ-SERICITE-CHLORITE ALTERED PORPHYRITIC VOLCANIC CUT BY QUARTZ-SERICITE-HEMATITE-LIMONITE(±MALACHITE, RELICT PYRITE) VEINS

Hand specimen is similar to 460, principally a fine-grained dark grey-green (possibly originally intermediate-mafic volcanic) rock in which small beige-coloured feldspar (?) relict phenocrysts are visible, cut by a network of locally vuggy, quartz-specular hematite-chalcopyrite-limonite-trace malachite veinlets up to 7 mm thick. The rock is slightly magnetic (hematite veins), shows trace reaction to cold dilute HCl, and no stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

Quartz (largely secondary)	40%
Sericite	35%
Chlorite	15%
Specular hematite	3-5%
Limonite, "pitch" limonite	3-5%
Malachite	<1%
Pyrite	<1%
Rutile	<1%

This sample consists of fine-grained, probably originally porphyritic, volcanic rock strongly altered to quartz-sericite-chlorite and cut by a network of sub-parallel (sheeted) veins of quartz-minor sericite, variable specular hematite-limonite, and apparently cross-cutting (later) veinlets of limonite, minor malachite.

In the wallrock, possible former phenocryst sites with subhedral to irregular outlines up to about 1.5 mm across are variably replaced by secondary quartz, sericite and chlorite. This quartz forms sub- to euhedral, commonly bladed crystals up to 0.6 mm long. Sericite forms minute, mainly randomly oriented, subhedral flakes mostly <45 microns in diameter. Chlorite forms tightly packed masses up to 0.5 mm across composed of subhedral flakes mostly <25 microns in diameter. Chlorite is pale green, weakly pleochroic, and has near-zero birefringence, suggesting F:M near 0.5 (?). The groundmass is composed of interlocking quartz (subhedral, mainly <40 microns in diameter), with interstitial sericite (subhedral flakes mostly<20 microns in diameter) and chlorite of similar size plus traces of rutile (euhedral, mainly <15 microns). Although with a more obviously relict porphyritic texture, the overall mineralogy and appearance is similar to that of the fragments in 460.

In the sheeted veins and veinlets, quartz forms euhedral to subhedral, commonly bladed to lath-shaped crystals up to almost 1.5 mm long, locally mixed with lesser sericite as sub- to euhedral flakes rarely over 0.1 mm in diameter. Specular hematite forms wispy, bladed laths or flakes up to almost 1 mm in diameter by <20 microns thick. Limonite forms botryoidal-textured, reniform-shaped or sub- to euhedral pseudomorphs, possibly of chalcopyrite (?) and pyrite (?) respectively, up to about 2 mm across. The immediately adjacent wallrock (envelope) is strongly sericitized (50-90% converted to flakes of sericite mostly <50 microns in diameter). Locally, in this adjacent wallrock, relict crystals of sulfide (mainly pyrite, forming euhedral cubic crystals up to 0.1 mm diameter) are mostly replaced by limonite.

In the less-well developed, possibly cross-cutting, more irregular and narrower (<1.5 mm thick), veinlets, quartz forms bladed crystals up to 0.7 mm long, and sericite is similar to that described for the major veins above, both in and adjacent to the veinlets. Limonite (mainly "pitch" variety, likely after chalcopyrite) forms botryoidal masses up to centimeters long, locally with central vugs. In places, the botryoidal "pitch" limonite is surrounded or infilled by bright green malachite as sub- to euhedral crystals up to 0.2 mm long.

In summary, this appears to be an intensely quartz-sericite-chlorite (trace rutile) altered porphyritic volcanic rock of uncertain composition, cut by veins of quartz-sericite-specular hematite-limonite and possibly later veinlets of quartz-sericite-"pitch" limonite-malachite (after chalcopyrite), both with sericite (±pyrite, oxidized to limonite) envelopes.

462: INTENSELY QUARTZ-CHLORITE-SERICITE ALTERED PORPHYRITIC VOLCANIC CUT BY QUARTZ, CHLORITE, SERICITE, LIMONITE (AFTER CHALCOPYRITE?) VEINS

Hand specimen is dark greenish-grey, very fine-grained, massive, possibly altered mafic volcanic rock, cut by 3-4 mm thick, irregular white quartz veins and later hairline fractures coated with limonite and variable malachite. The rock is locally weakly magnetic, but shows no reaction to cold dilute HCl, and no significant stain for K-feldspar in the etched offcut. Modal mineralogy in polished thin section is approximately:

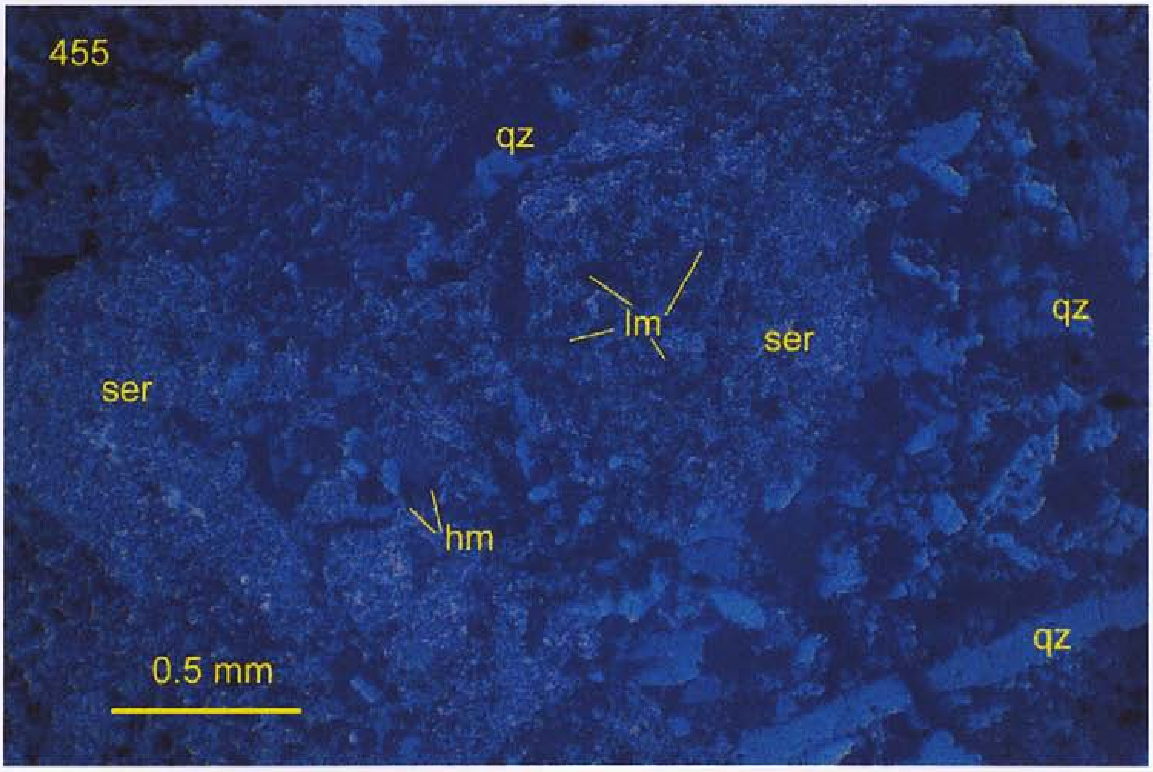
Quartz (largely secondary?)	50%
Chlorite	25%
Sericite	20%
Vugs, voids (largely due to plucking)	2-3%
Limonite (partly "pitch")	1-2%
Rutile	<1%
Magnetite/hematite, unidentified	<1%

This sample consists mainly of scattered relict phenocryst and possible amygdules (?) set in a fine-grained, possibly highly altered, groundmass of quartz-chlorite-sericite-minor rutile, locally cut by narrow irregular quartz or chlorite veinlets, and possibly later (?) fractures partly filled with limonite and associated with chlorite alteration.

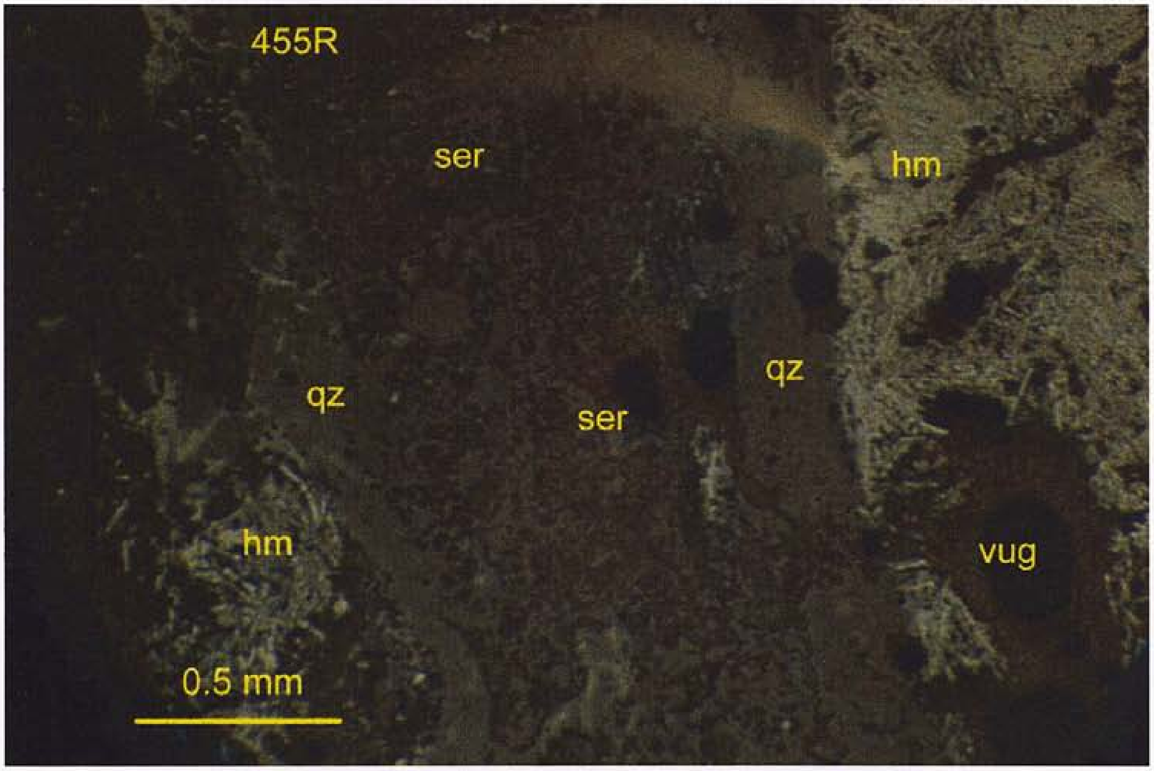
Relict phenocryst sites are of two main types: small, euhedral (rectangular, mostly <0.5 mm and rarely over 1 mm long), replaced by secondary quartz as subhedra to 0.3 mm and sericite as subhedral flakes to 65 microns, minor chlorite mostly <20 microns; and larger (locally square to rectangular, up to 8 mm long), replaced by chlorite as minute flakes mostly <15 microns in diameter, locally with minor quartz and sericite, accessory rutile and limonite. The former are suggestive of original feldspar, likely plagioclase; the latter are suggestive of mafic phenocrysts, possibly pyroxene or amphibole. Both types, but particularly the mafic relics, are in places partly plucked out due to section preparation. For chlorite, optical properties (strong green pleochroism, near-zero to anomalous greenish, length-slow birefringence) indicate a relatively ferriferous composition (F:M perhaps 0.5-0.6?). Rutile and limonite occur as aggregates rarely over 0.1 mm across composed of minute to sub-microscopic crystals, mostly <15 microns and <1 micron, respectively (except for limonite along fractures; see below). What may possibly have been former amygdules have less regular shapes up to about 3 mm across, and are composed of similar alteration minerals (chlorite, minor quartz, sericite) and voids (likely due mostly to plucking during section preparation). Locally, possible former fragments (?) with subangular outlines up to 3 mm across appear to be marked by enrichment in sericite, and in former feldspar phenocrysts. The groundmass is fine-grained enough that it is difficult to resolve with certainty, but it appears to consist mainly of quartz as interlocking subhedra mostly <20 microns in diameter, with interstitial chlorite and sericite as subhedral flakes both mainly <20 microns in diameter. The main question unresolved is whether any feldspar exists in the groundmass; it seems unlikely given the level of alteration, but cannot be ruled out.

Narrow, sub-planar veinlets <0.25 mm thick consist mainly of quartz (polygonal subhedra mainly <0.1 mm in size) with only minor sericite (flakes to 35 microns). However, sub-parallel, less regular, discontinuous fractures <0.1 mm thick, filled with chlorite as subhedral flakes <25 microns in size and associated with limonite (and rutile) aggregates to 0.2 mm, are also present. These appear to be cut (?) by later, highly irregular, discontinuous fractures partly filled with limonite (especially where they cross chlorite-filled mafic relics or amygdules). These limonitic aggregates have irregular outlines up to 3 mm long and consist of cores of magnetite (partly altered to hematite), surrounded by red-brown, possible "pitch" limonite (after chalcopyrite?), locally associated with an unidentified mineral as prisms mostly <50 microns long, and sericite as euhedral flakes <35 microns in diameter.

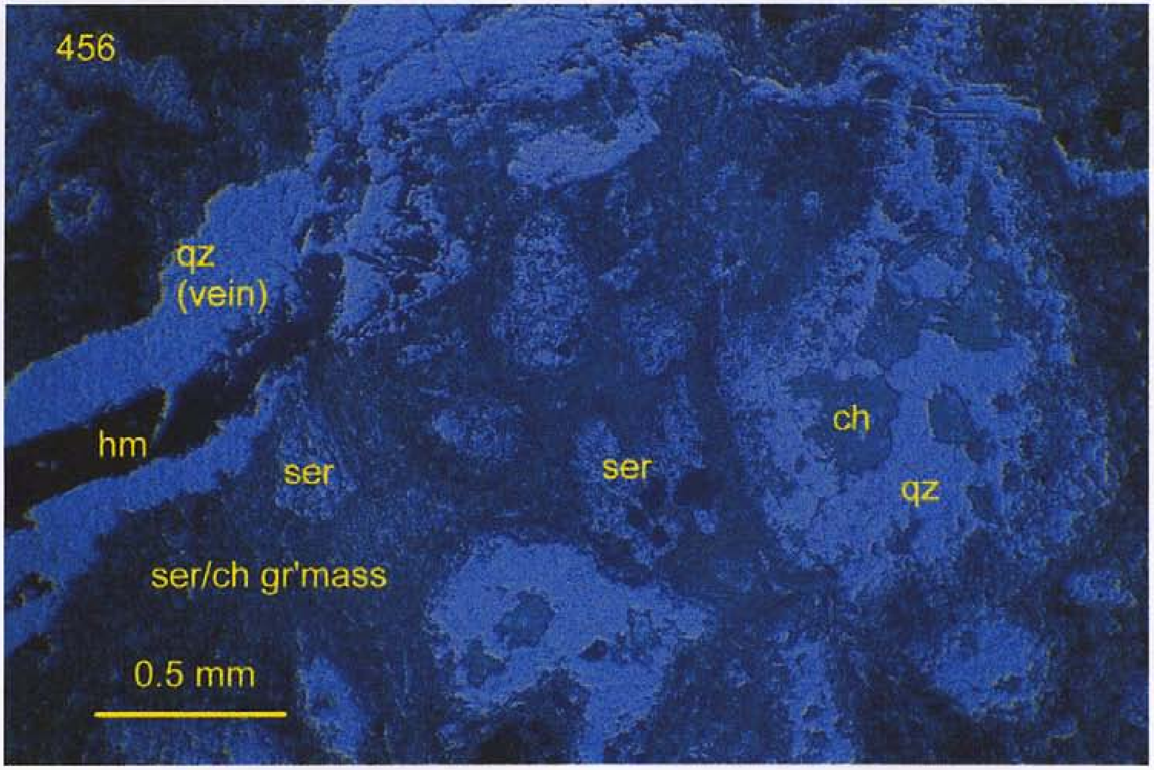
In summary, this appears to represent a highly quartz-chlorite-sericite (minor rutile, limonite) altered, likely originally porphyritic, possibly fragmental, intermediate-mafic (?) volcanic rock such as andesite-basalt (?), cut by veinlets of quartz, chlorite, minor sericite, local magnetite ± hematite, limonite (in part possibly after chalcopyrite), unidentified mineral that might be allanite (?).



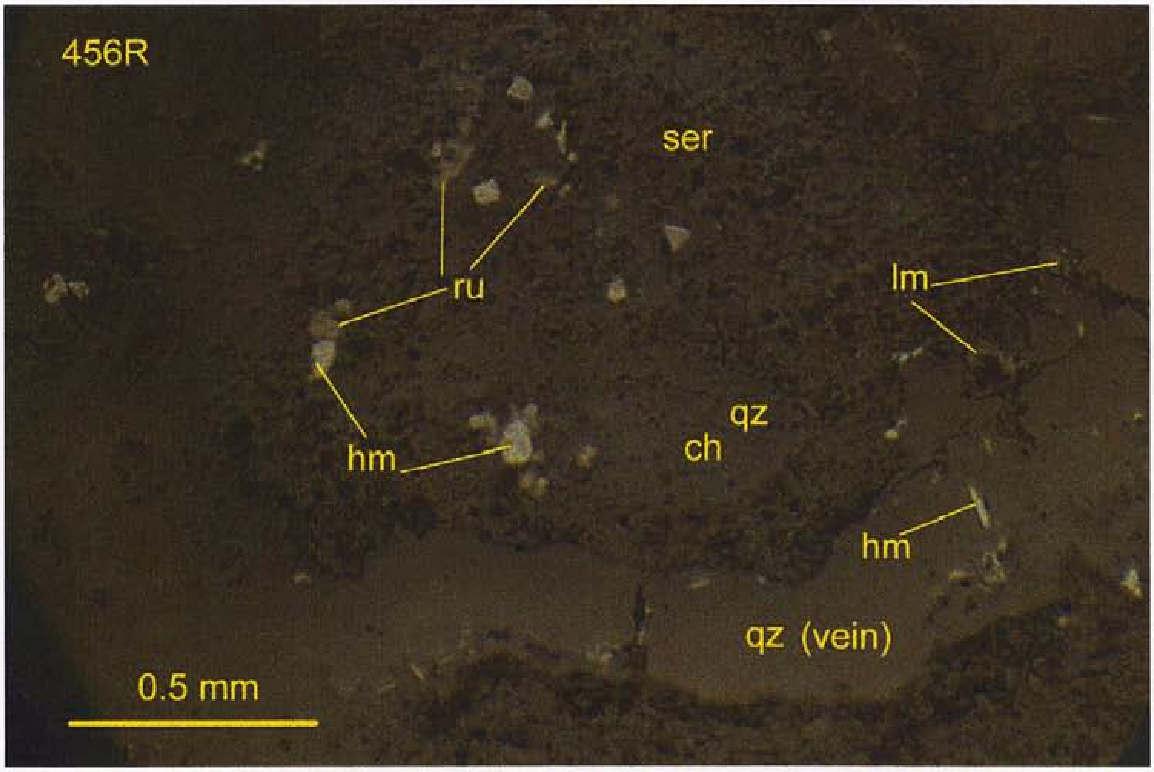
455: Breccia composed of strongly sericitized clasts (with relict phenocrysts pseudomorphed by sericite, ser, minor limonite, lm) cut by narrow vuggy veinlets of quartz that appear to be extensions off the adjacent hydrothermal matrix of secondary quartz (qz) and minor hematite (hm, opaque). Transmitted light, crossed polars, field of view 3 mm wide.



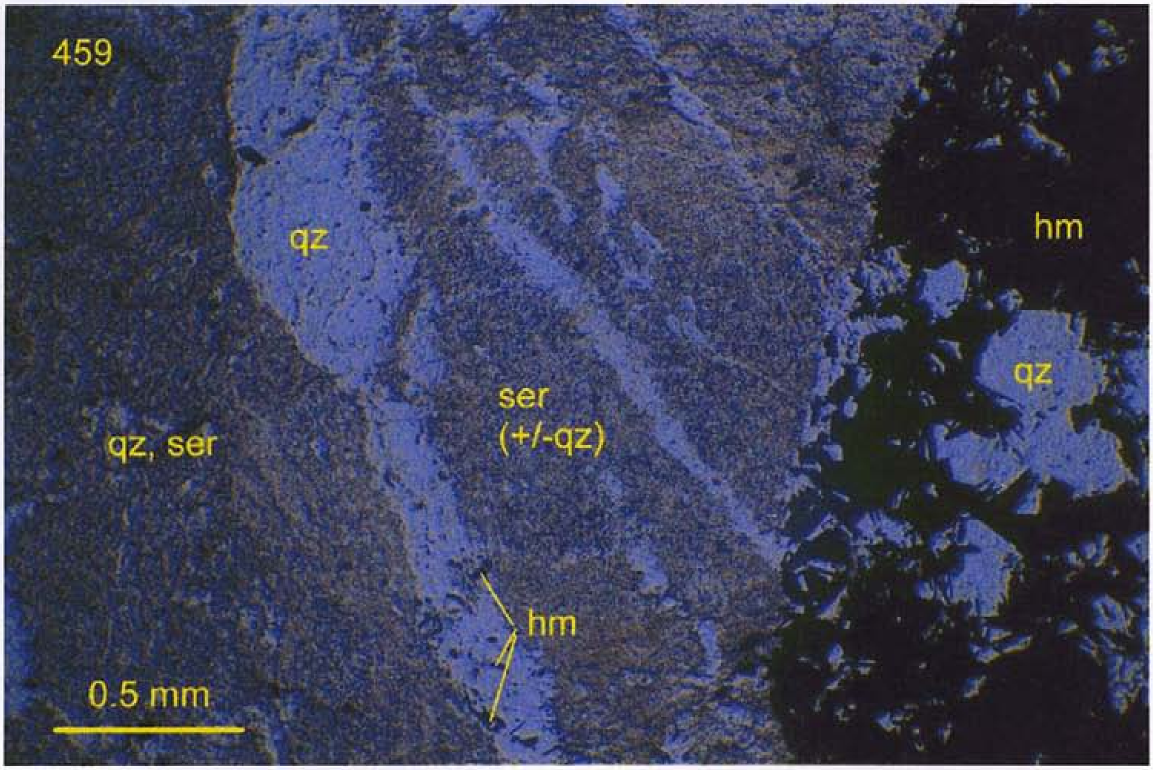
455R: Bladed laths of specular hematite (hm), locally in massive aggregates, associated with vuggy quartz (qz) veins cutting sericite (ser) altered volcanic rock (note rectangular outlines of euhedral relict feldspar (?) phenocrysts). Reflected light, uncrossed polars, field of view 2.75 mm wide.



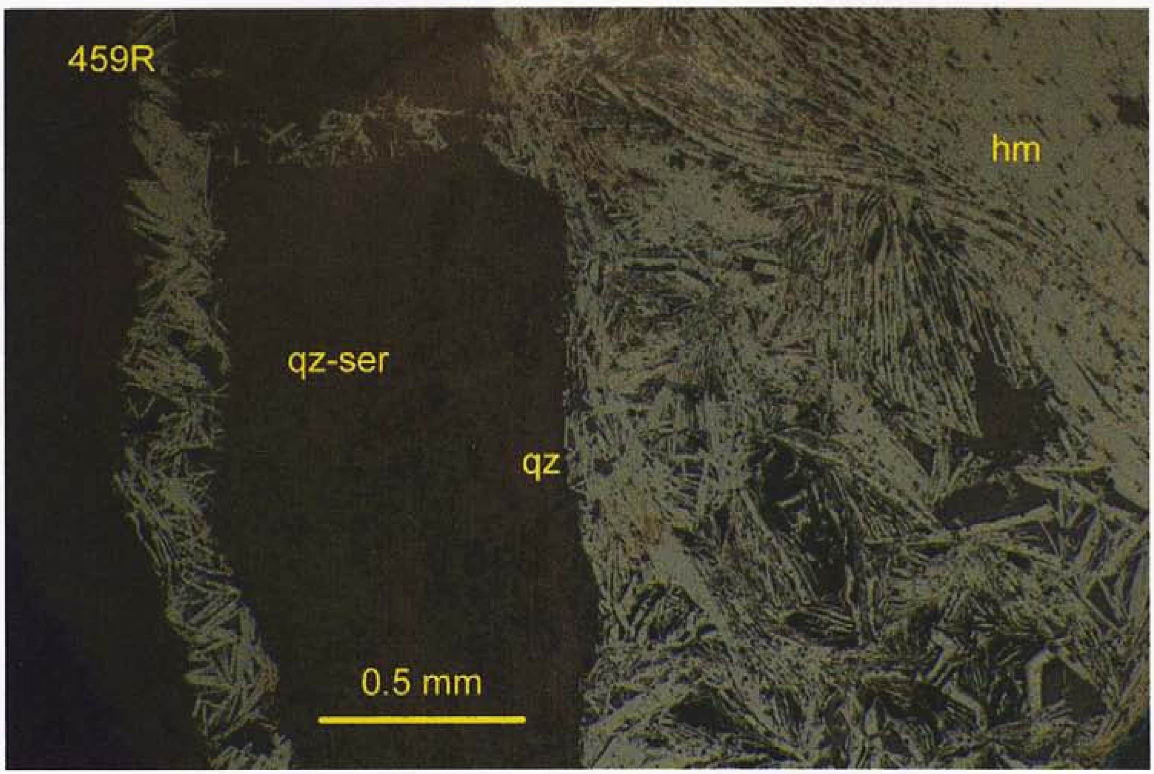
456: Strongly altered, possible basaltic volcanic rock composed of elliptical relict amygdules (?) filled with quartz (qz) and minor chlorite (ch), sericitized feldspar (?) relics replaced by sericite (ser), in fine-grained groundmass of sericite-chlorite, cut by veinlets of quartz and hematite (opaque). Transmitted plane light, field of view 3 mm wide.



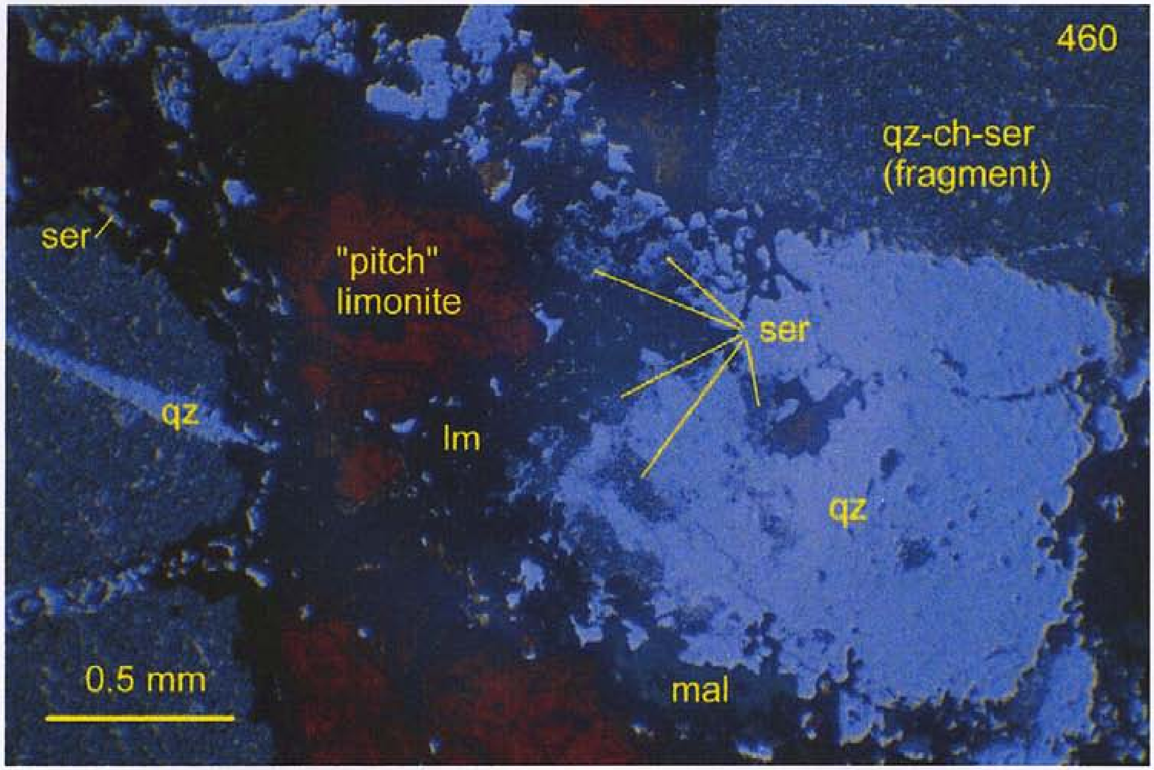
456R: Hematite (hm) as bladed lath-shaped crystals in quartz veins (locally associated with limonite, lm) or as disseminated crystals in adjacent quartz (qz)-sericite (ser)-minor chlorite (ch) altered rock, locally associated with rutile, (ru). Reflected light, uncrossed polars, field of view 2.25 mm wide.



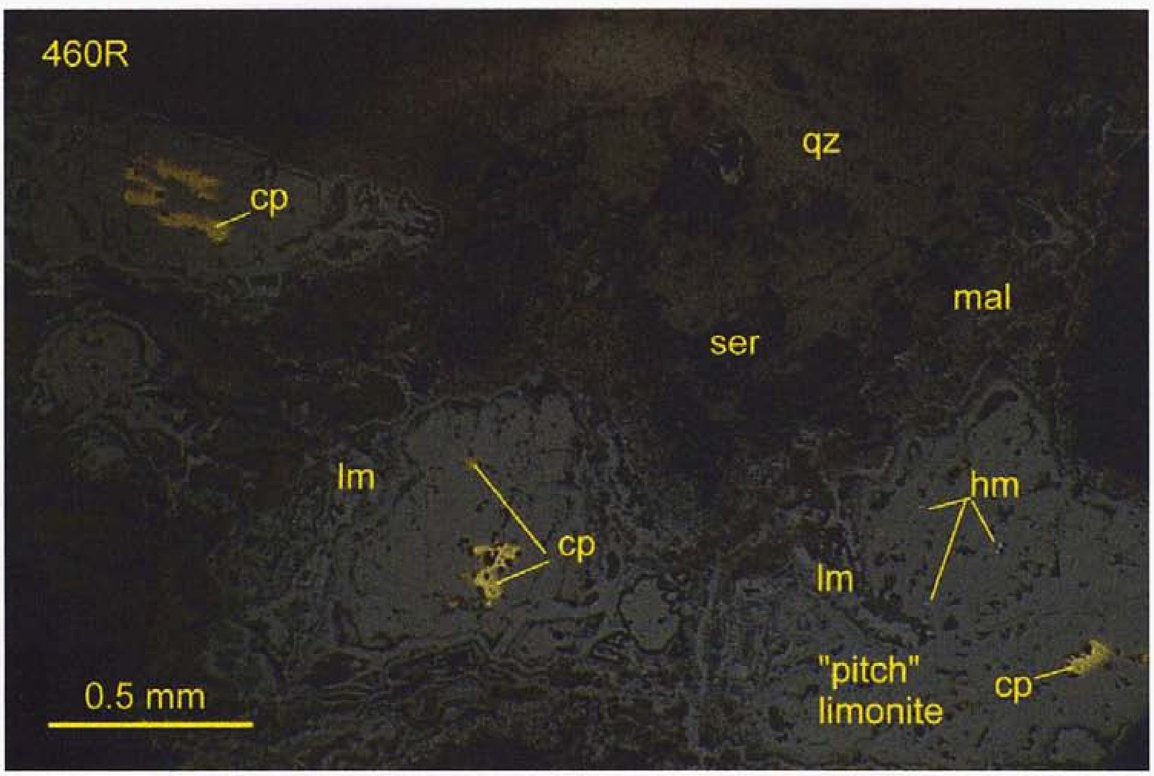
459: Intensely phyllic (quartz-sericite) altered, possibly originally fragmental volcanic (?) rock, cut by quartz (qz)- minor hematite, and possibly later, hematite (hm)-minor quartz veins. Transmitted plane light, field of view 3 mm wide.



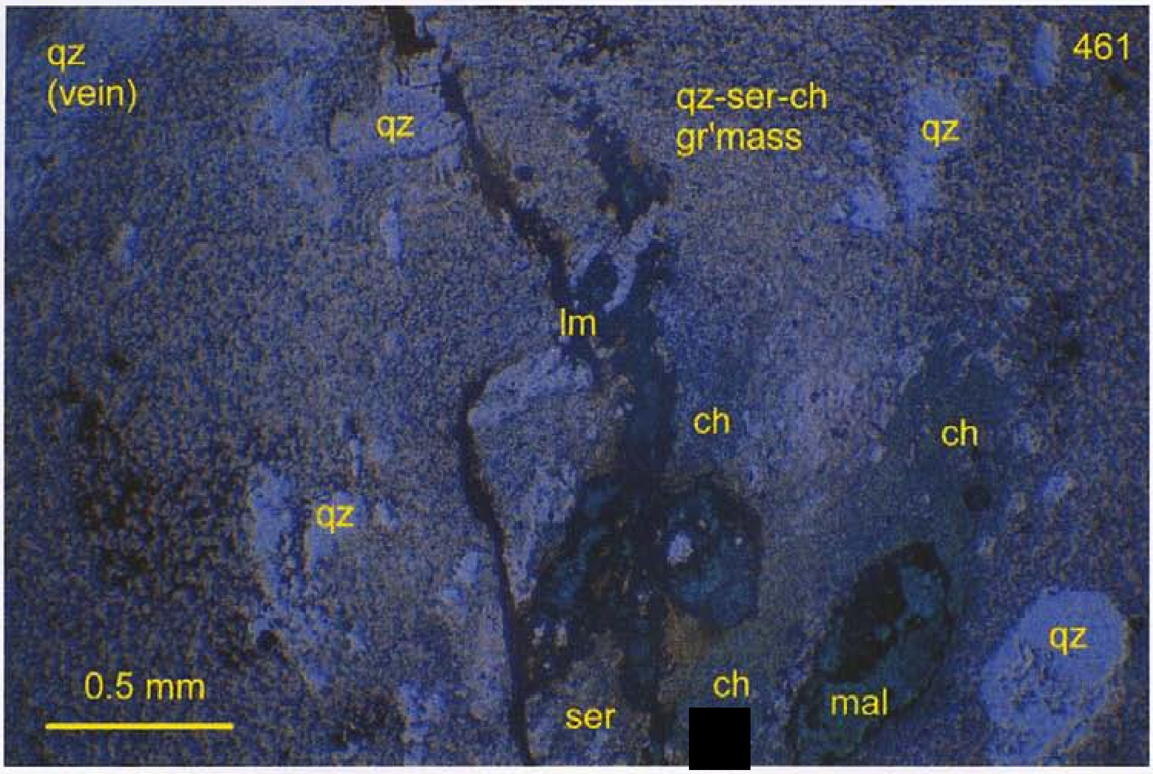
459R: Bladed, radiating specular hematite (hm) in vein with minor quartz (qz), cutting intensely quartz-sericite altered rock. Reflected light, uncrossed polars, field of view 2.75 mm wide.



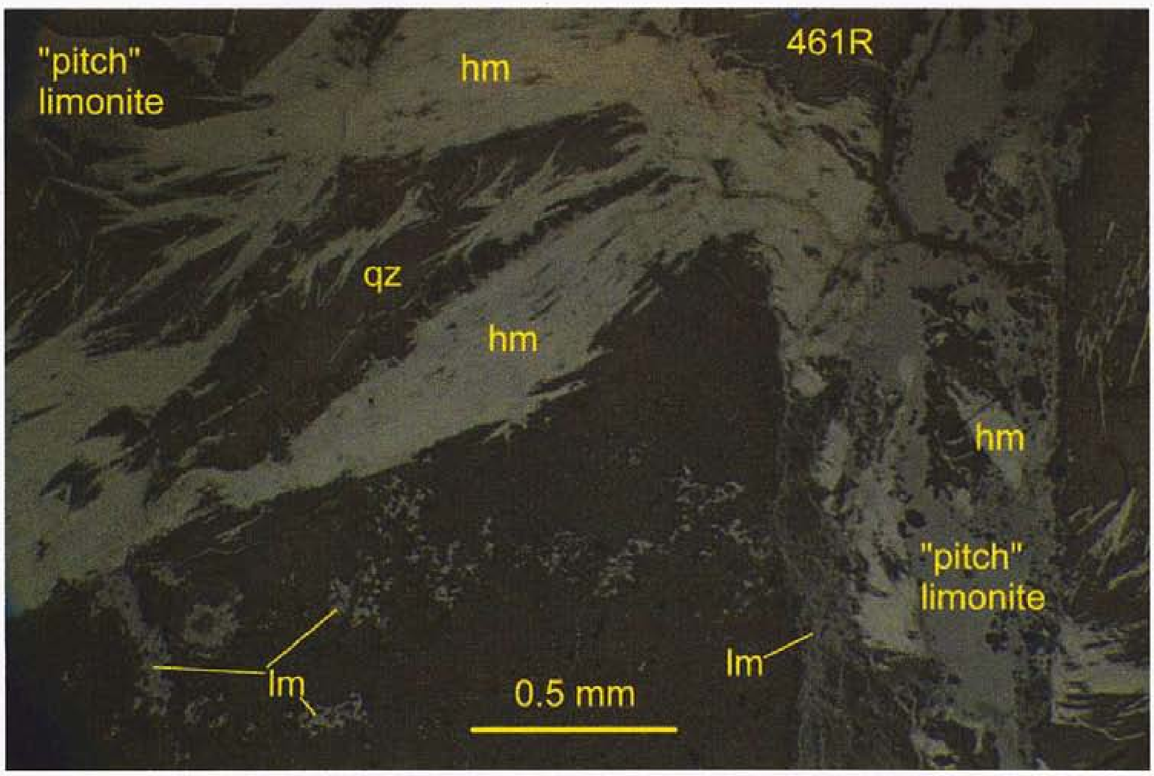
460: Angular fragments of fine-grained, intensely quartz-chlorite-sericite altered rock, cut by breccia matrix/stockwork of quartz (qz), botryoidal-textured "pitch" limonite and surrounding opaque limonite (lm), minor sericite (ser) and malachite (mal). Transmitted plane light, field of view 3 mm wide.



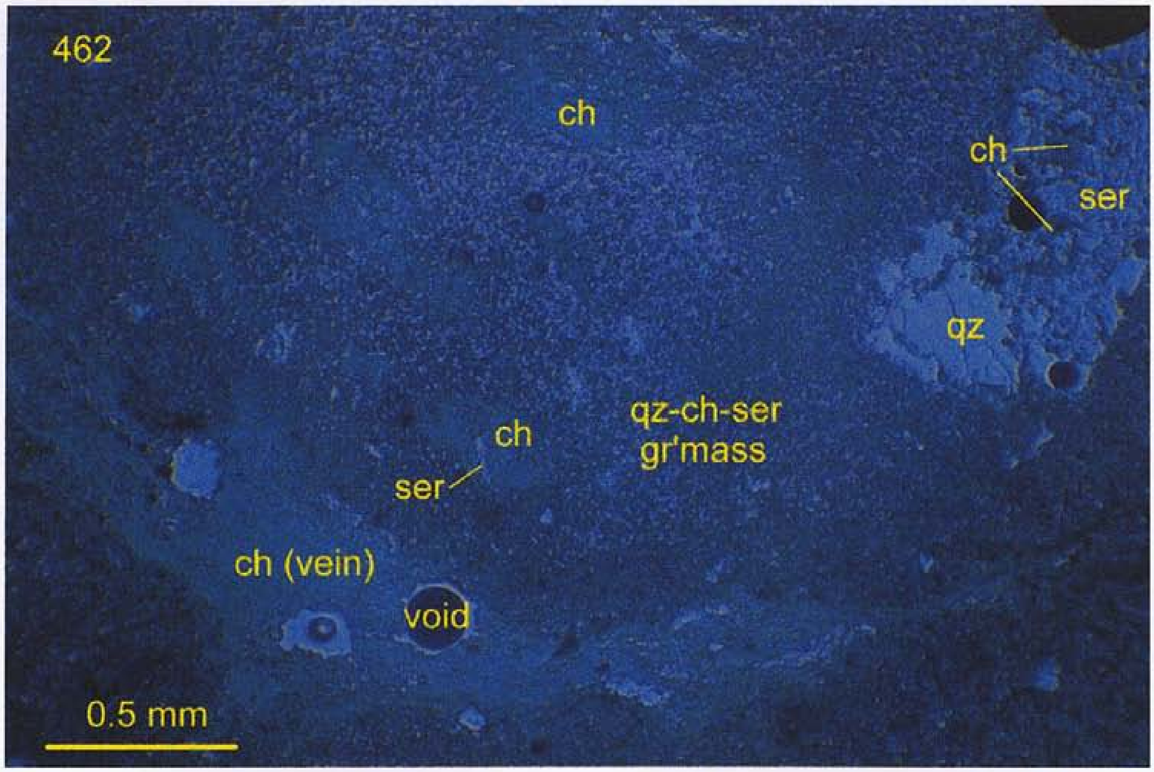
460R: Same area but in reflected light view to show "pitch" limonite with relict cores of chalcopyrite (cp) and rare trace specular hematite (hm), surrounded by limonite (lm), and variable malachite (mal), associated with quartz (qz) and minor sericite (ser) vein. Reflected light, uncrossed polars, field of view 2.75 mm wide.



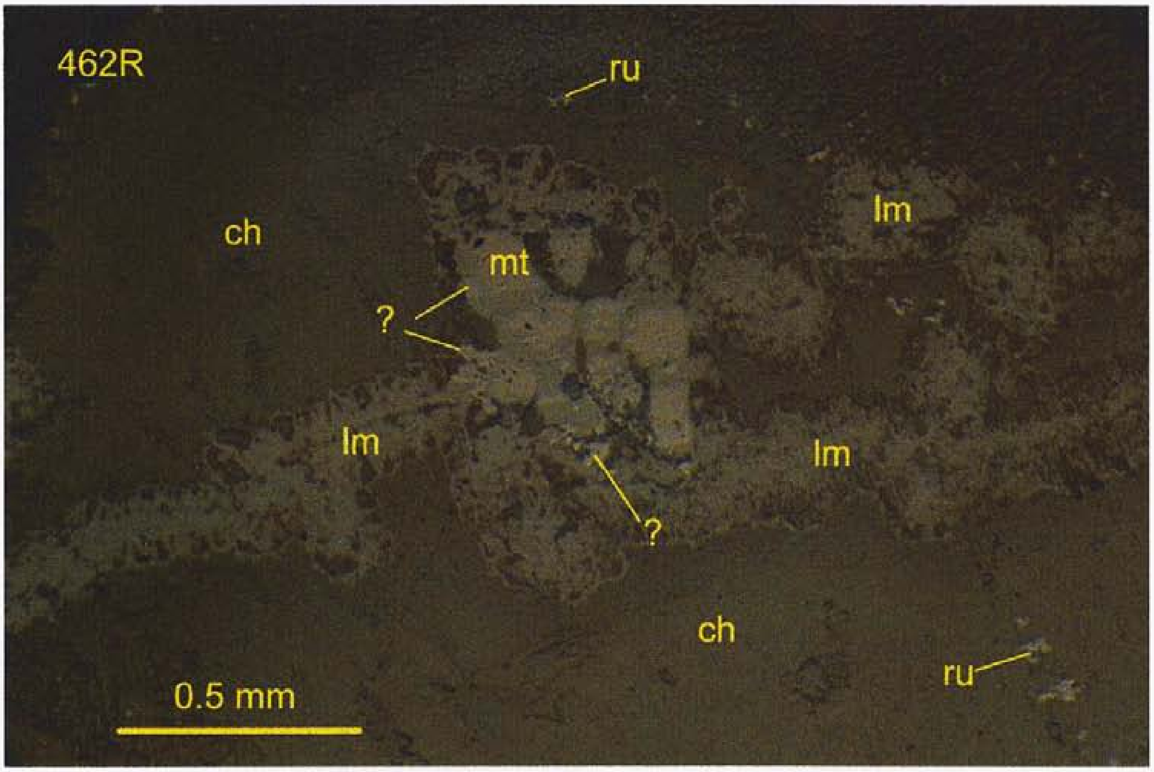
461: Intensely altered, porphyritic volcanic rock composed of relict phenocrysts replaced by quartz (qz), sericite (ser) and chlorite (ch), cut by veinlets of locally comb-textured quartz and possibly later limonite (opaque) and malachite, likely after chalcopyrite. Transmitted plane light, field of view 3 mm wide.



461R: Veinlets composed of quartz (qz), specular hematite (hm), and limonite (lm; partly "pitch" limonite, likely after chalcopyrite) which appears to cut and possibly partly replace the hematite. Reflected light, uncrossed polars, field of view 2.75 mm wide.



462: Rectangular former feldspar (?) phenocryst sites replaced by quartz (qz) and sericite (ser), minor chlorite (ch), and former mafic (?) sites replaced mostly by chlorite, grading into fracture-fill areas with traces of opaque rutile and limonite along their margins, in groundmass of quartz-chlorite-sericite. Transmitted plane light, field of view 3 mm wide.



462R: Veinlet of limonite (lm, possibly in part after former sulfides such as chalcopyrite?), minor magnetite (mt) partly altered to hematite at margins, and an unidentified mineral (?), cutting relict mafic phenocryst or amygdule (?) now replaced by chlorite; note rutile (ru) along margins and veinlets. Reflected light, uncrossed polars, field of view 2.25 mm.

Overview of all samples (stained offcuts and thin sections) showing locations of photomicrographs (green semi-circles).

Appendix V Analytical Certificates

CERTIFICATE OF ANALYSIS
iPL 06I2618

INTERNATIONAL PLASMA LABS LTD
ISO 9001:2000 CERTIFIED COMPANY

Richmond, B.C
Canada V7A 4V5
Phone (604) 879 7878
Fax (604) 272-0851
Website www.ipl.ca

West Range Exploration
Project : Merritt Project
Shipper : John Bradford
Shipment: PO#: Merritt
Comment:

10 Samples Print: Sep 22, 2006 In: Sep 15, 2006 [261815:23:15:60092206:001]

CODE	AMOUNT	TYPE	PREPARATION DESCRIPTION	PULP	REJECT
B21100	10	Rock	crush, split & pulverize to -150 mesh.	12M/Dis	03M/Dis
B84100	1	Repeat	Repeat sample - no Charge	12M/Dis	00M/Dis
B82101	1	Blk iPL	Blank iPL - no charge.	00M/Dis	00M/Dis
B90010	1	Std iPL	Std iPL(Au Certified) - no charge		

NS=No Sample Rep=Replicate M=Month Dis=Discard

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Canada					
Att: John Bradford	Ph:604-241-1765				
	Em:jabradford@shaw.ca				

Analytical Summary
Analysis: Au(FA/AAS 30g) ICP(AqR)30

##	Code	Method	Units	Description	Element	Limit Low	Limit High
01	0368	FA/AAS	g/mt	Au (FA/AAS 30g) g/mt	Gold	0.01	5000.00
02	0721	ICP	ppm	Ag ICP	Silver	0.1	100.0
03	0711	ICP	ppm	Cu ICP	Copper	1	10000
04	0714	ICP	ppm	Pb ICP	Lead	2	10000
05	0730	ICP	ppm	Zn ICP	Zinc	1	10000
06	0703	ICP	ppm	As ICP	Arsenic	5	10000
07	0702	ICP	ppm	Sb ICP	Antimony	5	2000
08	0732	ICP	ppm	Hg ICP	Mercury	3	10000
09	0717	ICP	ppm	Mo ICP	Molydenum	1	1000
10	0747	ICP	ppm	Tl ICP (Incomplete Digestion)	Thallium	10	1000
11	0705	ICP	ppm	Bi ICP	Bismuth	2	2000
12	0707	ICP	ppm	Cd ICP	Cadmium	0.2	2000.0
13	0710	ICP	ppm	Co ICP	Cobalt	1	10000
14	0718	ICP	ppm	Ni ICP	Nickel	1	10000
15	0704	ICP	ppm	Ba ICP (Incomplete Digestion)	Barium	2	10000
16	0727	ICP	ppm	W ICP (Incomplete Digestion)	Tungsten	5	1000
17	0709	ICP	ppm	Cr ICP (Incomplete Digestion)	Chromium	1	10000
18	0729	ICP	ppm	V ICP (Incomplete Digestion)	Vanadium	1	10000
19	0716	ICP	ppm	Mn ICP	Manganese	1	10000
20	0713	ICP	ppm	La ICP (Incomplete Digestion)	Lanthanum	2	10000
21	0723	ICP	ppm	Sr ICP (Incomplete Digestion)	Strontium	1	10000
22	0731	ICP	ppm	Zr ICP (Incomplete Digestion)	Zirconium	1	10000
23	0736	ICP	ppm	Sc ICP	Scandium	1	10000
24	0726	ICP	%	Ti ICP (Incomplete Digestion)	Titanium	0.01	10.00
25	0701	ICP	%	Al ICP (Incomplete Digestion)	Aluminum	0.01	10.00
26	0708	ICP	%	Ca ICP (Incomplete Digestion)	Calcium	0.01	10.00
27	0712	ICP	%	Fe ICP (Incomplete Digestion)	Iron	0.01	10.00
28	0715	ICP	%	Mg ICP (Incomplete Digestion)	Magnesium	0.01	10.00
29	0720	ICP	%	K ICP (Incomplete Digestion)	Potassium	0.01	10.00
30	0722	ICP	%	Na ICP (Incomplete Digestion)	Sodium	0.01	10.00
31	0719	ICP	%	P ICP	Phosphorus	0.01	5.00

EN=Envelope # RT=Report Style CC=Copies IN=Invoices Fx=Fax(1=Yes 0=No) Totals: 1=Copy 1=Invoice 0=3½ Disk
DL=Download 3D=3½ Disk EM=E-Mail BT=BBS Type BL=BBS(1=Yes 0=No) ID=C055401
* Our liability is limited solely to the analytical cost of these analyses.

BC Certified Assayers: David Chiu, Ron Williams

Signature: ____________

INTERNATIONAL PLASMA LABS LTD
ISO 9001:2000 CERTIFIED COMPANY

CERTIFICATE OF ANALYSIS
iPL 06I2618

[illegible] B.C.
Canada [illegible]
Phone (604) [illegible]
Fax (604) [illegible]
Website [illegible]

Client : West Range Exploration
Project: Merritt Project   Ship#

10 Samples
10=Rock 1=Repeat 1=Blk iPL 1=Std iPL [261815:23:15:60092206:001] Sep 15, 2006

Print: Sep 22, 2006

Sample Name	Type	Au g/mt	Ag ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Hg ppm	Mo ppm	Tl ppm	Bi ppm	Cd ppm	Co ppm	Ni ppm	Ba ppm	W ppm	Cr ppm	V ppm
C504454	Rock	0.03	0.2	450	<2	32	<5	<5	<3	7	<10	<2	<0.2	7	5	68	<5	56	82
C504455	Rock	2.69	4.8	1446	<2	39	52	<5	<3	4	<10	<2	<0.2	24	2	29	12	32	14
C504456	Rock	0.12	0.8	3304	<2	70	<5	<5	<3	<1	<10	<2	<0.2	8	2	24	8	24	33
C504457	Rock	0.14	0.8	1572	<2	35	<5	<5	<3	<1	<10	<2	<0.2	24	<1	24	28	32	40
C504458	Rock	1.10	5.0	5511	<2	104	<5	<5	<3	<1	<10	<2	<0.2	22	<1	34	<5	22	48
C504459	Rock	0.83	1.8	810	<2	50	52	<5	<3	<1	<10	<2	<0.2	28	<1	42	41	27	38
C504460	Rock	0.26	4.6	5353	<2	86	<5	<5	<3	<1	<10	<2	<0.2	23	3	77	<5	16	5
C504461	Rock	0.04	0.6	4154	<2	53	<5	<5	<3	<1	<10	<2	<0.2	31	4	91	<5	29	<1
C504462	Rock	0.05	0.4	1678	<2	52	<5	<5	<3	<1	<10	<2	<0.2	10	<1	36	<5	38	4
C504463	Rock	0.04	<0.1	1248	<2	72	<5	<5	<3	<1	<10	<2	<0.2	19	<1	137	<5	20	31
RE C504454	Repeat	0.03	0.2	468	<2	31	<5	<5	<3	5	<10	<2	<0.2	7	4	70	<5	55	85
Blank iPL	Blk iPL	<0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FA_GS1B	Std iPL	1.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FA_GS1B REF	Std iPL	1.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Minimum Detection		0.01	0.1	1	2	1	5	5	3	1	10	2	0.2	1	1	2	5	1	1
Maximum Detection		5000.00	100.0	10000	10000	10000	10000	2000	10000	1000	1000	2000	2000.0	10000	10000	10000	1000	10000	10000
Method		FA/AAS	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

—=No Test Ins=Insufficient Sample Del=Delay Max=No Estimate Rec=ReCheck m=x1000 %=Estimate % NS=No Sample

INTERNATIONAL PLASMA LABS LTD.
ISO 9001:2000 CERTIFIED COMPANY

CERTIFICATE OF ANALYSIS
iPL 06I2618

Richmond, B.C.
Canada V7A 4V5
Phone (604) 879-7878
Fax (604) 272-0851
Website www.ipl.ca

Client : West Range Exploration
Project: Merritt Project Ship#

10 Samples 10=Rock 1=Repeat 1=Blk iPL 1=Std iPL [261815:23:15:60092206:00h]

Print: Sep 22, 2006
Sep 15, 2006

Sample Name	Mn ppm	La ppm	Sr ppm	Zr ppm	Sc ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
C504454	421	2	4	75	2	<0.01	1.48	0.11	5.82	0.41	0.11	0.01	0.04
C504455	228	4	3	78	1	0.01	0.93	0.12	5.85	0.22	0.20	0.01	0.10
C504456	444	<2	2	67	2	0.02	2.32	0.17	5.63	0.48	0.23	0.01	0.09
C504457	385	<2	2	95	3	0.03	1.87	0.09	6.51	0.43	0.17	0.01	0.05
C504458	415	<2	3	105	4	<0.01	1.49	0.09	7.23	0.34	0.22	0.01	0.09
C504459	211	<2	2	100	2	0.01	0.84	0.05	7.36	0.21	0.17	0.01	0.04
C504460	284	5	2	59	2	<0.01	2.13	0.05	4.73	0.46	0.16	0.01	0.05
C504461	192	8	2	64	2	<0.01	0.81	0.04	5.11	0.18	0.22	<0.01	0.04
C504462	315	6	2	53	1	<0.01	1.15	0.09	4.28	0.24	0.23	<0.01	0.05
C504463	354	<2	2	99	2	0.02	1.51	0.08	6.68	0.32	0.17	<0.01	0.10
RE C504454	429	<2	4	75	1	<0.01	1.48	0.11	5.98	0.41	0.12	0.01	0.04
Blank iPL	—	—	—	—	—	—	—	—	—	—	—	—	—
FA_GS1B	—	—	—	—	—	—	—	—	—	—	—	—	—
FA_GS1B REF	—	—	—	—	—	—	—	—	—	—	—	—	—
Minimum Detection	1	2	1	1	1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Maximum Detection	10000	10000	10000	10000	10000	10.00	10.00	10.00	10.00	10.00	10.00	10.00	5.00
Method	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP

—=No Test Ins=Insufficient Sample Del=Delay Max=No Estimate Rec=ReCheck m=x1000 %=Estimate % NS=No Sample