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VANCOUVER, B.C.

**2000 Geological & Geochemical Report**

**on the Homestake Ridge Property**

**Skeena Mining Division**

**British Columbia**

**Lat. 54 45" Long. 129 35"**

**NTS 103P/12E & 13E**

**For-Teck Corp.**

**April, 2001  
By G.Evans**

**GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORT**

**26,540**

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## 1.0 - Introduction

This property has seen a prolonged period of exploration from 1914 to the present. The Homestake Ridge property is partially owned at present by Steve Coombes and optioned to Teck Corp. who can earn a 100% interest in the property (2% NSR retained by Coombes). The balance of the property is owned 100% by Teck. Work in 2000 by Teck was restricted to general geologic cross sections and limited rock sampling on the property. Work was focussed on determining the geological environment on the property and to examine the styles of the numerous mineralized occurrences. The property has an excess of 80 mineral occurrences hosted in lower Jurassic Hazelton volcanics and recently recognized lower Jurassic intrusives equated to Goldslide intrusives. There is potential for both Eskay analogue VMS systems on the property and Red Mtn. intrusive related and intrusion related Au (Ag,Cu) pyrrhotite vein systems on the property.

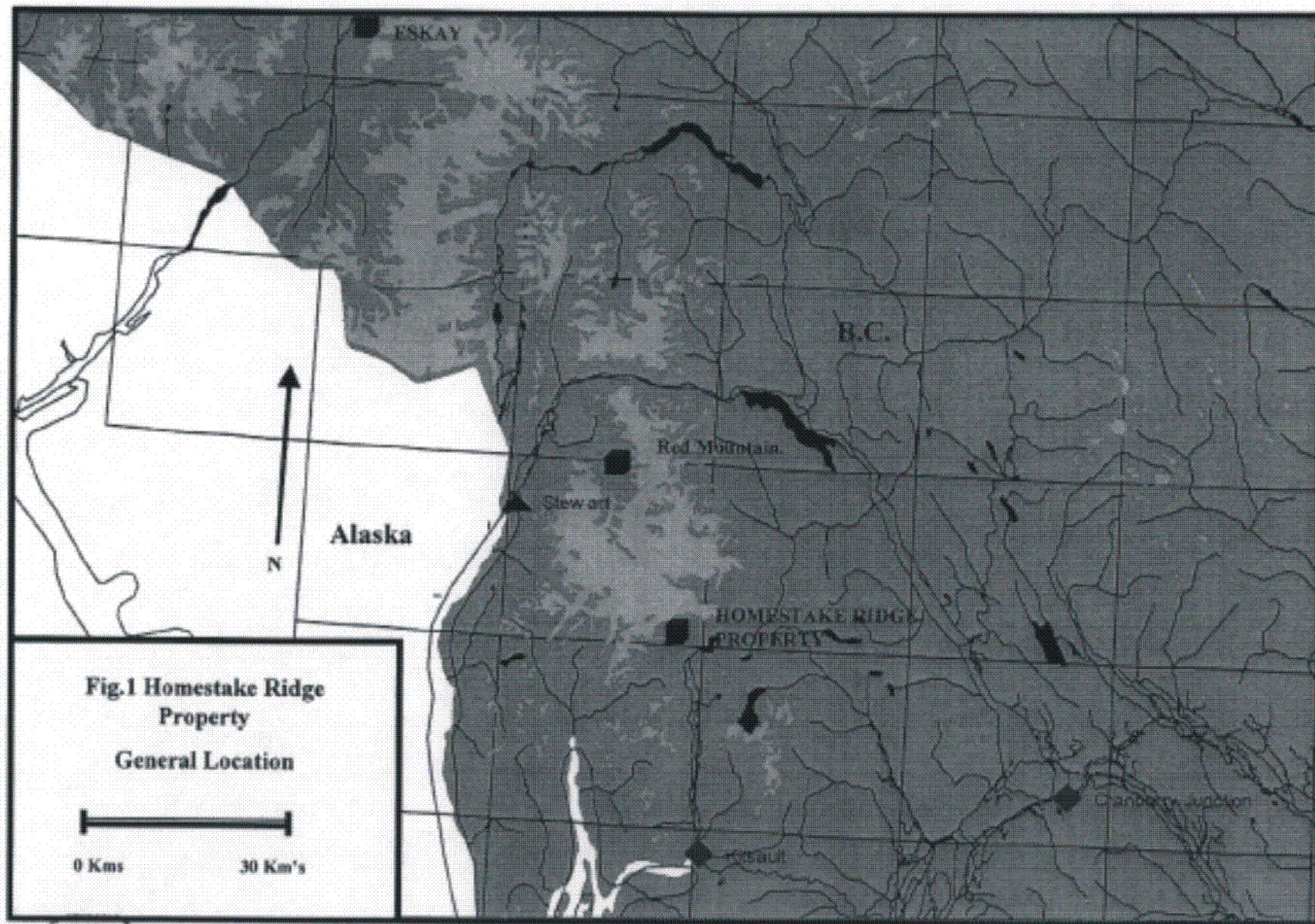
### Location and Access (Fig.1)

The Homestake Ridge property is located approximately 32 km's southeast of Stewart on NTS 103P/12E and 103P/13E centred near 55 degrees 45 minutes north, 129 degrees, 35 minutes east. The property is approximately 5 km's north of the Dolly Varden camp and is located 25 km's north of tidewater along the Kitsault river from the community of Kitsault. The property is accessed by helicopter from Stewart with an old cat trail previously accessing the south end of the property from Kitsault.

### 1.2 - Property Status (Fig.2)

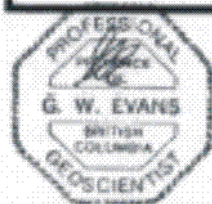
The Homestake Ridge property consists of the Cambria 1 and 2 claims optioned from Coombes and the KW and WK claims owned by Teck Corp, for a total of 116 units.

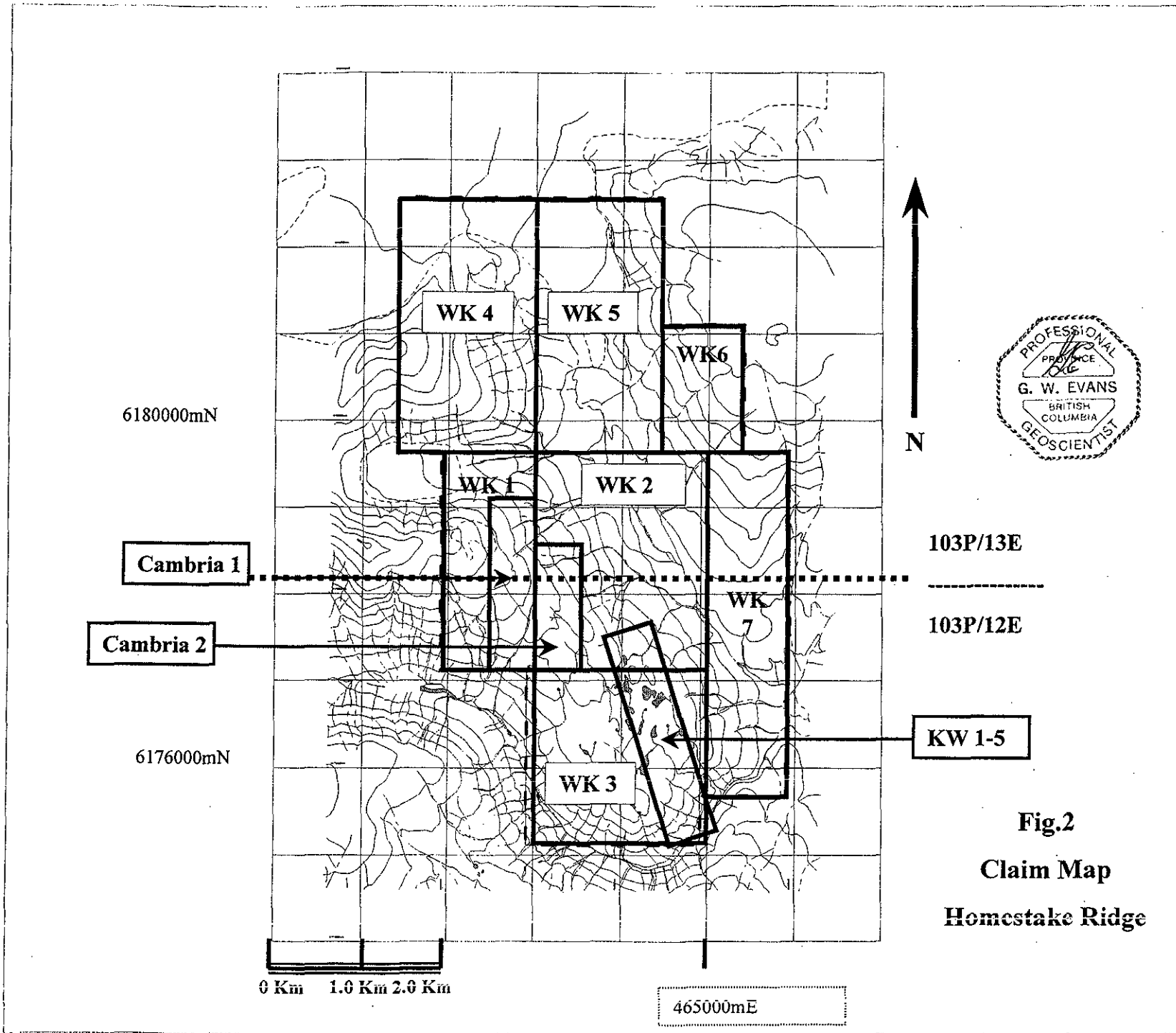
Claim Name	# of units	Record No.	Expiry Date
WK 1	10	377241	May 23, 2005 *
WK 2	20	377242	May 23, 2004 *
WK 3	16	377243	May 23, 2005 *
WK 4	18	380949	Sept. 20, 2001**
WK 5	18	380950	Sept. 20, 2001**
WK 6	6	383037	Nov. 28, 2001**
WK 7	16	383038	Nov. 28, 2001**
KW 1	1	380951	Sept. 20, 2001**
KW 2	1	380952	Sept. 20, 2001**
KW 3	1	380953	Sept. 20, 2001**
KW 4	1	383017	Nov. 28, 2001**
KW 5	1	383016	Nov. 28, 2001**
Cambria 1	4	251427	May 6, 2005 *
Cambria 2	3	251428	May 6, 2005 *



**Fig.1 Homestake Ridge  
Property  
General Location**

0 Kms      30 Km's





103P/13E

103P/12E

KW 1-5

**Fig.2**  
**Claim Map**  
**Homestake Ridge**

0 Km 1.0 Km 2.0 Km

465000mE

\* upon acceptance of the assessment report

\*\* claims were not staked at the time the work was conducted

### **1.3 - Physiography and Climate**

The property covers an N-S trending alpine ridge separated by a steeply incised E-W trending tributary creeks to the Kitsault river. Alpine begins at elevations of 1000 meters and elevations on the property range from 900-1450 meters. Forest cover below alpine consists of a mix of cedar, fir and spruce with areas of thick alder and devils club in wet seeps. The valleys contain several glaciers at elevations below the elevation of much of the property and valleys are covered by extensive moraines . This area is within the coastal Skeena climate with heavy snowfalls in the winter (5-12 meters). Snow cover remains on the property from late September to late June and coastal weather strongly affects flying to the property during the summer season.

### **1.4 - History**

The property has seen an extended exploration history including:

1914-1939 -Discovery of a number of gold showings on the Cambria claims as a spinoff from exploration on the adjacent Homestake, Vanguard and Vanguard Gold properties.

1964-1979 -Dwight Collison ( a local prospector) put in extensive time working a number of the showings and staked the entire area.

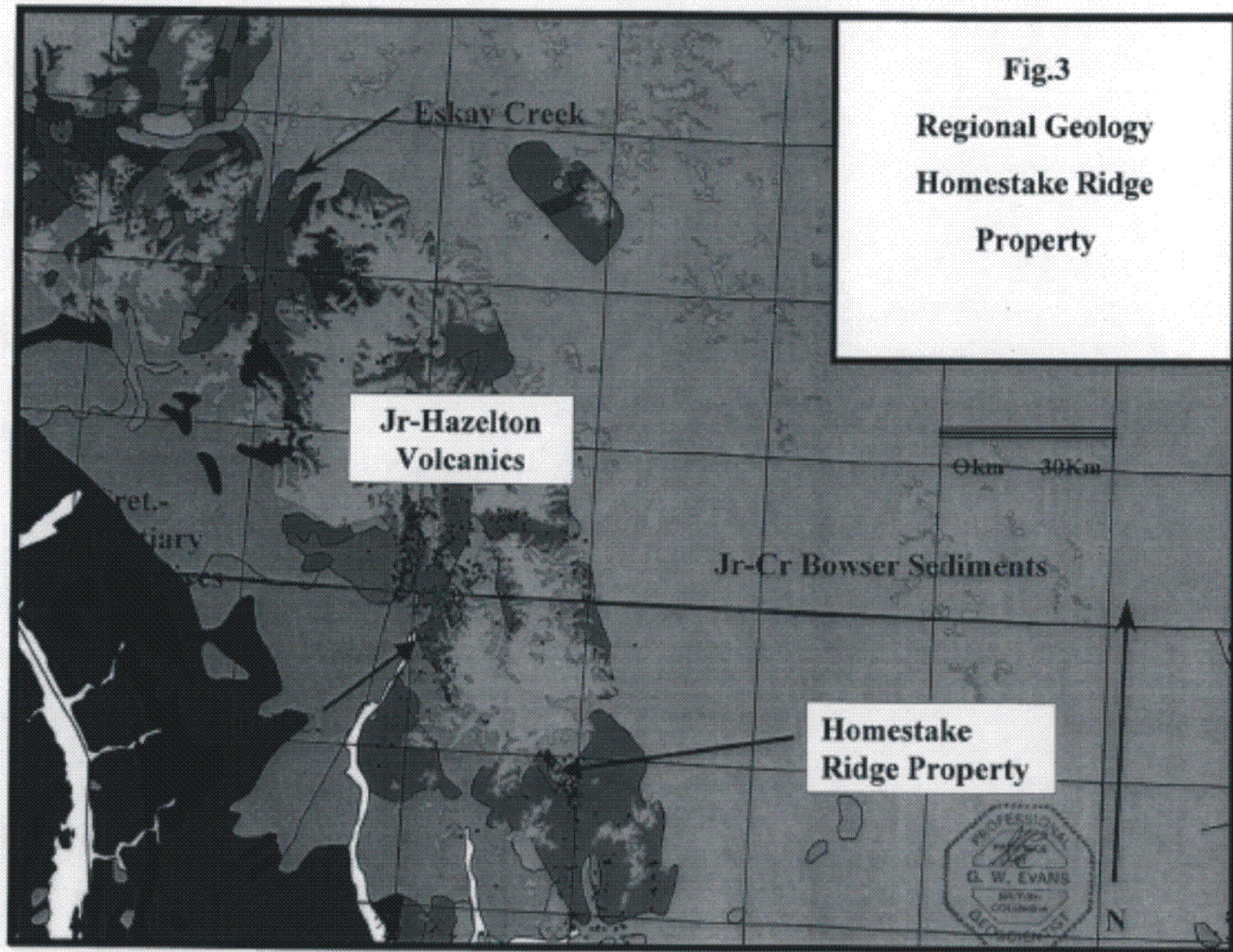
1979-1980 -Newmont Canada optioned the property from Collison and put in a grid, for mag and Max-Min geophysical surveys as well as geological mapping , with rock and soil collection.

1986-1988 -The open ground was staked by S. Coombes and D. Nelles and was optioned to Cambria Resources Ltd. They conducted geological mapping, rock sampling, blast trenching, and an I.P. and resistivity geophysical surveys.

1989-1991- Noranda optioned the property . They established a grid , and collected extensive silts, soil and rock samples. They also conducted geological mapping and magnetic, I.P. and resistivity surveys followed up by twelve diamond drill holes.

1994 -Property was to be optioned by Lac Minerals until Barrick took over the company.

2000 -The reduced Cambria claims held by S. Coombes were optioned by Teck Corp. and Teck staked the balance of the property.



**Fig.3**  
**Regional Geology**  
**Homestake Ridge**  
**Property**



## **2.0-2000 Program**

During a period from August 30-September 12, 2000 a number of visits were made to the property and initial geological traverses were conducted (1:5,000 scale) and 52 rock samples were collected for analysis. A total of 19 man days were spent on the property examining a number of occurrences and conducting traverses across the property to develop the general geological sequence.

## **3.0 – Regional Geology**

The Homestake Ridge property is located over lower to middle Jurassic volcanics and sediments deposited in a marine environment along the western margin of the Bowser basin. This sequence is collectively known as the “Hazelton Group” which consists of a well mineralized sequence formed in an island arc environment. This sequence in the Kitsault area is bounded by Tertiary intrusives to the west and the marine-lacustrine Bowser basin to the east. The Hazelton Group in the Kitsault area has undergone W-E compression which has resulted in asymmetric folding and possible thrusting, and produced only low grade greenschist metamorphism to the rocks.

The Kitsault area is the southern limit of a continuous belt of the Hazelton group which hosts the Eskay Creek VMS deposit located 80 km NW of the property. This unusual high precious metal content VMS system has a total resource of 2.558 MT grading 48.4 g/T Au, 2152 g/T Ag, 2.5% Pb, 4.16% Zn, 0.54% Cu. This is within a substantially larger resource of lower grade material. Homestake continues to operate this highly profitable deposit. The Eskay deposit occurs within and in sediments overlying felsic volcanics in a setting similar to that seen on the Homestake Ridge property. Another system that remains undeveloped is the Red Mountain deposit with a resource of 13.2 Mt @ 0.074 opt Au. Wheaton River Minerals is presently exploring the potential of developing a higher grade portion of this system. The system is related to ~190 mya Goldslide intrusions which are also present on the Homestake Ridge property.

Located 4-5 km south of the property is the Dolly Varden camp owned by New Dolly Varden Minerals Inc. where there is an existing resource of 515 Kt grading 11.04 opt Ag. Previous production from the Dolly Varden, North Star and Torbrit mines totalled 19.9 million oz. Ag, and 11 million lbs of Pb. Recent work (Devlin, 87 and others) suggests this system is a possible VMS system.

## **3.1 – Property Geology**

Only initial mapping of the property was undertaken by G. Evans, P. Baxter and A. Christopher, this was followed by a few site visits with Dr. J. Thompson and R. Farmer. Stratigraphy is complex reflecting a high energy volcanic submarine environment with local rapid facies changes.

In general units strike NW with common moderately to steep east dips (although some west dips were noted ie. fold vs. paleoslope?). Some asymmetric folds were noted in the sediments where antiforms display steep east dipping west limbs with moderate to shallow east dipping east limbs, this is compatible with observed folds in the region (Dawson, Aldrick and Greig). The Cambria claims appear to cover the west limb of a large scale overturned antiform gently plunging to the northwest. Topographic evidence seen in several locations supports this overturned model. Several large NE faults are apparent but no significant offset has been noted. Some of these faults have alteration along them and often coincide with dramatic facies changes perhaps reflecting a primary structure (ie. graben faults), these have clearly had late offset in several senses of offset and perhaps block faulting in Cretaceous or Tertiary time.

As mentioned the stratigraphic sequence is complex, a general stratigraphic sequence is listed here generally E-W in section through the Cambria claim area. Unit 1 is a maroon to green complex andesite pyroclastic unit. This sequence varies markedly with rapid facies changes and contains discrete flows and tuffaceous interbeds. This unit is equated to the Betty Creek Formation. To the west of this sequence is a complex area 200-400 meters wide largely obscured by intense pervasive sericite-pyrite alteration. This section where rocktypes were visible is a mixture of andesite pyroclastics (unit 1) and rhyolites (unit 6) and Hb-Fp Monzonite (unit 2) sills and dykes.

The FP-Hb Monzonite clearly crosscuts rhyolites and andesites in this area and appears similar in composition to Goldslide intrusions seen at Red Mtn. (~197 MYA) 25 km's to the NW of the property. In the west-central portion of the property the monzonite forms a large coarser grained core area intruding much of the sequence. According to Dr J. Thompson rafts of sediments and volcanics observed within the intrusive suggest emplacement of the intrusive into wet sediments. This supports a similar timing with the sequence being intruded by the Fp-Hb Monzonite at a volcanic centre late in the volcanic sequence. A gradational transition to overlying sediments on the west side of the thickest portion of the Fp-Hb monzonite suggests this was the paleosurface and hence tops in this area. This is also supported by an apparent facies change from SE-NW from good rhyolite (unit 6) flows and pyroclastics to dacite (unit 5) flows and pyroclastics. If the intrusive core occupies a volcanic edifice you could expect this lateral change.

Units 3 and 4 cover extensive areas mixed with the rhyolites in the central portion of the property. The units consist of mudstones, lithic tuffs, cherts and felsic tuffs. These units are highly variable and extensive areas of pervasive silicification make these units difficult to identify. These units with their proximity to felsic volcanics and lithology, resemble the Salmon River Formation. Felsic volcanics of unit 6 are high silica rhyolites that commonly display flow banding and often form thick pyroclastic flows. This unit is equated to the Mt. Dilworth Fm.

Overlying? The sequence along the western side of the property is a mixture of units 7 & 8 which consist of augite bearing mafics (basalt?) flows and pyroclastic units and laminated graphitic argillites and conglomerates which are possibly of the Salmon River Fm. This sequence is unique on the property and may reflect a primary graben feature analogous to the Sault property.

The NE corner of the property has a well exposed moderately east dipping sequence which tops evidence clearly outlines as an upright sequence on the eastern limb of the antiform. This sequence from W-E consists of a thick sequence of green-maroon andesitic pyroclastics and epiclastics correlated to the Betty Creek formation. These are intruded and overlain by high silica rhyolite domes several hundred meters in either dimension which equate to Mt. Dilworth formation. These domes commonly display flow banding and margins are commonly darker with carapace type features. These domes are intruded into and overlain by calcareous mudstones, grits and conglomerates of the Salmon River formation. These sediments contain numerous belemnite, brachiopod fossil rich beds and coarser sections with angular rhyolite fragments reflecting proximal debris flows. This relationship confirms tops evidence (tops to east) and confirms a contemporaneous timing with the felsic domes and the sediments. Sediments consist of argillites, wackes and conglomerates all of a marine origin.

In summary the geological setting on the property is favorable for either Red Mtn. or Eskay analogues. Geological sections reflect a complex sequence and much more detailed geological mapping is going to be required to unravel the complexities.

### **3.2- Property Rocktypes, Alteration & Mineralization**

As mentioned previously, there is a large variety of rocktypes present on the property. Rocktypes are simplified into 8 general units and where correlated with a stratigraphic unit are mentioned.

Unit 1 is dominated by green/maroon pyroclastic andesite flows and epiclastics. This unit is equated to the the Betty Creek formation and is very distinctive with its mixed green and maroon plagioclase phyric andesite textures. The unit most commonly consists of mixed coarse pyroclastic units although carbonate rich mudstone interbeds are very common with mixed felsic and intermediate volcanic fragments and detrital fossil belemnite and brachiopod debris. This unit in the area of the property has a thickness of at least 500-700 meters and the base does not appear exposed. This unit is intruded by the Hb-Fp monzonite (unit 2).

Unit 2 is typically a medium to coarse grained hornblende and plagioclase rich monzonite intrusive unit. This unit has been equated by Greig to be equivalent of the Goldslide intrusions dated at Red Mtn. at 190 Mya. This unit is clearly a hypabyssal intrusive with numerous dykes and sills intruding units 1, 3, 5, 6 and 7.

This unit ranges from medium grained to megacrystic with the matrix commonly pervasively potassic altered. As mentioned the mass of intrusive is grossly conformable with units but dykes are clearly discordant and large rafts of sediments show only minor quenched margins and the presence of pepperites indicate this intrusion was co-eval with the sequence and intruded into wet sediments.

Unit 3 consists of calcareous mudstones with lesser lithic tuffs and conglomerates. This distinctive unit is equated to the Salmon River Formation and generally is located on top of the felsic volcanics and Betty Creek volcanics. Interbeds of mudstone in the Betty Creek volcanics are identical to unit 3. This unit often contains angular fragments of felsic volcanics and argillite fragments and occasionally becomes more of a conglomerate unit. Sections of the mudstone proximal to rhyolite domes contain 5-40% fine grained pyrite. A distinctive feature of the mudstones is abundant belemnite and brachiopod fossil fragments. Some sections of wackes and conglomerates were also observed interbedded with augite bearing basalts in the southwest portion of the property. These are not of the typical Salmon River Formation but maybe stratigraphically the equivalent.

Unit 4 Chert and felsic tuffs also probably belong to the Salmon River Formation. These units also overlie the Betty Creek andesites and felsic volcanics. They are complex with rapid facies changes and have large areas of pervasive silicification which mask primary textures. In the southern portions of the property polyolithic chert breccias are present while much of the felsic tuffs display pervasive sericite alteration with only minor rhyolite chips and lappilli.

Unit 5 FP Dacite pyroclastics and flows are seen over large areas of the central portion of the property on strike with good rhyolite flow banded complexes. For this reason they are equated to the Mt. Dilworth formation. They consist of a apple green aphanitic matrix with 1-2 mm quartz and plagioclase phenocrysts. This sequence forms a distinctive belt in the northwest corner of the property.

Unit 6 Rhyolite is typically a pale buff colored siliceous aphanitic unit with distinctive flow banding. These rocks commonly form felsic domes and margins typically display hyaloclastites, disrupted banding and contamination . This discontinuous sequence is classical Mt. Dilworth felsic volcanics.

Unit 7 Graphitic argillites, wackes and conglomerates of this unit form thick alternating sequences and belong to the Bowser River Formation. These graphitic sediments commonly contain 5-25% fine grained primary pyrite which forms strongly oxidized beds. This sequence appears gradational with the underlying unit 3 and forms a package at least 400 meters thick on the property. Rocks appear of a anoxic marine environment on the property.

Unit 8 Mafic Volcanics form the southwesternmost unit on the property. This unit is a augite bearing basalt consisting of flows, lahars and pyroclastics with some intraformational conglomerates. This unit is very distinctive and appears to occupy the time equivalent of the Bowser sediments on strike.

Very little sampling (only 52 rock samples see fig. 4) were collected on the property in 2000 although numerous areas of mineralization and alteration were observed. Previous work by Noranda focussed on the extensive area of pervasive sericite-pyrite alteration zone through the central portion of the property. I.P. and gold soil geochem closely follow this zone which is 1.5 km in strike length on the property and 200-400 meters in width. This alteration zone also follows several of the NE striking faults which could be hydrothermal conduits. What the alteration is related to remains obscure but even if linked to the Hb-Fp monzonite this suggests a large subvolcanic hydrothermal system is present. This large zone may offer a bulk tonnage target but at this time, grades appear too low. Large areas to the southwest of the pervasive sericite altered areas display widespread pervasive silicification. The hostrocks are typically mudstone and pervasive silicification can be so strong it can make the mudstones appear as cherts. Of greatest interest at this time is the numerous sulphide veins which both crosscut stratigraphy and are conformable with bedding, these are seen over large areas of the property.

There are several types of sulphide veins including massive barite veins with chalcopyrite, carbonate/barite veins with sphalerite and galena (ie. 223605-116.7 g/t Au, 6.24% Cu), and several types of quartz veins and massive sulphide veins. Massive sulfide veins consist of massive pyrite-arsenopyrite (ie. sample # 223572 - arsenopyrite veins 4.3 g/t Au, 205 g/t Ag), massive pyrrhotite with minor cpy, ga, sp and have selvages of either strong sericite (ie. sample # 64006)- or strong chlorite (ie. sample 223604). Quartz veins attain widths up to 10 meters and in some instances follow Hb-Fp monzonite dykes. Typically these quartz veins are dominated by pyrite, minor chalcedonic +/- barite veins were also noted. There is a good probability of there being some metal zoning on the property but this has not been addressed to date. Some massive sulphide veins parallel stratigraphy but no classical VMS style stratiform mineralization has been observed on the property to date. The exception to this is areas in the northeast corner of the property contain 5-40% disseminated pyrite within mudstones directly above the felsic domes.

Initial sampling indicates gold and silver are associated with either high As or base metal content. Elevated Hg and Sb are widespread throughout the property. Much more sampling is required to separate any zonation on a property scale.

#### 4.-CONCLUSIONS & RECOMMENDATIONS

The Homestake Ridge property has a early to middle Jurassic sequence of volcanics and sediments very similar to the Eskay creek stratigraphy. Extensive areas of Hb-Fp monzonite believed to be equivalent to the Goldslide intrusions at Red Mtn. are also present. This is a similar aged intrusive to the volcanics with many subvolcanic textures. There is extensive areas of precious and base metal mineralization with evidence of a large subvolcanic hydrothermal system present. The property has a very high chance of having a Red Mtn. or Eskay style of system present.

Both these systems have similar alteration and signatures and combined with very close spatial timing maybe quite difficult to identify and vector into. Detailed geological mapping and sampling is required to develop drill targets. Geophysics is not particularly effective in this complex package. Wholerock and thin section work will also help with lithologies and alteration. Future work requires detailed work to unravel the styles of mineralization and unravel the complex high energy volcanic environment.

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**APPENDIX 1**

**ROCK DESCRIPTION TABLE**



## ROCK SAMPLES

## HOMESTAKE RIDGE

Sample No	E	N	R Type	Description	Au ppb	As ppm	Sb ppm	Hg ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm
64001	463725	6176410	dac-and tuff	6-10" barite vein at 085/65S - py in wall rock	455	6280	79	260	24.4	797	600	558
64002	464030	6176730	chert?	strongly siliceous and cherty with 5% py - 120/75W	-5	20	1.2	70	-0.2	20	8	188
64003	646325	6176580	Felsic volcanic	feldspar porphyritic with chl atn and 5% py	970	29	1.8	-10	1	-1	14	66
64004	464240	6176660	Felsic volcanic	2m gossan 5% py	140	8	1.2	-10	0.4	2	4	54
64005	464250	6176700	Felsic volcanic	4.5m gossan 5-10% dis py - sil host	360	20	1.8	-10	1	21	6	58
64006	464250	6176700	Felsic volcanic	5-10% py diss and fract coatings in float	480	12	1.2	-10	0.6	13	8	66
64007	464400	6176700	dac-and tuff	chl alt 3-5% py in pit - gossan	95	15	2.2	-10	-0.2	-1	10	80
64008	462430	6177870	lithic-int tuff	gossan, Ba vn, py, seds	125	152	4.8	30	0.8	80	42	82
64009	462525	6177820	lithic-int tuff	gossan, tr cpy, py, pit	5170	10000	980	1520	412	2800	5950	10800
64010	460440	6182750	mafic pyroclastic	gossan, 5% py in fractures sed with 5-10% diss py and py frags just above rhyolite contact - not gossanous	20	81	9.2	160	3.6	26	70	118
64011	463430	6181230	lithic sed	black rhyolite, rhyolite bx (sed?)	-5	57	11.5	80	1	16	36	262
64012	463210	6181300	black rhy	3m wide zone with 20% massive py stringers/vns - not gossanous	-5	31	6	70	-0.2	7	20	94
64013	463350	6180760	BC	gossanous	-5	484	58	3500	2.4	12	38	84
64014	463350	6180760	BC	massive py veins in sericitic structure (2m) - weakly gossanous 3-10m zone of py-ba-cb vns at 020 - along river - both sides - not gossanous	-5	715	150	2300	1.8	16	26	106
64015	463470	6180680	BC	q-cb vns with epi alteration halos to 2m with stockwork - 080/steep south - traces of cct-bn-mal - local gossan with pyrite	-5	20	2.8	30	2	1880	14	64
223551	463300	6177000	Felsic volcanic	0.6 m wide massive sulph vein? // foln py,asp	34210	10000	125	390	497	4020	14600	8360
223552	464410	6176350	Felsic volcanic	0.8 m wide massive sulph vein // foln py, cp	105	375	9.8	840	12.2	48	662	1845
223553	462160	6182010	Felsic volcanic	rep of flow banded rhyolite w/ 5-8% diss fgr py	40	257	19	100	2.2	11	74	104
223554	462525	6181635	Felsic volcanic	rep of flow banded rhyolite w/ 6-8% diss fgr py	-5	66	22	90	1	3	52	66
223555	463115	6181080	pale flow banded rhyolite	10-15% Blackjack sp w/ 2-3% dissem py in float boulder	-5	862	11	11430	3.6	74	126	46700
223556	463320	6180860	Felsic volcanic	black rhyolite, rhyolite bx (sed?) w/ 30% vfgr py dissem	-5	84	24	220	1.4	13	46	394
223557	463580	6180580	Felsic volcanic	black rhyolite, dome carapace 10% py-in place rep	-5	46	12.5	150	0.4	10	20	164
223558	463580	6180580	Felsic volcanic	transitional mudstone/felsic dome 30% vfgr py in situ	-5	69	25	200	1.8	19	40	228
223559	463390	6180850	Felsic volcanic	transitional mudstone/felsic dome breccia 10-15% vfgr py in situ	-5	97	39	360	16.2	11	350	204
223560	463830	6180600	Lam Argillite	float of lam, carb argillite w/ 15% fgr py lams	-5	504	22	570	1.4	3	32	934
223561A	463900	6180520	Lam Argillite	float near source of lam, carb argillite w/ 10% fgr py lams	15	79	18	1950	0.8	22	24	66
223561B	463890	6180200	BC	Calcite/Ba/Py vein - 10 cm in BC	5	1	2.4	10	0.8	163	24	164
223562	463220	6180790	Felsic volcanic	float of felsic volcanic w/ 40% vfgr sulph-py	15	696	43	1280	26.6	120	600	100
223601	463590	6176870	Chert/Mudstone	2.5 m wide vein ba vein 3-4% cp, 2-3% py, tr ga,sp	650	143	29	2160	87.6	10500	8180	23600
223602	463000	6181620	Mudstone	Coarse granular mudstone w/ 30% vfgr sulph	-5	58	16.5	150	1	70	60	140
223603	462970	6179220	Vein in B.C.	float at Myberg-Py-Qtz-Ba 30-40% Py	675	445	23	2590	10	735	16	206
223604	462970	6179220	Vein in B.C.	Myberg chl-sp-ga vein 1.0m	1420	248	22	43500	28.8	106	41200	89600
223605	462970	6179220	Vein in B.C.	Myberg chl-cpy vein dump grab 2-3 m zone	116700	179	33	3870	99.2	23700	4810	21000
223570	462040	6179800	Felsic volcanic	rep of 20% vfgr py in silic QFP dome	-5	30	4	590	0.2	15	32	28
223571	462040	6179800	Felsic volcanic	rep of seric/ba tract w/ 25% py in QFP dome	15	14	4.4	8140	0.2	11	16	12
223572	462970	6177380	Chert	float of ferrocrete zone in cherts-70% sulph py,asp	4300	10000	360	2780	205	1755	9500	1800
223573	463070	6177520	Felsic volcanic	chl altd rhyolite w/ 30% py, tr cp,asp	575	7370	79	230	16.6	1955	312	1030

## ROCK SAMPLES

## HOMESTAKE RIDGE

Sample No	E	N	R Type	Description	Au ppb	As ppm	Sb ppm	Hg ppb	Ag ppm	Cu ppm	Pb ppm	Zn ppm
223574	463070	6177520	Felsic volcanic	3.0 m NE trending zonesp,gacp,py in calc/ba vein	655	1285	1000	10530	375	3450	5710	45200
223575	463320	6177525	Felsic volcanic	1-2 m wide chl-py stringer	-5	241	8.2	90	4.6	61	88	394
223576	463200	6177450	Vein	rep of 5.0 m Qtz/20% crse py vein E-W	85	115	3	20	1	47	24	86
223606	463930	6179710	Volcanoclastic	Belemnite rich clastic w/ 7-10% py	-5	96	39	730	0.2	14	14	64
223607	463970	6179780	Volcanoclastic	Felsic rich fragmental w/ 5-7% py	-5	25	18	220	-0.2	26	6	44
223608	464140	6179950	Volcanoclastic	10-20cm py stringer	-5	787	100	3870	0.6	6	10	56
223609	463380	6177680	Vein	10-15 cm vein carb w/ py,asp,ga,sp	4970	28	49	48700	38.8	1570	30200	229000
223610	463490	6177520	Felsic volcanic	float sil/ser felsics w/ 5-25% py	105	9	0.8	90	2	8	16	444
223611	463490	6177700	Vein	Vanguard Gold Ba vein float ga,sp,cpy	370	41	33	12780	27.2	3530	14800	19300
223612	463460	6177730	Vein	Vanguard Gold Ba vein float ga,sp,cpy	3720	84	18	3430	29.2	62400	8350	4760
223613	463460	6177730	Vein	Vanguard Gold Ba vein 30 cm w/ ga,sp,cpy	5380	26	8.6	4860	9.2	1320	8070	9650
223614	463850	6180520	Shale	Float of pyritic shale 30-40% py lams	40	97	15.5	530	4.2	126	76	334
223615	463540	6180680	Felsic volcanic	Py,Carb,Ba stringer in felsic volc.	15	142	8.6	620	0.2	23	42	166
223616	463590	6180650	Felsic volcanic	Py stringers in top of rhyolite dome	-5	61	10	470	0.6	27	22	266

**APPENDIX 2**

**CERTIFICATES OF ANALYSIS - ROCKS**



# ALS Chemex

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 Analytical Chemists \* Geochemists \* Registered Assayers  
 212 Brooksbank Ave., North Vancouver  
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To: TECK EXPLORATIONS LTD.

350 - 272 VICTORIA ST.  
 KAMLOOPS, BC  
 V2C 1Z6

Page Number :1-A  
 Total Pages :1  
 Certificate Date: 29-SEP-00  
 Invoice No. : I0028649  
 P.O. Number :  
 Account : HPQ

Project : HR  
 Comments : ATTN: G. EVANS

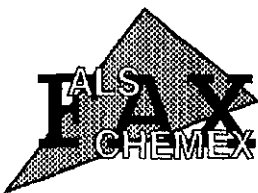
\* PLEASE NOTE

## CERTIFICATE OF ANALYSIS A0028649

SAMPLE	PREP		Au ppb	Au FA	As	Sb	Hg	Ag ppm	Al %	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	K %	Mg %	Mn ppm
	CODE		FA+AA	g/t	ppm	ppm	ppb	AAS	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)	(ICP)
64001	205	226	455	-----	6280	79	260	24.4	1.60	150	< 0.5	78	14.20	4.5	92	58	797	8.97	0.22	5.46	5130
64002	205	226	< 5	-----	20	1.2	70	< 0.2	7.94	110	1.0	2	2.07	< 0.5	16	159	20	3.04	0.87	1.40	245
64003	205	226	970	-----	29	1.8	< 10	1.0	5.68	50	< 0.5	< 2	0.17	< 0.5	12	107	< 1	11.00	0.52	1.58	1425
64004	205	226	140	-----	8	1.2	< 10	0.4	8.39	130	0.5	< 2	0.61	< 0.5	10	47	2	6.33	2.78	1.22	715
64005	205	226	360	-----	20	1.8	< 10	1.0	8.75	100	0.5	10	0.22	< 0.5	10	45	21	5.40	1.81	1.11	290
64006	205	226	480	-----	12	1.2	< 10	0.6	6.93	150	< 0.5	2	0.18	< 0.5	15	91	13	8.73	1.77	1.25	390
64007	205	226	95	-----	15	2.2	< 10	< 0.2	8.24	170	< 0.5	< 2	0.16	< 0.5	8	70	< 1	6.19	2.21	1.35	705
64008	205	226	125	-----	152	4.8	30	0.8	5.10	580	< 0.5	8	0.33	< 0.5	9	109	80	5.09	1.37	0.77	570
64009	205	226	5170	-----	>10000	980	1520	>100.0	5.14	90	< 0.5	28	2.27	104.0	47	93	2800	8.58	1.80	0.71	1705
64010	205	226	20	-----	81	9.2	160	3.6	8.45	120	0.5	2	0.58	< 0.5	6	36	26	4.16	2.61	0.79	555
64011	205	226	< 5	-----	57	11.5	80	1.0	6.96	200	1.0	< 2	3.66	< 0.5	8	54	16	3.15	5.28	0.66	500
64012	205	226	< 5	-----	31	6.0	70	< 0.2	7.31	520	1.0	< 2	3.38	< 0.5	7	56	7	1.65	5.55	0.32	445
64013	205	226	< 5	-----	484	58	3500	2.4	1.61	40	< 0.5	< 2	4.17	< 0.5	22	81	12	>25.0	0.48	0.77	1175
64014	205	226	< 5	-----	715	150	2300	1.8	4.79	120	< 0.5	< 2	2.88	< 0.5	18	48	16	19.15	1.55	1.82	1050
64015	205	226	< 5	-----	584	31	1610	2.8	0.96	40	< 0.5	< 2	20.1	0.5	15	60	524	19.55	0.23	0.36	3680
64016	205	226	< 5	-----	20	2.8	30	2.0	8.53	170	0.5	< 2	9.31	< 0.5	20	71	1860	5.77	0.72	1.45	1740
223551	205	226	>10000	34.21	>10000	125	390	>100.0	0.36	30	< 0.5	1845	0.04	79.0	930	65	4020	>25.0	0.17	0.01	10
223552	205	226	105	-----	375	9.8	840	12.2	2.94	180	0.5	14	0.38	16.0	23	161	48	19.20	1.35	0.18	175
223553	205	226	40	-----	257	19.0	100	2.2	8.32	310	1.0	2	0.48	1.5	6	59	11	1.94	9.33	0.10	180
223554	205	226	< 5	-----	66	22	90	1.0	8.37	220	1.5	< 2	0.08	< 0.5	3	61	3	1.88	8.15	0.13	55
223555	205	226	< 5	-----	862	11.0	11430	3.6	4.95	300	0.5	2	0.10	386	8	93	74	3.45	4.14	0.34	145
223556	205	226	< 5	-----	84	24	220	1.4	8.84	220	2.0	8	0.71	2.0	9	51	13	3.27	7.33	0.68	170
223557	205	226	< 5	-----	46	12.5	150	0.4	6.70	100	1.5	2	9.29	2.0	19	28	10	4.78	6.46	0.41	1115
223558	205	226	< 5	-----	69	25	200	1.8	8.56	1020	2.0	< 2	0.45	< 0.5	11	40	19	4.94	5.94	0.51	150
223559	205	226	< 5	-----	97	39	360	16.2	5.94	150	1.5	< 2	1.75	1.0	3	54	11	5.64	6.58	0.09	650
223560	205	226	< 5	-----	504	22	570	1.4	7.08	1040	1.5	< 2	0.21	0.5	26	54	3	8.34	6.73	0.17	130
223561A	205	226	15	-----	79	18.0	1950	0.8	4.22	460	< 0.5	< 2	0.29	< 0.5	19	79	22	12.35	0.76	0.24	135
223561B	205	226	5	-----	1	2.4	10	0.8	9.29	200	1.5	< 2	3.00	< 0.5	30	49	163	6.78	2.03	2.74	605
223562	205	226	15	-----	696	43	1280	26.6	4.83	1170	1.0	< 2	0.09	< 0.5	20	72	120	10.75	4.44	0.15	160
223601	205	226	650	-----	143	29	2160	87.6	3.07	80	0.5	Intf*	0.62	229	14	102	>10000	7.71	1.08	0.90	975
223602	205	226	< 5	-----	58	16.5	150	1.0	6.42	140	1.0	6	11.25	< 0.5	10	37	70	2.73	4.77	0.50	985
223603	205	226	675	-----	445	23	2590	10.0	1.47	30	0.5	< 2	0.48	1.0	11	61	735	11.85	0.42	0.77	895
223604	205	226	1420	-----	248	22	43500	28.8	5.58	300	0.5	2	0.55	>500	15	51	106	9.18	3.93	2.26	2530
223605	205	226	>10000	116.70	179	33	3870	99.2	2.87	80	0.5	Intf*	1.99	229	12	43	>10000	13.55	0.59	1.96	3400

CERTIFICATION:

\* INTERFERENCE HIGH ON BI AND P



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350 - 272 VICTORIA ST.  
 KAMLOOPS, BC  
 V2C 1Z6

Project: HR  
 Comments: ATTN: G. EVANS

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 Certificate Date: 29-SEP-00  
 Invoice No. :10028649  
 P.O. Number :  
 Account :HPQ

\* PLEASE NOTE

## CERTIFICATE OF ANALYSIS A0028649

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64001	205 226	1	< 0.01	12	360	600	541	0.06	49	< 10	558
64002	205 226	6	4.33	26	1080	8	441	0.31	185	< 10	188
64003	205 226	1	1.89	3	710	14	39	0.11	84	< 10	66
64004	205 226	8	2.69	1	1140	4	112	0.18	143	< 10	54
64005	205 226	11	3.30	< 1	1210	6	114	0.21	159	< 10	56
64006	205 226	10	2.08	7	930	8	66	0.16	136	< 10	66
64007	205 226	6	3.34	1	1150	10	75	0.16	131	< 10	80
64008	205 226	11	0.58	11	750	42	19	0.23	286	< 10	82
64009	205 226	3	0.13	14	710	5950	35	0.17	142	10	>10000
64010	205 226	2	3.05	< 1	800	70	434	0.29	124	< 10	118
64011	205 226	< 1	0.27	1	270	36	229	0.20	50	< 10	262
64012	205 226	< 1	1.53	< 1	260	20	201	0.17	63	< 10	94
64013	205 226	61	0.03	6	180	38	91	0.07	41	< 10	84
64014	205 226	9	0.57	5	520	26	71	0.21	149	< 10	106
64015	205 226	61	0.11	< 1	130	28	374	0.02	37	< 10	78
64016	205 226	4	0.32	6	740	14	1625	0.29	333	< 10	64
223551	205 226	< 1	< 0.01	3	180	>10000	55	< 0.01	6	< 10	8360
223552	205 226	9	< 0.01	5	180	662	167	0.06	59	< 10	1845
223553	205 226	< 1	0.36	2	520	74	166	0.13	44	< 10	104
223554	205 226	< 1	0.89	< 1	530	52	138	0.12	48	< 10	66
223555	205 226	< 1	0.17	< 1	350	126	75	0.07	24	< 10	>10000
223556	205 226	5	0.87	3	1990	46	140	0.32	123	< 10	394
223557	205 226	6	0.68	5	490	20	401	0.16	71	< 10	164
223558	205 226	9	1.10	1	1430	40	183	0.58	263	< 10	228
223559	205 226	20	0.23	< 1	220	350	179	0.08	26	< 10	204
223560	205 226	12	0.57	5	80	32	146	0.08	26	< 10	934
223561A	205 226	103	2.34	9	220	24	166	0.17	70	< 10	66
223561B	205 226	< 1	2.39	23	2010	24	341	0.42	295	< 10	164
223562	205 226	< 1	0.19	41	260	600	101	0.09	155	< 10	100
223601	205 226	17	0.03	25	Intf*	8180	482	0.09	95	< 10	>10000
223602	205 226	5	0.71	4	610	60	442	0.28	158	< 10	140
223603	205 226	5	< 0.01	1	240	16	191	0.07	58	< 10	206
223604	205 226	< 1	0.08	< 1	760	>10000	91	0.16	140	< 10	>10000
223605	205 226	< 1	0.01	6	Intf*	4810	97	0.07	104	< 10	>10000

CERTIFICATION:

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To: TEOK EXPLORATIONS LTD.

350 - 272 VICTORIA ST.  
 KAMLOOPS, BC  
 V2C 1Z6

Project: H.R.  
 Comments: ATTN: G. EVANS

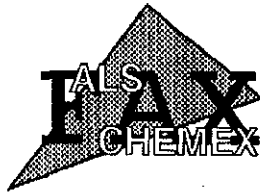
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 Invoice No. :10029419  
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 Account :HPQ

\* PLEASE NOTE

## CERTIFICATE OF ANALYSIS A0029419

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223570	205 226	< 5	30	4.0	590	0.2	8.99	260	0.5	< 2	0.09	< 0.5	13	76	15
223571	205 226	15	14	4.4	8140	0.2	7.22	690	< 0.5	< 2	0.02	< 0.5	11	60	11
223572	205 226	4300	>10000	360	2780	>100.0	0.88	80	< 0.5	60	0.01	13.0	316	150	1755
223573	205 226	575	7370	79	230	16.6	2.57	60	< 0.5	32	5.37	9.5	412	60	1955
223574	205 226	655	1285	>1000	10530	>100.0	0.59	40	< 0.5	64	5.17	>500	87	132	3450
223575	205 226	< 5	241	8.2	90	4.6	4.02	50	< 0.5	28	2.31	1.5	39	54	61
223576	205 226	85	115	3.0	20	1.0	7.15	80	< 0.5	< 2	0.14	< 0.5	140	139	47
223606	205 226	< 5	96	39	730	0.2	8.59	180	0.5	< 2	2.29	< 0.5	11	36	14
223607	205 226	< 5	25	18.0	220	< 0.2	5.28	160	0.5	2	18.10	< 0.5	17	19	26
223608	205 226	< 5	787	100	3870	0.6	1.14	40	< 0.5	< 2	9.01	< 0.5	35	45	6
223609	205 226	4970	28	49	48700	38.8	0.58	80	< 0.5	2	6.74	>500	5	43	1570
223610	205 226	105	9	0.8	90	2.0	4.18	530	< 0.5	2	0.13	2.0	63	144	8
223611	205 226	370	41	33	12780	27.2	1.14	100	< 0.5	6	10.80	165.5	4	68	3530
223612	205 226	3720	84	18.0	3430	29.2	1.05	130	< 0.5	Intf*	15.00	55.0	5	35	>10000
223613	205 226	5380	26	8.6	4660	9.2	1.29	70	< 0.5	8	21.3	119.0	5	20	1320
223614	205 226	40	97	15.5	530	4.2	7.19	200	0.5	< 2	0.29	5.5	13	78	126
223615	205 226	15	142	8.6	620	0.2	6.06	280	0.5	< 2	3.34	0.5	4	66	23
223616	205 226	< 5	61	10.0	470	0.6	6.85	450	0.5	< 2	1.25	1.0	9	60	27

CERTIFICATION: \_\_\_\_\_



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To: TECK EXPLORATIONS LTD.

350 - 272 VICTORIA ST.  
 KAMLOOPS, BC  
 V2C 1Z8

Project: H.R.  
 Comments: ATTN: G. EVANS

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 Invoice No. : I0029419  
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 Account : HPQ

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## CERTIFICATE OF ANALYSIS A0029419

SAMPLE	PREP CODE	Fe % (ICP)	K % (ICP)	Mg % (ICP)	Mn ppm (ICP)	Mo ppm (ICP)	Na % (ICP)	Ni ppm (ICP)	P ppm (ICP)	Pb ppm AAS	Sr ppm (ICP)	Ti % (ICP)	V ppm (ICP)	W ppm (ICP)	Zn ppm (ICP)
223570	205 226	4.13	3.00	0.34	80	< 1	0.36	7	740	32	200	0.28	132	< 10	28
223571	205 226	5.30	2.32	0.09	10	6	0.33	3	40	16	167	0.13	105	< 10	12
223572	205 226	18.50	0.36	0.04	35	7	0.02	18	80	9500	23	0.03	58	< 10	1800
223573	205 226	17.85	0.12	1.65	3310	16	0.06	20	220	312	145	0.05	38	< 10	1030
223574	205 226	8.16	0.26	1.79	5890	16	0.01	20	50	5710	476	0.01	13	< 10	>10000
223575	205 226	>25.0	0.14	2.54	3580	< 1	0.12	11	830	88	74	0.08	117	< 10	394
223576	205 226	14.35	0.29	0.98	250	7	4.25	39	390	24	73	0.17	120	< 10	86
223606	205 226	3.18	7.12	0.33	340	3	0.36	12	750	14	140	0.36	184	< 10	64
223607	205 226	2.78	3.04	0.51	1465	< 1	0.70	3	560	6	353	0.24	160	< 10	44
223608	205 226	22.0	0.81	0.11	675	40	0.07	6	150	10	314	0.06	49	< 10	56
223609	205 226	3.90	0.26	2.57	7970	< 1	0.02	< 1	120	>10000	460	0.01	6	< 10	>10000
223610	205 226	11.75	1.80	0.41	105	10	0.29	16	300	16	14	0.06	103	< 10	444
223611	205 226	5.95	0.52	4.52	>10000	< 1	0.02	< 1	120	>10000	134	0.03	26	< 10	>10000
223612	205 226	9.37	0.36	4.50	>10000	< 1	0.09	< 1	Intf*	8350	314	0.03	24	< 10	4760
223613	205 226	4.32	0.24	3.34	>10000	< 1	0.03	< 1	160	8070	330	0.03	24	< 10	9650
223614	205 226	5.78	1.69	0.46	400	58	2.13	51	660	76	187	0.44	263	< 10	334
223615	205 226	10.05	5.10	0.16	650	11	0.84	1	130	42	153	0.07	26	< 10	166
223616	205 226	8.26	5.29	0.32	180	4	0.67	2	270	22	133	0.12	59	< 10	266

CHEMEX LABS Alpha-FAX2

PAGE 003

CERTIFICATION: \_\_\_\_\_

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# ALS Chemex

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To: TECK EXPLORATIONS LTD.

350 - 272 VICTORIA ST.  
 KAMLOOPS, BC  
 V2C 1Z8

Project: HR  
 Comments: ATTN: G. EVANS

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 Certificate Date: 28-SEP-00  
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 Account : HPQ

## CERTIFICATE OF ANALYSIS

A0029996

SAMPLE	PREP CODE	Ag FA g/t	Cu %	Pb %	Zn %						
64009	212 --	412	-----	-----	1.08						
223551	212 --	497	-----	1.46	-----						
223555	212 --	-----	-----	-----	4.67						
223601	212 --	-----	2.37	-----	2.36						
223604	212 --	-----	-----	4.12	8.96						
223605	212 --	-----	6.24	-----	2.10						

CERTIFICATION: \_\_\_\_\_





**APPENDIX 3**  
**ANALYTICAL PROCEDURES**

# TECHNICAL INFO

## Geological Principles - Sample Preparation Procedures

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- [Contamination Control during Sample Preparation](#)
- [Sample Preparation Equipment](#)
  - [Drying Ovens](#)
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### Introduction

Geological samples are highly variable and encompass a broad range of sample types that includes soils, silts, drill core, rocks and panning concentrates. The purpose of sample preparation is to produce a small, dry and manageable sample suitable for laboratory scale analysis while at the same time ensuring that the prepared sample is homogeneous and fully representative of the original field material. Experience has shown that the potential risk for contamination is greater in the sample preparation process than in any other part of laboratory operations. For this reason particular care and attention must be paid to sample handling and there must be strict adherence to standard operating procedures and good work practices. The physical plant facilities must be designed for an orderly workflow, possess sufficient crushing and grinding equipment to allow for specialized usage, and have a comprehensive dust control system.

- For sample preparation procedures and prices, see the [Sample Preparation Services](#).



### Contamination Control during Sample Preparation

We take many steps to minimize the risk of cross contamination between samples during the preparation process. One of the most important steps is to sort and classify samples according to matrix type and expected metal concentrations as soon as they enter the laboratory. The samples will then be routed through the laboratory in different batch streams. Physically separated areas are maintained as much as possible so that, for example, concentrates and vegetation samples would never be processed in the same area.

Once samples are classified, they are prepared using equipment which has been designated for certain matrix types and expected metal concentration ranges. Equipment is color-coded and numbered so that it is clear for which sample type it is intended to be used.

In all our sample preparation laboratories, we have invested a considerable amount of time and energy in designing proper dust control systems. Our experience has shown that the fine dust which can otherwise collect will invariably contain trace amounts of gold and base metals. We are progressively updating all our sample preparation laboratories, for example by building enhanced dust control systems in which crushing and grinding equipment is virtually completely enclosed. The end result is an improved dust control system which reduces the risk of sample contamination and which provides a healthier work environment for our employees.

It is unfortunate that all machinery grinding surfaces impart some degree of metal content to samples during pulverization. As a result, there will always be some degree of contamination when crushing and grinding procedures are used. However at Chemex we have a great variety of grinding surfaces that vary widely in their chemical composition. We offer equipment made of hardened manganese steel, chrome steel or carbon steel as well as non-ferrous materials such as zirconia and tungsten carbide. Hence an explorationist can choose one of these options in such a way as to eliminate the possibility of contaminating a sample with an element of potential exploration significance.

- The issues of contamination from grinding surfaces, the elements imparted to the sample, and their likely concentration ranges, are discussed more fully in the [Contamination Introduced by Sample Preparation Equipment](#) section.



## Sample Preparation Equipment

The main equipment in use at Chemex consists of:

- crushers (roll, traditional jaw and oscillating jaw)
- pulverizers (small ring, large ring, plate)
- ball mills
- drying ovens
- an assortment of splitters, screens and homogenizing equipment

### Drying Ovens

The sample drying process is more critical than may appear at first. Many samples arrive at the laboratory sopping wet and drying time for these samples is invariably a major contributor to lengthened turnaround times. Hence it would be tempting to improve turnaround time by using blast furnace drying techniques. However there is a considerable risk to sample integrity by taking such an approach in that some samples will appreciably oxidize at higher temperatures (especially sulfides) and some potentially volatile elements (arsenic, antimony, mercury-all key pathfinder elements for gold exploration) will be lost at elevated drying temperatures. Of course, even if these elements are not of immediate interest, the samples will be rendered useless for any future analysis.

At Chemex we use two different drying temperatures and once again the choice of temperature depends on the sample classification. For rocks, rock chips, drill core and other "coarse" material with a relatively low surface area, we employ a drying temperature in the range of 110-120 deg C (230-250 deg F). Independent studies of these sample types have shown that the potentially volatile elements will not be lost at this temperature. However for soils, silts, sediments and other "fine" materials with a proportionately higher surface area, we limit the drying temperature to 60 deg C (140 deg F).

Our ovens are all large, gas-heated forced air furnaces; samples are pre-loaded onto moveable drying racks before being rolled into an oven. This avoids the potential contamination risk that is inherent in fixed shelving units. Large samples are placed into stainless steel trays to ensure efficient heat transfer and minimal drying times.

### Crushers

In recent years improvements have been made to the traditional jaw crusher by the introduction of the oscillating jaw crusher. These new crushers, built specifically for laboratory usage, provide enhanced crushing by ensuring that the sample receives continuous grinding as it passes between the plates. The end result is a finer product in a single step, typically >50% is -1mm whereas only about 10% is -1mm in the traditional jaw crusher. These new crushers are also much easier to clean and therefore chances of cross contamination between samples are reduced. We have replaced all our old jaw crushers with these improved oscillating crushers.

We also use roll crushers at Chemex as these crushers are ideal for processing larger reverse circulation drilling samples due to their higher throughput. Our roll crushers are fitted with vibratory feeders to ensure a smooth sample delivery at a more or less constant rate. One of the limitations of these crushers is that the rolls will physically separate when the material fed into the machines contains very coarse particles. Of course this will result in some coarse material passing through the rolls. A further disadvantage is that roll crushers are not as easy to clean as jaw crushers. However as we use roll crushers for samples that are typically large, the carryover should only amount to a fraction of a percent.

A third kind of crusher that Chemex employs is a ball mill used exclusively for the preparation of secondary reference materials in bulk.

- The ball mill, and the secondary reference materials that it produces, are described in greater detail in the Quality Assurance section.

## Pulverizers

At Chemex we use two different types of pulverizers, ring mills and plate pulverizers. Ring mills have become the industry standard in recent years. Basically they consist of a bowl which contains either a small puck and one or more rings, or a large saucer. Crushed samples are added to the bowl, the bowls are sealed and then subjected to centrifugal force by mechanical action. The puck and/or ring(s), being free to move inside the bowl, subject the sample to considerable grinding action, resulting in a very fine sample. Bowls are manufactured in different sizes ranging from 50 g capacity to 5 kg capacity. At Chemex we use two sizes primarily, 250 g and 2 kg. The bowls themselves are made of different materials including manganese steel, chrome steel, zirconia and tungsten carbide so that it is easy to avoid contaminating a sample with an element of potential interest.

The second type of pulverizer that we use is the vertical plate pulverizer. In these units, a stationary plate stands on end while the rotating plate is pushed into it from the side. In our pulverizers, even plate pressure is guaranteed by a unique pneumatic plate closure system; this system also allows for the two plates to separate completely when cleaning between samples, thus minimizing chances of sample contamination. Our plate pulverizers are typically fitted with a vibratory feeding system to prevent overfeeding of the sample which would result in a widened gap between the grinding surfaces. Vertical plate pulverizers are applicable to coarse gold projects because the plates are capable of breaking up soft gold nuggets and reducing its particle size, thereby producing less variance in the gold assays. Although the gold will initially "smear" on the plates, it will be subsequently ground off by the harder matrix material.

## Screens

Screens are used to sieve soil samples in order that the fine fraction can be analyzed. At Chemex we use stainless steel screens exclusively. Brass screens are a potential source of contamination for both copper and zinc, especially if the sample contains hard, abrasive particles.



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## Contamination Introduced by Sample Preparation Equipment

The intense grinding action produced by crushers and pulverizers results in wear metals being added to the samples being ground. The elements that are added will depend on the composition of the grinding surfaces. The amount of the elements added is harder to determine as it will depend on a number of factors including the hardness of the grinding surface, the hardness of the sample and the length of grinding time.

- The Table shows typical levels of contaminating elements that can be added for each type of grinding medium. It

must be stressed that these are typical ranges which may not apply to exceptional samples.

**Table: Contamination Levels Observed in Granite for Different Grinding Media**

<b>Composition of Pulverizer Rings or Plates</b>					
<b>Element</b>	<b>Manganese steel (ppm)</b>	<b>Chrome steel (ppm)</b>	<b>Carbon steel (ppm)</b>	<b>Zirconia (ppm)</b>	<b>Tungsten carbide (ppm)</b>
Chromium	2-10	20-500	5-25	<1	
Iron	0.2-1.5%	0.1-0.5%	0.2-1.5%	<10	
Manganese	10-100	5-20	10-125	<1	
Molybdenum	<1	1	1	<1	
Nickel	1-2	1-5	6	<1	
Lead		2	3	<2	
Vanadium		1	<1	<1	
Tungsten					30-300
Cobalt					10-100
Zirconium				30-300	
Hafnium				1-5	



## Sample Preparation Procedures

### Crushing

Samples that require crushing are dried at 110-120 deg C and then crushed with either an oscillating jaw crusher or a roll crusher. The Chemex QC specifications for crushed material is that >70% of the sample must pass a 10 mesh (2 mm) screen (see [Graph 1](#)). Crushing charges are based on the sample weight. The entire sample is crushed but only a portion of the crushed material is carried through to the pulverizing stage. That amount, typically 250 g to 1 kg, is subdivided from the main sample by use of a riffle splitter. In either case, a substantial part of the sample (the "reject") remains. Ordinarily we retain a 1-2 kg split of this reject, but if a client wishes to pay a small additional charge, then we will retain the entire reject.

- For more details, please consult the [Pulp and Reject Storage Policy](#) section.

### Pulverizing

A crushed split derived from the crushing process is pulverized using either a ring mill or a plate pulverizer. The size of the split is determined by the client based on the pulverizing procedure that is selected. Split sizes for manganese or chrome steel rings are typically 250 g to 1 kg; however split sizes for zirconia rings are 100 g and those for tungsten carbide rings are only 75 g. Because of the relative lightness of these latter two materials, the size of the sample to be pulverized must necessarily be reduced to these weights in order to achieve the Chemex QC specification for final pulverizing, namely that >95% of the sample be less than 150 mesh (106 microns) (see [Graph 3](#)).

For those samples which require enhanced homogeneity, such as samples which are known to exhibit coarse gold behavior, intermediate pulverization of the entire sample (or a representative split) is also available. The Chemex QC specification for intermediate pulverizing is that 90% of the sample must pass a 250 micron (-60 mesh) screen (see [Graph 2](#)).

### Screening

Soil and sediment samples are typically sieved through a -80 mesh (180 micron) screen and the fine fraction is retained for analysis. This procedure is satisfactory for smaller (i.e. 500 g or less) samples where the exploration target is base

metals. However, when gold is the exploration target, we recommend that the particle size of the minus fraction be further reduced using ring mill pulverization to 95% -150 mesh (106 microns) in order to obtain more reproducible gold data.

With today's emphasis on gold exploration, many "soil" samples weigh in at several kilograms or more. In this latter case, the samples often contain larger components such as pebbles or agglomerations of clay and other material. For samples like this, we recommend that after disaggregation the sample is sieved through a -10 mesh (2 mm) screen to remove the coarse material. Following this intermediate screening, the -10 mesh (2 mm) material is then split to about 500g using a riffle screen and then sieved through a standard -80 mesh (180 micron) to obtain a minimum of 150 g of fine material. We still recommend further ring mill pulverization if gold is the exploration target, for the reasons outlined above.

- Detailed flow sheets which outline our screening procedures for all sample weights are available. Please contact a Chemex Client Services representative for more information.

## Special Procedures

Vegetation and humus samples require special procedures because they are easily contaminated, difficult to reduce in particle size and awkward to homogenize. This type of sample tends to be highly variable, ranging from well-rooted humus to bits of tree trunk. All vegetation sample preparation is done in our main Vancouver laboratory because we have special facilities available. Samples submitted to branch offices will be shipped to the Vancouver laboratory and this may result in some extra shipping charges to the client if the weights are judged to be excessive.

- For more specific information on the preparation of your particular sample type, please contact a Chemex Client Services representative.



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## Composites

Composite samples are normally prepared on a volumetric basis and the composite is homogenized by mixing the samples in vials which are mounted in dual orbiting mixers. Composites can be prepared on a weight basis if desired but the charges are greater because the labor costs are significantly higher.



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## Quality Control Procedures for Sample Preparation

- Detailed information is provided in the [Quality Assurance](#) section.



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## Pulp and Reject Policy

Pulps are retained until the end of the calendar year and then clients are contacted in writing and asked to select one of three options:

- returning the pulp to the client
- continued storage subject to a warehousing charge
- discarding the pulp

Reject material can be saved in part or in total according to instructions received from the client. If no specific instructions are received, the Chemex default policy is to retain the entire reject. There is no charge for storage of a 1-2 kg reject split. The charges for storing the entire reject vary according to sample weight. We guarantee that we will retain the reject for a minimum of 90 days; in practice, most reject is retained until the end of the calendar year and clients are contacted to determine how they wish to dispose of the reject.

We can provide reports about your pulps and rejects at any time upon request. These reports will include information about Chemex workorder numbers, your project name or number, and numbers of samples.

Please note that when local tipping fees are significant, we reserve the right to bill clients for the cost of disposing rejects to landfill.



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# TECHNICAL INFO

## Multi-Element Packages - Trace Geochemical Analysis by ICP Spectroscopy

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- [Introduction](#)
- [G32 - 32 Element Partial Leach Multielement ICP Analysis](#)
- [G32m - 32 Element Partial Leach Package with Quantitative Low Detection Mercury](#)
- [The G9 Multielement ICP Packages](#)
- [The VG Multielement Package for Vegetation and Humus](#)
- [T24 - 24 Element Total Digestion Multielement ICP Package](#)
- [T27 - 27 Element Total Digestion Multielement ICP Package](#)
- [Quality Control Procedures for ICP Spectroscopy](#)
- [FAQs](#)



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### Introduction

Inductively-coupled plasma atomic emission spectroscopy (ICP spectroscopy) has been a highly successful and popular analytical technique for a number of reasons which have been outlined in the section entitled [Plasma Emission Spectroscopy](#).

- Several of the most successful packages that have traditionally been offered by Chemex are outlined below.



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### G32 - 32 Element Partial Leach Multielement ICP Analysis

The most important traditional ICP package in use at Chemex has been denoted G32 and has historically been our most popular and successful ICP package. Data for 32 elements are reported, giving the explorationist the widest possible range of information. Even though the leach has been designated "partial", it is still sufficiently strong to dissolve 18 of the elements in a quantitative manner. The remaining 14 elements are dissolved in a manner which is usually incomplete

- These elements are outlined both in our [Fee Schedule](#) and on our Certificates of Analysis.

In addition to offering the widest range of information about elemental concentrations, the [G32 package](#) is also the most economical of the large scale packages, thus providing extremely good value.

The [G32 package](#) has been designed for soils, silts, lake and stream sediment analysis. Rock characterization is better accomplished using the ICP package outlined below.

- For a complete list of G32 elements, detection limits, and upper limits, see the [Nitric Aqua-Regia Leach Packages \(ICP-32\)](#) section of the [1998 Fee Schedule](#).

Many laboratories offer some form of multielement ICP package roughly equivalent to the Chemex G32 package but subtle differences exist from one package to another and complete agreement between these various packages cannot necessarily be expected. Some of the features of the G32 package which should be borne in mind by explorationists are as follows:

### Digestion or Leaching Procedure

Chemex uses a nitric acid-aqua regia digestion for the G32 package. The use of pure nitric acid in the early stage of the digestion facilitates both the dissolution of sulfide minerals and the destruction of organic matter. Consequently the nitric-aqua regia digestion is stronger than a 3:1 HCl:HNO<sub>3</sub> aqua regia digestion or a 3:1:2 HCl:HNO<sub>3</sub>:H<sub>2</sub>O digestion used by other laboratories. Data produced with the Chemex G32 package is often fractionally higher than the data generated using weaker aqua regia systems. However, none of these partial leach digestion systems completely dissolves all elements, especially those shaded in yellow in the 1998 Fee Schedule. This issue is discussed in greater detail below. For explorationists requiring totally quantitative data, the Chemex T24 package described below offers an attractive alternative.

### Detection Limits

A brief glance at the list of detection limits in the G32 package shows that there is a wide variation from one element to another. Several different factors such as analytical sensitivity of an elemental spectral line and interelement interferences have a major effect on the detection limit offered. The G32 package represents a compromise, an attempt to offer the most meaningful detection limit for the largest number of elements.

### Accuracy and Precision

The precision of the G32 elements at the detection limits is +/- 100%. At concentration values 5 times higher than the detection limit, the precision is typically +/- 40%; at values 100 times the detection limit, the precision is typically +/- 10%. An explorationist who requires extremely precise data within the range of 1-5 times the detection limit of an element within the G32 package should consider using one of our ultratrace G32 package instead. These ultratrace packages have been designed to be quantitative and offer significantly lower detection limits.

### Interelement Effects

The concentration values of some elements in the G32 package are routinely corrected for interelement effects caused by spectral line overlap. Great care and attention is taken to ensure that these corrections are made properly. Certain major elements such as Al and Fe have significant effects on some trace element concentrations (e.g. Be), depending on the analytical wavelength that has been selected. Although these interelement effects can usually be compensated for, in extreme cases the effect may be sufficiently great as to prevent the measurement of a small number of elements as stated in our Fee Schedule.

### Evaluation of data for incompletely dissolved elements

Silicates, clays and resistant minerals are incompletely dissolved in all partial leach aqua regia digestion systems. Elements such as Al, Ba, Ti, Na and K (those shaded in yellow in the 1998 Fee Schedule will rarely be fully dissolved and so data for these elements will never match data generated by stronger digestion techniques such as total digestions or whole rock analyses.

### Cautionary Notes

The explorationist should keep in mind the comments made above regarding the digestion efficiency of the various aqua regia digestion systems. Concentration values for many elements, especially those that are incompletely dissolved, are more likely to be higher with a nitric-aqua regia digestion than with other weaker aqua regia digestions.

Professional opinion varies significantly on the potential usefulness of data derived from incompletely dissolved elements. Analysts have traditionally urged caution but at least one school of thought among exploration geochemists believes that much of this data may be potentially useful.



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## G32m - 32 Element Partial Leach Package with Quantitative Low Detection Mercury

The analytical sensitivity for mercury using ICP spectroscopy is adequate for some sample types but in many cases explorationists require a better sensitivity than the 1 ppm detection limit offered by conventional ICP spectroscopy. In the G32m package, we substitute a quantitative geochemical procedure for mercury (Chemex code 20). This procedure uses conventional cold vapor atomic absorption spectroscopy with a detection limit for Hg of 10 ppb, a one hundred fold improvement over that offered in the G32 package.



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## The G9 Multielement ICP Packages

### Introduction

Not all explorationists require the comprehensive information provided by the G32 and the G32m packages. As a result Chemex designed a number of condensed 9-element packages which offer quantitative data for the elements reported.

- For a complete list of elements for the various G9 procedures and prices, see the ICP-AES Multielement Analysis section of the 1998 Fee Schedule.

### The G9g Package

The G9g package includes pathfinder elements likely to be of interest to those explorationists searching for gold.

### The G9m Package

The G9m package contains the same 9 elements as the G9g package. The only difference is that in the G9g package, mercury is determined by ICP spectroscopy to a detection limit of 1 ppm, whereas in the G9m package, mercury is determined by cold vapor atomic absorption spectroscopy to a detection limit of 10 ppb.

### The G9b Package

The G9b multielement package has been designed to be of interest to those explorationists looking for base metals and the G9b package includes elements such as nickel, cobalt, iron and manganese instead of gold pathfinders.



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## The VG Multielement Package for Vegetation and Humus

The VG package consists of a suite of 33 elements (including gold) which has been designed to offer the best possible detection limits for the analysis of highly organic samples. The VG package uses both ICP spectroscopy and instrumental neutron activation analysis (NAA) to obtain exceptionally low detection limits, e.g. 0.1 ppb Au.

These low detection limits can only be obtained if the samples are highly organic vegetation or humus samples and this package is not appropriate even for soils or sediments due to increased interferences from the inorganic constituents of such samples.

- For a complete list of elements for the VG package and prices, please contact a Chemex sales and marketing representative.



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## T24 - 24 Element Total Digestion Multielement ICP Package

### Introduction

The Chemex T24 package has been designed to be complementary to the G32 package. Whereas the G32 package offers a partial leach, the T24 package includes a total digestion so that data reported for all 24 elements is considered quantitative. This package is considered most appropriate for rock characterization as it includes data for all major and minor elements except silicon.

- For a complete list of elements in the T24 package and prices, see the Triple-Acid Total Digestion section of the 1998 Fee Schedule.

### Digestion

The T24 package uses a total digestion in which the sample is completely dissolved using a mixture of hot, concentrated nitric, perchloric and hydrofluoric acids. In order for this digestion to go to completion, the acid mixture must be taken to dryness. This process ensures the best possible dissolution but also results in the loss of volatile elements such as arsenic, antimony and mercury. In addition, this digestion particular acid mixture results in the loss of silicon, an element not normally considered to be volatile. Obviously reliable data cannot be reported for these four elements with the T24 package.

To assist in the final dissolution of the sample residue, hydrochloric acid is added and then sample analysis is carried out in a dilute hydrochloric acid matrix.

This digestion will be "total" for most rock samples. Certain types of highly resistant minerals, for example zircons, may not be totally attacked. In these limited cases, we recommend that the whole rock fusion technique be used.

- For a complete list of elements using the whole rock fusion technique and prices, see the Chemex packages in the Whole Rock Analysis section of the 1998 Fee Schedule.

### Cautionary Note

Certain mineral species are capable of fully dissolving during the digestion process but because of their fundamental chemistry are prone to precipitation rather quickly. Barium, even if present in relatively low concentrations, is susceptible to precipitation and may also remove (co-precipitate) other elements such as silver and lead as it precipitates. Laboratory technicians are trained to watch for this phenomenon and corrective action is taken where possible by quickly analyzing solutions following the digestion process.

### Pricing

The T24 package yields substantially the same information as provided by whole rock analysis (with the exception of silicon) but also includes significant trace element information. Yet the total cost of the T24 package is half that of whole rock analysis and thus represents extremely good value for the budget-conscious explorationist.



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## T27 - 27 Element Total Digestion Multielement ICP Package

As noted in the section above, three elements of significant interest to explorationists, namely arsenic, antimony and mercury, are lost during the T24 digestion. Since these elements are frequently crucial pathfinder elements in the search for gold, we have included them in an expanded [T27 package](#). The T27 package includes the standard [T24 package](#) outlined above but with the addition of quantitative individual procedures for arsenic, antimony and mercury (Chemex codes [13](#), [22](#) and [20](#) respectively).

- For a complete list of elements in the T27 package and prices, see the [ICP-AES Multielement Analysis](#) section of the [1998 Fee Schedule](#).



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## Quality Control Procedures for ICP Spectroscopy

- Click here for details of the [Quality Control Procedures](#) in place for ICP-AES.



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## FAQs

**Why are my barium results by the T24 procedure lower than those that I got by your whole rock procedure?**

In the [T24 procedure](#), samples are digested using the triple acid combination of nitric, perchloric and hydrofluoric acids. A sample containing a significant amount of sulfides will produce sulfate ions during the digestion and this can occasionally cause the premature precipitation of barium as barium sulfate, resulting in low barium data. In the whole rock procedure, the samples are greatly diluted following the whole rock fusion and this helps prevent precipitation of barium.

**Why, instead of receiving data for thallium, did the certificate of analysis say "INTERFERENCE"?**

Thallium is an element that suffers from spectral overlap from iron. Occasionally the iron concentration is so high as to swamp the thallium signal. In this case, there is little that we can do but to report that an interference has prevented the measurement. If the thallium value is crucial to you, then we would propose the standard geochemical procedure ([code 39](#)) which is an AAS measurement.

**Couldn't you report As, Sb and Hg data from a T24 package anyway and let me decide how to use the data?**

We have looked at arsenic data after a [T24 digestion](#) and compared it with arsenic data generated by the optimized geochemical procedure by AAS ([code 13](#)). The data scatter was extremely wide-in some cases, most of the arsenic was lost, in others most of the arsenic remained. Under these circumstances we feel we would be reckless to report any data.

**I'm not really interested in all that data from partially digested elements. Can you simplify my certificates by eliminating all the partially digested elements?**

You bet we can. Just contact one of our [Client Services representatives](#) and we will make the necessary arrangements.

**Why do you have an upper limit on your G32 package? Some other labs don't have upper limits on their ICP packages.**

There are a number of reasons why we adopt this approach. The main one is our insistence on contamination control by sorting samples according to expected metal concentrations and routing them through separate batch streams. In this way we can provide better service for all clients by minimizing chances of cross contamination. We prefer that samples expected to exceed our G32 upper limits be analyzed by one of our ICP assay packages, A30 or A22, which have been especially designed for this purpose. The digestions for these packages take place in a physically separate part of the laboratory designed for handling higher grade samples. In addition, even though ICP-AES has linear calibration curves over several orders of magnitude, these curves cannot be extended indefinitely to higher concentrations. For best results it is preferable to prepare a more dilute solution as we do for the A22 and A30 packages.

**I would like to have arsenic reported in my G9b package. Can I ask for arsenic instead of iron?**

In choosing the elements that we allow to be substituted in our packages, we permit substitutions when the measurement procedure is identical for both elements. In the case of iron and arsenic, both are measured by AAS but they are made in fundamentally different ways on different equipment and the arsenic procedure is more costly. Hence we would not ordinarily allow this substitution. However it is likely that you could add arsenic at a significantly reduced rate if you discussed the matter with a Chemex [Client Services representative](#). Incidentally we do constantly review our packages in order to make sure that we are satisfying industry demand. Let us know if there are certain combinations you would like to see packaged together.



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## The Fire Assay-Gravimetric Procedure for Ore Grade Samples

The classic technique of gold measurement is the fire assay fusion followed by cupellation and a gravimetric finish (Chemex codes 996 and 997 primarily). This is still the preferred procedure for the analysis of high grade ores. There is no upper limit applied for these procedures but clients should note that the detection limit is significantly higher than for procedures which use spectroscopic measurement techniques.

## Fire Assay-Atomic Absorption procedures for Low Grade Ore and Exploration Samples

With the increase in the price of gold and the discovery of large low grade gold deposits throughout the world, many samples reach the laboratory which have "intermediate" levels of gold, that is in the range of 5-15 g/t (0.1-0.4 oz/ton). These samples are best analyzed using FA-AA procedures (Chemex codes 877, 398 and 998 primarily).

Exploration samples require a better detection limit than that offered by gravimetric procedures. The combination of a fire assay fusion with atomic absorption spectroscopy (AAS) offers the advantages of a large subsample together with a very sensitive analytical technique to yield detection limits in the range of 1-5 ppb (Chemex codes 100, 983 and 3993 primarily). The best detection limit of 1 ppb is provided by Chemex code 3993 which includes a fire assay fusion followed by a solvent extraction and then a final measurement using AAS. Because of the additional extraction step, the code 3993 procedure is more expensive than the code 100 and 983 procedures. However for explorationists looking for the best resolution of low level gold anomalies, this procedure is excellent.

## Advantages of the Fire Assay Process

- A large subsample (10-50g or more) can be taken for analysis, helping to ensure that the subsample is truly representative of the field material
- The fire assay fusion is considered to provide a "total" gold
- All samples are amenable to the fire assay procedure in the hands of a skilled assayer
- The fire assay procedure is universally accepted as the definitive method for the analysis of gold
- The fire assay fusion quantitatively dissolves and extracts the entire platinum metal group in addition to gold and silver.

## Limitations of the Fire Assay Process

- When a gravimetric finish is used, it is essential that the separation ("parting") of silver and gold is complete; if the silver is incompletely removed, then the gold results will be artificially high and the silver results will be low.
- Inquarting (the addition of a known amount of silver) is a normal procedure in the gravimetric analysis of silver and gold. In order to determine silver, the value of the inquart must be subtracted from the total silver weight. In the event that the samples contain low silver, the resulting gravimetric silver analyses can suffer from high uncertainty.
- A certain amount of silver (usually estimated to be in the range of 2%) is lost by volatilization during the cupellation process.
- When an atomic absorption spectroscopy finish is selected, the upper reporting limit is set at 0.5 oz/ton (15 g/t) and samples higher than this must be re-analyzed using a gravimetric finish.
- Samples containing coarse gold can give erratic results making it difficult to determine the true ore grade; however this problem is caused by sample heterogeneity rather than the fire assay process.
- Soil samples (typically -80 mesh, 180 micron material) can also give erratic results but again for the same reason.
- It can take many years of experience before a fire assayer has the necessary degree of skill and knowledge to flux difficult ore types.
- Some ores such as chromites and tellurides can be more difficult to fuse, resulting in the need to take smaller subsamples for analysis and consequently yielding higher detection limits than normal.



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## Alkaline Cyanidation



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## Limitations of Silver Analytical Methodology

In the determination of silver using acid digestions, the analyst must be aware that silver is not a particularly soluble element. Silver halides in particular are quite insoluble and silver is also prone to co-precipitate with other compounds such as barium sulfate or lead sulfate. Ordinarily an excess of hydrochloric acid is used to keep silver in solution by complexation. It is also advantageous to perform the silver analyses as soon as possible after sample digestion.

When silver is determined by ICP-AES, there can be a significant spectral interference from iron. If samples contain "normal" levels of iron, i.e. in the range of several percent, a successful correction can be made. However for samples containing elevated iron concentrations, we recommend that AAS techniques be used in preference to ICP. As part of our Quality Assurance program, we do carry out random AAS checks of ICP-generated silver data where it is suspected that elevated levels of iron may be present.

The limitations of the fire assay procedure have been discussed elsewhere on this website. The principal limitations in the measurement of silver relate to inquarting, the parting of silver and gold, and the volatility losses of silver during the cupellation process.



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## Quality Control Procedures for Silver

The quality control procedures in use for the fire assay process and chemical digestion procedures is outlined in the Quality Assurance section.



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## FAQs

### How do I know if my samples require a total digestion for silver assay?

If your samples contain silver halide minerals and originate in the U.S. Southwest or Mexico, then it may be necessary to use a total digestion silver assay (code 3386). We recommend talking to a Chemex Client Services representative regarding the analysis of a limited batch of test samples.

### When is an aqua regia digestion adequate for a silver assay?

The aqua regia digestion is ordinarily adequate for a reliable silver assay. However, if silver halide minerals are present, we recommend a total digestion. It is always possible to analyze a small test batch by both methods in order to confirm the validity of the aqua regia digestions.





**APPENDIX 4**  
**STATEMENT OF COSTS**

## STATEMENT OF COSTS

### 1. Wages

Graeme Evans - Geologist @ (Aug. 29,30,31 Sept 1,2,3,4,9,11,12) 10 days @ \$ 360.00/day	\$3600.00
Paul Baxter - Geologist @ ( Aug 30,31Sept 1,2,3,4,9,11,12) 9 days @ \$ 330.00/day	\$2970.00
Alex Christopher-Geologist @ (Aug.30,31 Sept.1,2, 4) 5 days @ \$360.00/day	\$2160.00
Randy Farmer-District Manager @ (Sept. 11, 12) 2 days @ \$420.00/day	\$ 840.00
Dr. John Thomson-Chief Geoscientist @ (Sept. 11,12) 2 days @ \$450.00/day	\$ 900.00

### 2. Accom. And Field Suplies

Lodging Stewart August-Sept 28 man days @ \$100/ man day (meals & accom)	\$3000.00
Field Supplies (Camp gear, food, field equipment)	\$ 150.00

### 3. Helicopter Costs

Vancouver Island Helicopters 206 @ \$910.00/hr (includes. Fuel) casual August 31,September 1,2,4,12 for a total of 8.4 hrs	\$7644.00
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### 4. Rock Analyses

52 rocks analyzed for Au geochem & 27element ICP total digestion @ \$29.36/sample	\$1526.72
rocks analyzed for 2 Au assays, 4 Ag assays, 3 Cu assays, 4 Pb assays, 8 Zn assays @\$8.26/sample assay	\$ 173.46
Sample Shipment via. Greyhound (Smithers to Vancouver)	\$ 118.00

**5. Report Writing & Compiling**

G. Evans 4 days @ \$360/day \$1440.00

S. Archibald -Draftsman 6 days @ \$170/day \$1020.00

Materials & Copy Costs \$ 140.00

**TOTAL COST \$25,682.18**

**APPENDIX 5**

**STATEMENT OF QUALIFICATIONS**

## STATEMENT OF QUALIFICATIONS

I, Graeme Evans, do certify that:

- 1) I am a geologist and have practiced my profession for the last nineteen years.
- 2) I graduated from the University of British Columbia, Vancouver, British Columbia with a Bachelor of Science degree in Geology (1983).
- 3) I am a member in good standing with the APEGBC as a professional geoscientist.
- 4) I was actively involved and supervised the Homestake Ridge program and authored the report herein.
- 5) All data contained in this report and conclusions drawn from it are true and accurate to the best of my knowledge.
- 6) I hold no direct or indirect personal interest, in the Homestake Ridge property which is the subject of this report.

  
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Graeme Evans  
Senior Geologist  
April, 2001



