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EPITHERMAL MINERALIZATION ON THE WATSON BAR PROPERTY (92/01E), CLINTON MINING DIVISION, SOUTHERN B.C.

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KEYWORDS: Watson Bar, Second-Ulcer claims, Zone V, low sulphidation, epithermal, gold, silver, arsenic, mercury, antimony, lead, zinc, Jackass Mountain Group, porphyry sills and dikes, thrust faults.

INTRODUCTION

This paper describes low-sulphidation epithermal gold-silver-base-metal mineralization at Zone V on the Watson Bar property (Second-Ulcer claims, Second prospect; MINFILE number 092O 051). Zone V is located south of Watson Bar Creek in the Camelsfoot Range on the west side of the Fraser River, approximately 40 kilometres north-northwest of Lillooet (Figure 1). The area is reached by following the all-weather Slok Creek (West Pavilion) logging road north from Lillooet to the 71 kilometre mark. An alternate access route is from Clinton via logging roads and the Big Bar ferry.

Mineralization at Zone V is hosted by a shallow southwest-dipping thrust fault which cuts feldspathic and volcanic lithic arenites of the Early Cretaceous Jackass Mountain Group. Drilling since 1989 has outlined a zone up to 35 metres thick which contains a stacked series of auriferous quartz-sulphide veins and carbonaceous shear zones. Zone V was estimated to contain a geological reserve of 136 962 tonnes grading 14.33 ppm gold at a 6.86 ppm cut-off, or 306 143 tonnes grading 8.13 ppm gold at a 1.71 ppm cut-off (J. Casey, private report for Stirrup Creek Gold Ltd., July, 1997). The thrust is marked by a two kilometre long, moderate to strong, induced polarization chargeabilty anomaly. At Zone I, located 800 metres to the south, similar Au-As mineralization has been intersected at the inferred down dip extension of the Zone V thrust fault, suggesting that these two zones may be part of the same structure.

Watson Bar Gold Belt

Although only Zone V was studied in detail for this paper, a review of regional geology and mineral occurrence maps indicates there is a pronounced southeast alignment of mineral prospects and geologic features which we call the Watson Bar gold belt. The Zone V prospect occurs near the southern end of this 25 kilometre long trend, which also includes the Mad (MINFILE number 092O 092), Buster (92O 055), Astonisher (92O 054), GB (92O 060) and several new or unnamed prospects (Figure 1). These structurally controlled mineral occurrences are all hosted by the Jackass Mountain Group on the southwest side of the Slok Creek fault, and are spatially associated with a series of porphyry bodies. At least five different styles of mineralization are recognized:

1. Iron carbonate-silica alteration zones. These occur as wide (>500 metres) and extensive (>1000 metres long) reddish-brown weathering zones that are marked by pervasive iron carbonate alteration, local chalcedonic silica, sericitic and clay alteration, sporadic to widespread As, Sb and Hg enrichment and spotty anomalous gold values. Examples include Zone IV and the rusty weathering cliffs in lower Madsen Creek and Watson Bar Creek.

2. Thrust-hosted quartz-sulphide mineralization. At Zone V, this consists of tectonic clasts and boudins of mineralized and unmineralized wallrock and auriferous quartz-sulphide veins surrounded by a highly deformed, carbonaceous fault gouge matrix. The Mad (Adit) occurrence (Lisle, 1988) may be analogous.

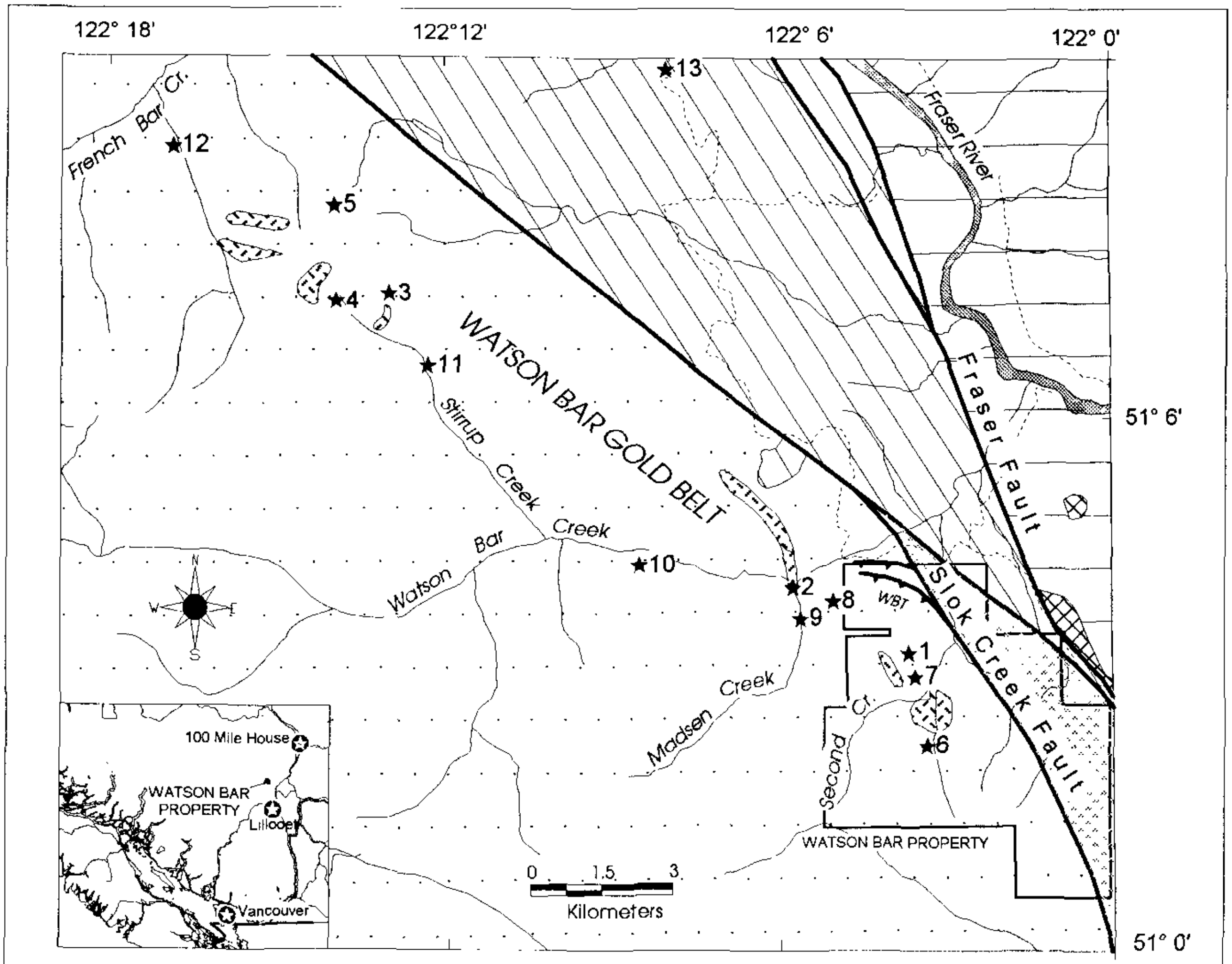
3. Intrusion-hosted quartz-sulphide veins. At Zone I, gold-bearing, quartz-sulphide veins, breccias and stockworks cut silicified and sericitized quartz-feldspar porphyry sills and adjacent sandstone containing carbonaceous shears. This mineralization may be a deeper, more proximal style of mineralization, perhaps the upper part of a buried porphyry system.

4. High-angle quartz-sulphide veins and stockworks. These occur as narrow (<1.5 metres) veins of quartz, quartz breccia and chalcedonic silica that carry gold with variable amounts of pyrite, arsenopyrite and other sulphides. The veins have sharp margins and thin envelopes of bleaching in adjacent wallrocks. They crosscut the bedding in the hosting sedimentary wallrocks at a high angle.

5. Weakly to moderately auriferous conformable zones. Sulphides occur in conformable veins, siliceous replacements and as disseminations in sandstone beds (Lisle, 1988).

History

The first recorded mineral discovery in the Watson Bar area was made in 1886 when two prospectors reported finding "some very heavy, lead-coloured rock" 11 kilometres up Watson Bar Creek on its south side. Assays showed that the rock contained no Au or Ag but a very large percentage of As (Minister of Mines Annual Report, 1886, p. 209). This occurrence probably corresponds to



NUM	MINFILE_NO	NAME	ELEMENTS
1	092O 051	Zone V (Second, Ulcer)	Au, Ag, As, Pb, Zn, Cu, Sb, Hg
2	092O 092	Mad (Adit)	Au, Ag, As, Pb, Zn, Cu, Sb, Hg
3	092O 054	Astonisher	Au, Ag, As, Sb, Hg, Cu, Pb, Zn
4	092O 055	Buster (Trimble)	Sb, Ag
5	092O 060	GB	Hg, Sb, As, Pb, Zn
6	n/a	Zone IV	As, Sb, Hg
7	n/a	Zone I	Au, Ag, As
8	n/a	Watermelon	Au, Ag, As, Sb, Pb, Cu
9	n/a	YR	Au, As, Sb, Hg, Cu, Zn
10	n/a	MS 1-4	Au, Ag, As
11	n/a	Stirrup Creek Placer	Au
12	n/a	Rod	Au, As, Pb
13	092O 091	Big Bar (Sheep, Edge)	Au, Ag, Cu, Zn, As, Hg

Geological Boundary (approximate)

Fault - High Angle

Watson Bar Thrust (WBT)

★ Metallic Mineral Occurrence

Miocene to Pliocene

Chilcotin Group: vesicular and amygdaloidal basalt flows and associated sediments

Eocene

Ward Creek Assemblage: andesite to rhyolite flows, tuffs, breccia; volcaniclastic sedimentary rocks

Eocene and/or Cretaceous

Hornblende diorite, granodiorite, hornblende-feldspar porphyry, and quartz-feldspar porphyry

Cretaceous

Spences Bridge Group: porphyritic andesite and dacite flows and breccias

Middle Lower Cretaceous

Jackass Mountain Group: feldspathic and volcanic lithic arenite , siltstone, *argillite, polymictic conglomerate*

Permian to Lower Jurrassic (?)

Cache Creek Complex: grey to green phyllite, ribbon chert, greenstone

Figure 1. Generalized geology map of the Watson Bar gold belt (after Tipper, 1978, and Hickson *et al.*, 1994) showing precious metal occurrences and the location of the Watson Bar Property.

one of several arsenopyrite showings on the current Mad claims (Figure 1).

Placer gold was discovered on Stirrup Creek at the north end of the belt during World War I, and although exact production figures are unknown, Warren (1982) estimated that approximately 3000 to 5000 ounces of gold was produced by about 1940. Old placer workings in Watson Bar Creek probably correspond to this period also, and small scale placer mining continues to the present day. Since 1924, prospecting for the bedrock source of the gold in the headwaters of Stirrup Creek has resulted in the discovery of the Buster (Sb, Ag), Astonisher (Au, Sb, As, Hg, Cu), GB (Hg, Sb, Pb, Zn) and several other minor showings (Lisle and McAllister, 1989).

In May 1980, E & B Explorations Inc., staked the Carolyn 1-8 claims over the Madsen and Second Creeks area and identified several large alteration zones of silica and carbonate, with sporadic stibnite, arsenopyrite, pyrite, cinnabar and other sulphides (Price *et al.*, 1981; Livingston, 1982). Follow-up work outlined numerous As, Hg and Au soil anomalies including one over the Zone V area. Following a 1982 release of government stream sediment survey data which showed anomalous Cu, As, Au and Hg in the area, Utah Mines Ltd. staked the Mad 1-11 claims to the west of the Carolyn group. The Carolyn claims later lapsed and the ground was restaked in 1986-87 as the Second-Ulcer claims (Watson Bar property) by R.M. Dürfeld and J.A. McClintock, and as extensions to the Mad property by Utah Mines Ltd.

The Watson Bar property was optioned by Cyprus Gold (Canada) Ltd. in 1987 which conducted soil sampling, geological mapping and induced polarization surveys to define 14 targets. In 1988, test pitting and trenching of gold-arsenic soil anomalies at Zone V discovered a shallow dipping zone of quartz veins containing visible gold (McClintock and Dürfeld, 1988). The first drill hole, WB-89-1 intersected the vein zone 20 metres downdip of the trench and assayed 4 metres grading 24.5 ppm Au and 67 ppm Ag, as well as several deeper zones of lower grade mineralization (Dürfeld, 1990). Cyprus Gold (Canada) Ltd. further explored Zone V and other targets with trenching and drilling before relinquishing the property in 1992. A 91 tonne bulk sample grading 39.74 ppm Au was mined from the Zone V trench and processed at Westmin Resources' Premier Mill at Stewart in 1993-94.

The current operator, Stirrup Creek Gold Ltd., optioned the property and drilled 14 holes at Zone V in 1996 (Dürfeld, 1996). A further 11 holes were drilled on Zones I, V, X and XI in 1997 and exploration is continuing.

REGIONAL GEOLOGICAL SETTING

The Watson Bar gold belt is hosted by clastic sedimentary rocks of the Early Cretaceous Jackass Mountain Group (JMG) which forms part of the accreted Methow terrane. The belt occurs southwest of the Slok Creek fault (SCF), a southeast-trending structure that merges with the Fraser Fault near Lillooet (Figure 1). To the northeast of the SCF are andesites and dacites of the Cretaceous Spences Bridge Group and andesite flows and tuffs and bentonitic sediments of the Eocene Ward Creek Assemblage (Trettin, 1961, Hickson *et al.*, 1994).

The JMG is a shallow to moderately southwest-dipping package of volcaniclastic sedimentary rocks which is at least 5000 metres thick. It was probably deposited in a submarine fan setting on the margin of the Tyaughton Basin, a 150 kilometre long, southward-narrowing synclinorium (Trettin, 1961; Kleinspehn, 1985; Hickson *et al.*, 1994). The Watson Bar gold belt is mainly underlain by the informally named "Member 3" of Hickson *et al.* (1994) which comprises thick-bedded to massive, medium to coarse-grained feldspathic and volcanic lithic arenite with intercalated pebble conglomerate, siltstone and argillite.

Coincident with the gold belt is a southeast trending belt of small stocks, dikes and sills which intrude the JMG (Figure 1). These intrusions range in composition from diorite to rhyodacite and are most commonly granodiorite. They are commonly porphyritic but are locally medium-grained and equigranular in texture. Phenocrysts are generally hornblende and/or plagioclase, and less commonly quartz. The intrusions are locally deformed and weakly altered. On the Watson Bar property the largest stock is about 1 kilometre in diameter. The intrusions have not been radiometrically dated but field relationships suggest they are post-Early Cretaceous and pre-Eocene in age.

The SCF has been interpreted to be a high-angle splay of the Fraser Fault with latest motion being strike slip (Hickson *et al.*, 1994). The paucity of Eocene strata west of the fault suggests that at least some of the movement was post-Eocene with a minimum, east-side-down displacement of 1000 metres. To the northwest, near French Bar Creek, the SCF disappears under Tertiary volcanic rocks (Tipper, 1978).

South of Watson Bar Creek, the SCF cuts the Watson Bar thrust (WBT), an imbricate zone of south southwest-dipping thrust faults mapped by Hickson *et al.* (1994). The WBT is described as a highly disrupted, iron stained zone, approximately 500 metres thick. It is exposed between the 72 and 75 kilometre marks on the West Pavillion road. where it consists of boudinaged sandstone blocks surrounded by sheared and contorted carbonaceous material (Figure 2). Here, the WBT strongly resembles the mineralized thrust at Zone V. Tectonic indicators suggest north or northeasterly directed movement on the structure. To the west, near Madsen Creek, the sheared carbonaceous material is uncommon and it appears the WBT either dies out, is covered by overburden, or is focused into a few narrow thrust planes which have not yet been identified. The easterly orientation of the WBT suggests that it may be an accommodation structure associated with movement on the Fraser fault system (J.M. Journeay, personal communication, 1993, cited in Hickson *et al.*, 1994).

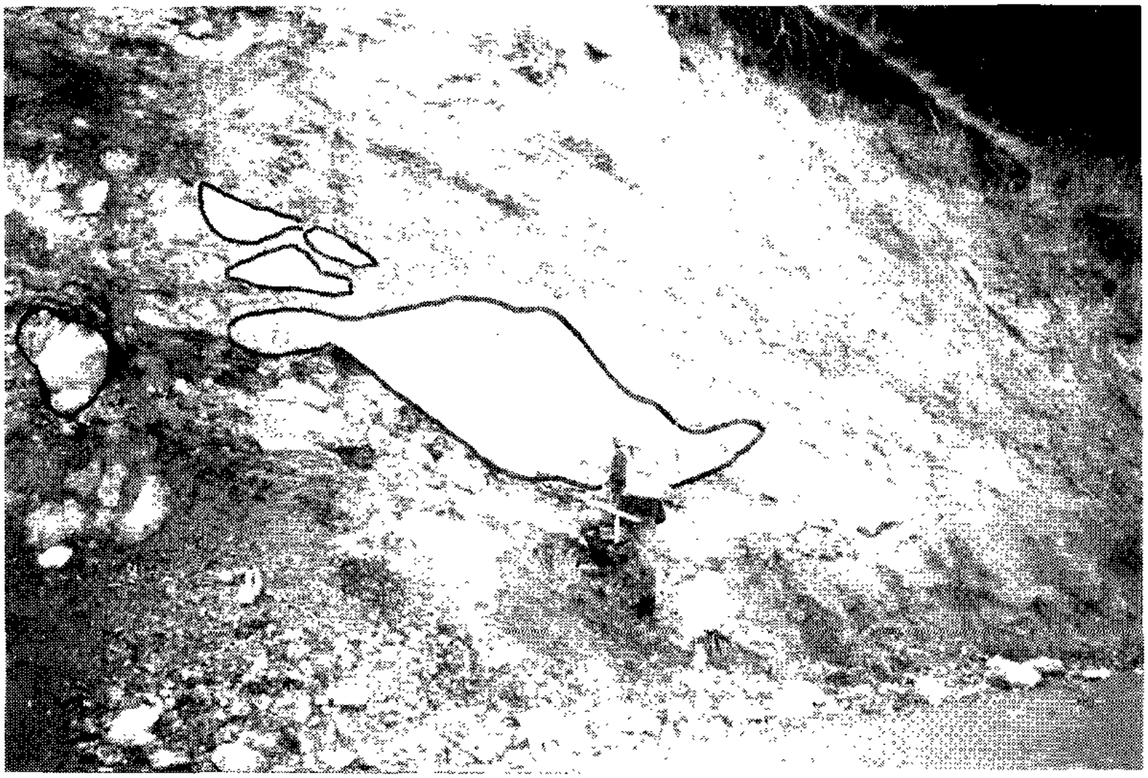


Figure 2. Photograph of Watson Bar thrust fault showing blocks of sandstone (white) surrounded by contorted carbonaceous gouge (grey). Roadcut at 72.5 kilometres, West Pavilion road.

GEOLOGY OF WATSON BAR PROPERTY

The Watson Bar (Second) property has been mapped at a scale of 1:5000 by Dürfeld and McClintock (1987), McClintock and Dürfeld (1988), Dürfeld and Jackson (1990), Dürfeld (1990, 1992) and Read (unpublished data). All petrographic descriptions presented here are summarized from unpublished thin and polished thin-section reports done by J. G. Payne for Cyprus Gold (Canada) Ltd. or by R. C. Wells and J.F. Harris for Stirrup Creek Gold Ltd. X-ray diffraction (XRD) results for four samples were provided by M. Chaudry (personal communication, 1997). The following description refers to the immediate area of Zones V, IV and I.

Structure and Lithologies

Bedding in the JMG at the property strikes southeasterly (130 degrees) and dips shallowly (15-30 degrees) to the southwest. In the vicinity of Zone V, the JMG consists mainly of thick-bedded to massive, grey to greyish-green, fine- to medium-grained, altered feldspathic arenite, siltstone and minor argillite and conglomerate. Peripheral to Zone V, many of the sandstone/siltstone units contain calcite veins and/or secondary carbonate in the matrix.

In thin-section, the arenites are seen to be grain-supported and composed mainly of 0.1-1.0 millimetre detrital grains of feldspar, lesser quartz, biotite, and lithic fragments in a secondary matrix of calcite, ankerite, sericite, biotite and chlorite. Conglomerates are matrix supported and polymictic with intrusive and volcanic clasts up to 10 centimetres in diameter.

At least six sills and several small dikes intrude the sandstone succession at the Zone V occurrence (Figure 3). The intrusions are porphyritic, containing phenocrysts up to five millimetres in length of plagioclase and/or hornblende. Quartz phenocrysts are locally present. The sills range in thickness from 2 to 15 metres and have a similar strike and dip to the mineralized zone. Dikes in the area are steeply dipping with strikes trending roughly north or east to southeasterly. The dikes and sills are fresh to weakly altered; altered varieties are mottled, greenish-grey, weakly to moderately sericitized and chloritized, and weakly calcareous. Plagioclase is altered to fine sericite, clay and carbonate and hornblende is partially replaced by chlorite, carbonate and fine opaques. At Zone I, quartz-feldspar porphyry sills have been intersected by drillholes at about the same stratigraphic level as the Zone V thrust. Here they are moderately sericitized, silicified and locally mineralized with weakly auriferous (500-2440 ppb Au) quartz-arsenopyrite-pyrite veins. At Zone IV, a porphyry border phase of the stock has iron carbonate alteration and fine calcite veins cutting it.

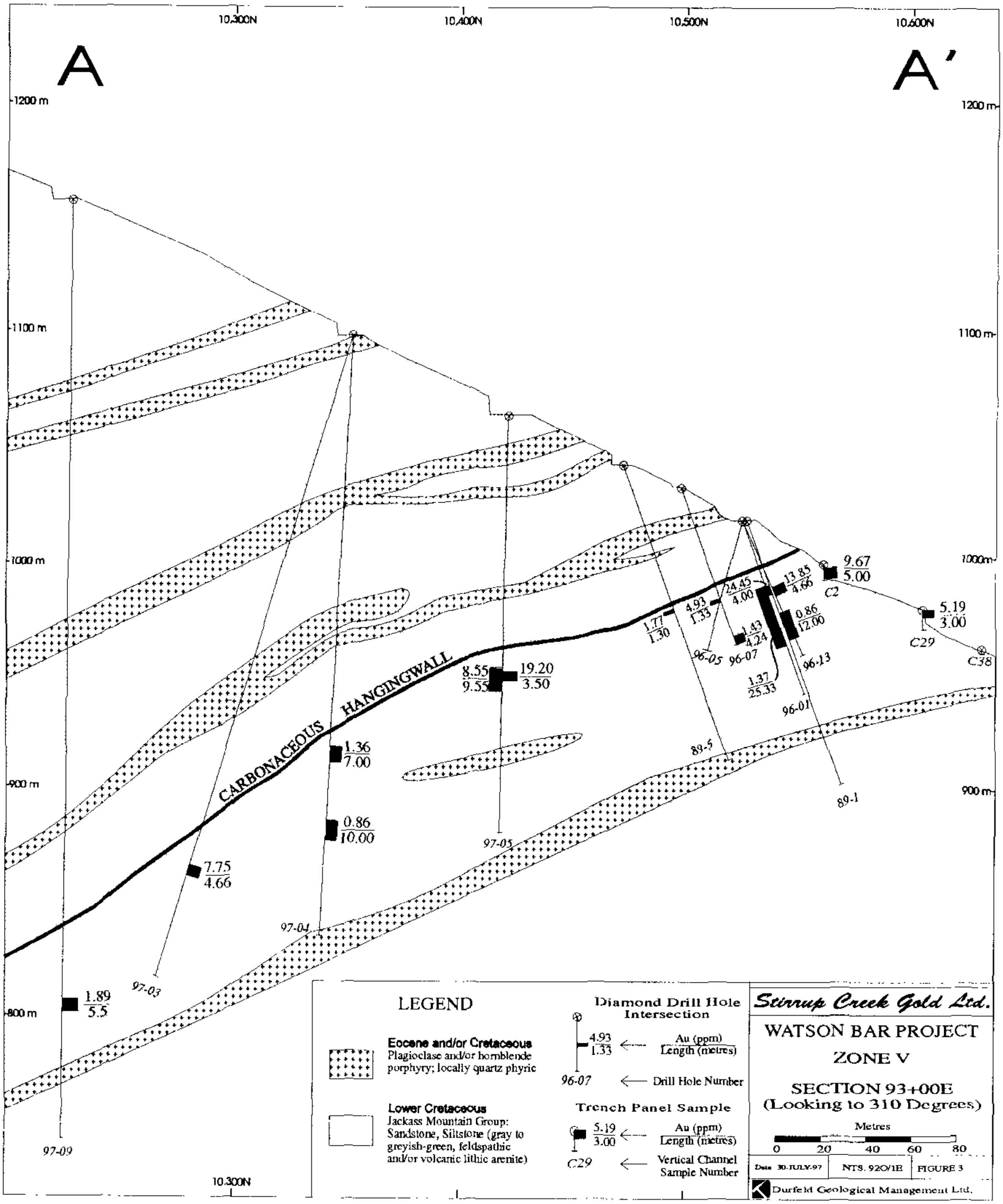


Figure 3. Cross-section 93+00E through Zone V (looking northwest).

Alteration

Wallrock alteration at the Watson Bar property includes locally developed pervasive zones of carbonate, sericite-pyrite and silica alteration, together with some biotite, argillic and propylitic alteration. The identification of these alteration types has been aided by x-ray diffraction analyses (XRD) and by whole rock analyses presented in Table 1.

Carbonate Alteration

At Zones I and IV, large areas (>500 metres wide) of the sandstone are brown weathering due to pervasive iron carbonate and/or dolomite alteration, and calcite is common on fractures. Similar, extensive zone of iron carbonate alteration are also seen in the Madsen Creek and Watson Bar drainages to the northwest. Although calcite or dolomite may be present as a minor constituent of quartz veins at Zone V, wallrock directly adjacent to these veins is generally not carbonate-rich, probably due to later overprinting by more advanced alteration types. Above and below the mineralized zone, however, strong pervasive calcite-iron carbonate alteration is present. Thin-section examination of drill core specimens indicates that feldspar grains and matrix are altered to fine carbonate, sericite, chlorite, and possibly clay.

Silicification

In addition to the auriferous quartz-sulphide veins and stockworks described above, there is local pervasive replacement by massive chalcedonic quartz. At Zone IV, small zones (up to a few metres wide) of chalcedonic silica with quartz-calcite-realgar-arsenopyrite-stibnite veins and weakly anomalous gold values are present, and occur within a broad iron carbonate alteration zone. Whole rock analysis shows this rock to be mainly composed of silica, aluminum, iron, magnesium and calcium, a composition which is consistent with quartz, dolomite, iron carbonate and mica minerals (sample GR97-44, Table 1).

Sericite-Pyrite Alteration

Sericite-pyrite alteration occurs as selvages adjacent to auriferous quartz-carbonate-sulphide veins. It generally lacks carbonate minerals, suggesting it has overprinted and replaced the earlier, more widespread carbonate alteration. Muscovite has been identified by XRD in black carbonaceous material, and in light grey "clay" alteration. In thin-section, sericite is seen replacing both detrital grains and matrix in the sandstones, and pyrite occurs as subhedral to euhedral grains up to 0.3 millimetres in size. In general, intrusive rocks at Zone V show only weak sericite-chlorite-carbonate alteration, however, porphyry sills mineralized with quartz-arsenopyrite-pyrite veins in the deeper part of Zone I to the south show pervasive quartz-sericite-pyrite alteration and are locally silicified.

Argillic Alteration

Zones of pervasive argillic alteration of sandstone have been identified in the main trench at Zone V. Pale grey to white, mineralized sandstone adjacent to cockscomb quartz veins is rich in silica, aluminum and potassium (samples GR97-48, 49, Table 1). An XRD analysis of sample GR97-48 indicates that illite/muscovite, quartz, scorodite, and kaolinite-smectite are present. In addition, an unweathered, clay-altered sample, taken from DDH 97-05, contains muscovite/illite, kaolinite and pseudorutile. Small patches of similar argillic alteration are exposed in road cuts at Zones I and IV. These contain white clay or kaolinite alteration adjacent to silicified zones within larger zones of pervasive iron carbonate alteration. A sample of clay-altered rock from Zone IV is high in Al_2O_3 and SiO_2 (sample GR97-43, Table 1) and XRD analyses indicates that the minerals quartz, kaolinite, scorodite and chlorite are present. Some of the kaolinite in surface exposures was probably formed by weathering rather than hypogene processes.

Biotite Alteration

At Zone V, minor brown biotite occurs as both detrital grains and in the sandstone matrix. However, it is not clear if the biotite in the matrix represents minute detritus, is a hydrothermal alteration related to the nearby mineralization, or is a weak hornfels related to the porphyry sills and dikes.

Mineralization

Geometry and Structure

Zone V consists of an assemblage of bedding-parallel shears, brecciated quartz-sulphide vein material, gouge, carbonaceous material and altered and unaltered sandstone blocks. It varies from a few metres to as much as 35 metres in thickness, strikes southeasterly and dips shallowly southwest, conformable with the local strike and dip of the sandstone bedding.

The upper plane of the zone is marked by sheared, pyritic, carbonaceous material and is undulating in cross-section (Figure 3), ranging in dip angle from 15 to 35 degrees but averaging 20-25 degrees. To date the zone has been defined by trenching and drilling over a strike length of 150 metres and a dip length of 350 metres. In the main trench (Figure 4), the zone consists of a numerous tectonized blocks of quartz-sulphide vein material, altered and mineralized wallrock and unmineralized sandstone country rock, all surrounded by contorted and sheared carbonaceous material and gouge. Individual unaltered sandstone blocks are locally boudinaged and show rounding, milling and rotation (Figure 4). Most blocks are ellipsoid and have an apparent northerly elongation.

Table 1. Whole rock geochemical data, Zones I, IV and Watson Bar Property.

Element	Units	Method	Sample # / Zone / Lab.	GR97-43	GR97-44	GR97-46	GR97-47	GR97-48	GR97-49	GR97-53	GR97-54
			Zone	IV	IV	V	V	V	V	I	I
SiO2	%	XRF1	COM	67.97	53.61	81.92	83.69	69.08	66.72	46.35	58.35
TiO2	%	XRF1	COM	1.21	0.18	0.02	0.02	0.51	0.97	0.82	0.89
Al2O3	%	XRF1	COM	20.72	4.65	0.95	0.84	16.18	17.83	17.48	19.21
Fe2O3	%	XRF1	COM	0.43	6.03	5.53	4.37	2.05	1.95	5.66	7.85
MnO	%	XRF1	COM	0.01	0.16	0.03	0.02	0.01	0.01	0.09	0.11
MgO	%	XRF1	COM	0.16	4.73	1.31	0.68	1.24	1.24	3.5	0.11
CaO	%	XRF1	COM	0.15	11.78	0.17	0.19	0.19	0.22	7.26	2.03
Na2O	%	XRF1	COM	0.01	0.01	0.02	0.02	0.15	0.08	0.02	0.04
K2O	%	XRF1	COM	0.28	0.31	0.11	0.06	4.33	4.71	0.09	0.16
P2O5	%	XRF1	COM	0.11	0.05	0.02	0.02	0.03	0.13	0.24	0.28
Ba	%	XRF1	COM	0.01	0.04	0.01	0.01	0.04	0.05	0.01	0.02
LOI	%	FUS	COM	8.89	17.48	5.32	4.9	4.48	5.12	18.39	10.78
Total	%	SUM	COM	99.95	99.03	95.41	94.82	98.29	99.03	99.91	99.83

Notes:
Steel mill grinding @ GSB
XRF1 = Fused Disc - X-ray fluorescence
Ba* = Fused disc analysis for XRF calibration (use with CAUTION)
COM = Cominco
FUS = Fusion

Sample descriptions:

GR97-43	Trench grab - white clay
GR97-44	Trench grab - silicification+realgar+arsenopyrite+pyrite veins
GR97-46	Trench grab - bladed quartz vein
GR97-47	Trench grab - bladed quartz vein
GR97-48	Trench grab - grey, clay-altered wallrock
GR97-49	Trench grab - grey, clay-altered wallrock
GR97-53	Surface grab - limonite-weathered grey-green rock
GR97-54	Surface grab - limonite stained arkosic sandstone

Table 2. Trace element geochemical data, Zones I, IV and V, Watson Bar Property.

Element	Units	Method	Lab.	Detection	GR97-43	GR97-44	GR97-45	GR97-46	GR97-47	GR97-48	GR97-49	GR97-50	GR97-52	GR97-53	GR97-54	GR97-55	GR97-56	GR97-57
				Zone	IV	IV	IV	V	V	V	V	V	V	I	I	V	V	V
Au	PPB	INA	ACT	2	<2	<2	44	42300	39400	3000	3570	71200	52100	88	62	3900	10400	10700
Ag	PPM	TICP	ACM	0.5	0.6	< .5	1.2	54.2	77.5	2.1	3.3	26.8	103.5	< .5	< .5	9.3	1	11.9
Al	%	TICP	ACM	0.01	10.27	2.33	1.45	0.32	0.22	7.7	8.83	0.88	0.45	9.11	9.69	5.25	7.11	0.49
As	PPM	INA	ACT	0.5	2200	2400	6100	39000	30000	11000	9500	100000	45000	210	110	32000	61000	40600
Ba	PPM	TICP	ACM	1	65	395	24	35	10	357	486	61	26	94	116	314	55	23
Bi	PPM	TICP	ACM	5	< 5	< 5	< 5	84	76	< 5	5	29	121	< 5	< 5	27	< 5	20
Ca	%	TICP	ACM	0.01	0.11	7.35	8.75	0.02	0.02	0.09	0.12	0.14	0.02	4.85	1.41	2.08	4.77	0.04
Cd	PPM	TICP	ACM	0.4	< .4	0.4	< .4	5.2	3.5	2.2	1.3	5.5	8	0.4	< .4	6.3	< .4	2.8
Co	PPM	INA	ACT	1	<1	3	3	<1	2	<1	<1	<1	<1	25	22	8	11	1
Cu	PPM	TICP	ACM	2	11	59	54	434	482	96	27	824	518	45	40	127	14	6
Fe	%	INA	ACT	0.01	0.36	4.07	3.76	3.65	2.9	1.33	1.46	17.2	4.48	3.72	5.21	4.11	7.95	4.46
Hg	PPB	FLA	ACM	10	12465	4095	10440	855	1360	160	225	3735	1175	1135	1065	1005	225	265
K	%	TICP	ACM	0.01	0.24	0.25	0.22	0.08	0.06	3.29	3.8	0.41	0.13	0.08	0.13	1.71	2.63	0.16
Mg	%	TICP	ACM	0.01	0.04	2.62	3.67	0.01	0.01	0.39	0.48	0.06	0.02	2.12	0.1	0.68	1.08	0.04
Mn	PPM	TICP	ACM	5	56	1164	832	20	19	36	51	8	13	686	870	363	982	18
Mo	PPM	INA	ACT	1	<2	<2	<2	<17	<9	<1	<1	<1	<1	<1	<1	<11	<24	<19
Na	%	INA	ACT	0.01	0.07	0.06	0.07	0.03	<0.01	0.1	0.13	0.11	0.12	0.08	0.08	<0.01	<0.02	<0.01
Ni	PPM	TICP	ACM	2	< 2	6	5	3	4	2	2	< 2	4	29	28	18	21	4
P	%	TICP	ACM	0.01	0.059	0.017	0.015	0.01	0.008	0.018	0.066	0.066	0.013	0.113	0.124	0.051	0.071	0.003
Pb	PPM	TICP	ACM	5	< 5	23	266	6213	23184	519	288	14440	15574	15	8	494	52	1042
Sb	PPM	INA	ACT	0.1	220	380	250	78	70	14	20	240	82	4.6	2.5	29	62	46
Se	PPM	INA	ACT	3	<3	<3	<3	13	17	<3	<3	20	11	<3	4	6	<3	5
Se	PPM	UTIC	ACM	3	n/a	n/a	n/a	15.5	20.4	<3	n/a	28.2	25.4	n/a	n/a	14.3	<3	13.6
Ti	%	TICP	ACM	0.01	0.73	0.1	0.05	< .01	< .01	0.21	0.56	0.01	< .01	0.49	0.52	0.18	0.2	0.01
Tl	PPM	UTIC	ACM	2	n/a	n/a	n/a	10.7	7.6	3.3	n/a	10.9	17.9	n/a	n/a	15.1	<2	13.1
V	PPM	TICP	ACM	2	206	65	41	7	5	82	191	30	10	202	234	82	127	8
W	PPM	INA	ACT	1	18	<2	<1	<1	<4	<1	<5	<1	<1	<1	<1	<1	<1	<1
Zn	PPM	TICP	ACM	2	6	70	135	149	89	41	38	271	243	86	66	491	28	312

Notes:
Fe*, Cr = Possible Fe & Cr contamination from grinding
INA = Thermal neutron activation analysis
TICP = HCLO4-HNO3-HCl-HF digestion - inductively coupled plasma emission spectroscopy
UTIC = Aqua regia digestion - ultratrace inductively coupled plasma emission spectroscopy
FLA = Flameless AAS
ACT = ActLabs, Ancaster, Ontario
ACM = ACME Analytical

Sample descriptions:

GR97-43	Trench grab - white clay
GR97-44	Trench grab - silicification+realgar+arsenopyrite+pyrite veins
GR97-45	Trench grab - chalcedonic silica+scorodite
GR97-46	Trench grab - bladed quartz vein
GR97-47	Trench grab - bladed quartz vein
GR97-48	Trench grab - grey, clay-altered wallrock
GR97-49	Trench grab - grey, clay-altered wallrock
GR97-50	Trench grab - gouge+grey-altered wallrock - high Au (3.4 oz/ton)
GR97-52	Trench grab - bladed quartz+scorodite+galena+arsenopyrite
GR97-53	Surface grab - limonite-weathered grey-green rock
GR97-54	Surface grab - limonite stained arkosic sandstone
GR97-55	Drill hole grab, DDH97-06@186.5 m, quartz vein+graphitic rock
GR97-56	Drill hole grab, DDH 97-03@244.33 m, graphitic sheared rock+massive arsenopyrite+cubic pyrite
GR97-57	Drillhole grab, DDH 97-06, 113.5 m, quartz vein and white (clay) wallrock

Locally, gently south-dipping, coarsely bladed cockscomb quartz-sulphide veins are separated by thin gouge layers (Figure 5). These veins appear to be sygmoidal tension veins, however, it is unclear whether the veins are pre-shear in age or whether they developed in dilational zones during the thrusting movement. In other places, greyish-white clay-altered sandstone is cut by a stockwork of coarsely bladed, cockscomb, auriferous quartz veins (Figure 6). Overall, this zone of shearing and brecciation is interpreted to be a north or northeast-directed thrust fault, and could represent the upper plane of the Watson Bar thrust.

Drill hole cross-sections also suggest, in a larger sense, that the carbonaceous/quartz-sulphide zone is an undulating, anastamozing series of parallel, conformable thrusts (Figure 3). However, there are typically two distinct mineralized zones that locally merge to form one thick zone up to 35 metres thick (Figure 3). The upper zone is typically richer in Au and is situated from five to ten metres below the carbonaceous hangingwall and is less than ten metres in thickness. The top of the lower zone lies from 20 to 30 metres beneath the upper plane and it can be as much as fifteen metres thick.

A contoured plan of Au grade times thickness in drill intersections shows that there are two or three trends of gold enrichment and/or thickening of the mineralized zone (Figure 7). These trends have northerly, easterly, and southeasterly azimuths. These enriched zones may be due to smearing and/or elongation of the gold mineralization due to the north or northeasterly directed shearing. Alternatively, they may represent unrecognized cross faults which could have acted as channelways for mineralizing fluids.

Mineralogy

Gold at the Zone V trench occur in the following settings: (1) in deformed, fractured, coarse-bladed, drusy, cockscomb quartz-carbonate-sulphide veins, (2) in black carbonaceous gouge material which contains broken-up quartz-sulphide veins, and (3) less commonly, in bleached, clay-altered sandstone which locally forms wallrock to the quartz veins. Analyses for gold and other metals are presented in Table 2.

Visible gold is seen locally in the quartz veins, and free gold can be panned from scorodite-rich quartz vein material taken from the main trench (Figures 5, 6). The quartz veins grade up to 233.8 ppm Au in grab samples (Dürfeld, 1996). Individual veins are generally less than 20 centimetres in width and consist of bladed, cockscomb quartz crystals up to 5 centimetres in length and interstitial carbonate and sulphides. The quartz is commonly deformed and brecciated and contains abundant coarse-grained euhedral arsenopyrite, pyrite and lesser galena, sphalerite and chalcopyrite (samples GR97-46, 47, 57, Table 2). Gangue minerals are predominantly quartz with lesser calcite and/or dolomite. The bladed habit of the quartz crystals suggest that they are pseudomorphs after early formed calcite and this is one feature suggesting it developed in an epithermal environment.

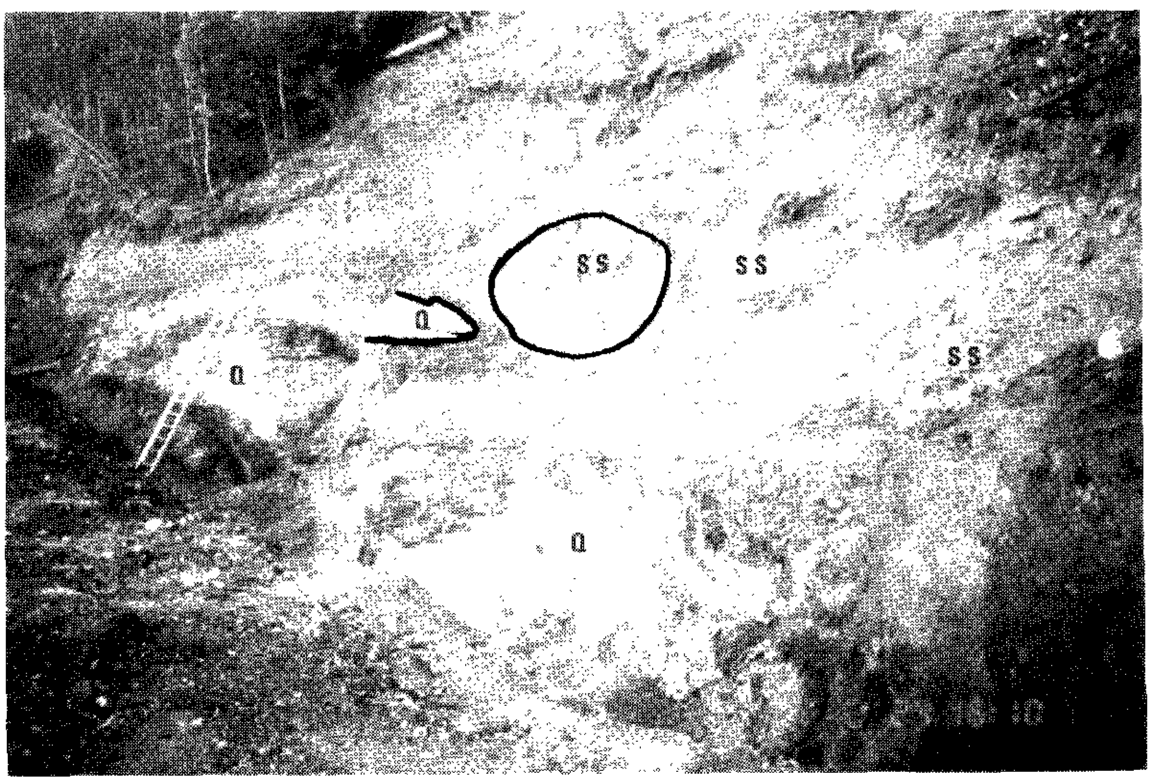


Figure 4. Zone V trench, looking south. Note rounded, milled blocks and boudinaged beds of unaltered sandstone (SS) and quartz-veined and clay-altered sandstone (Q) surrounded by sheared carbonaceous material (black).

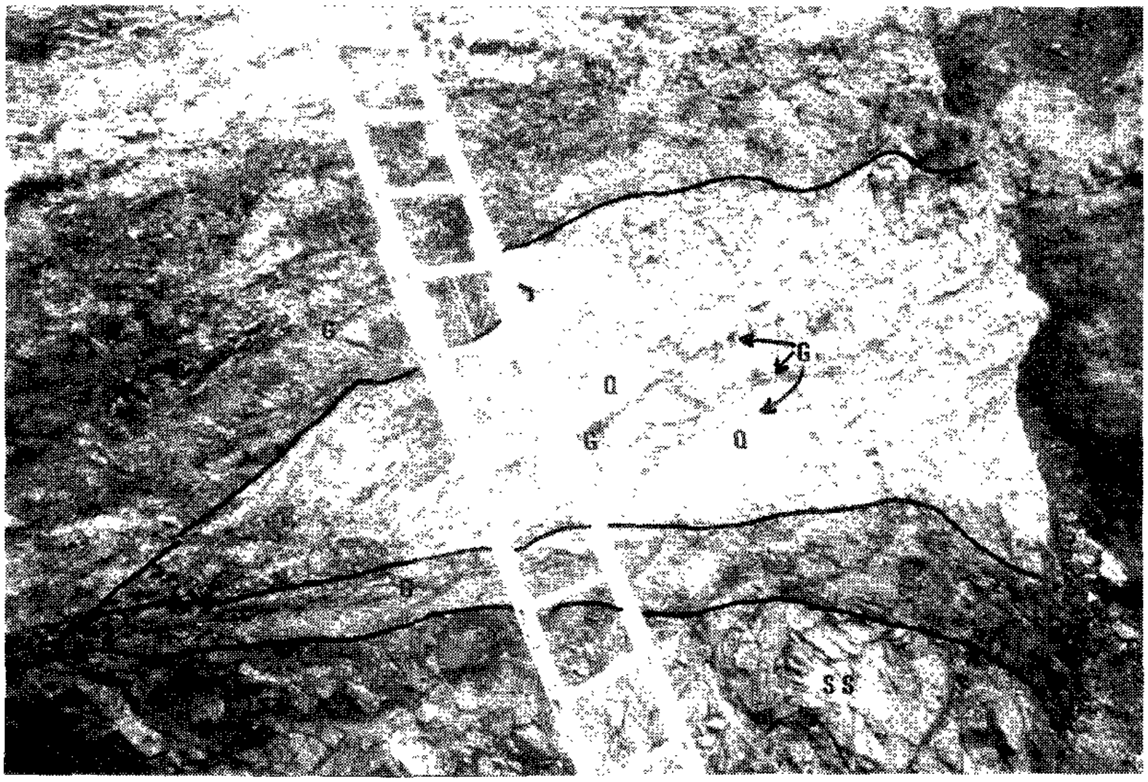


Figure 5. Zone V trench, looking southwest. Note coarsely bladed, cockscomb, auriferous quartz-sulphide veins (Q) separated by dark grey, contorted carbonaceous gouge (G). Lower bed is relatively unaltered sandstone (SS).

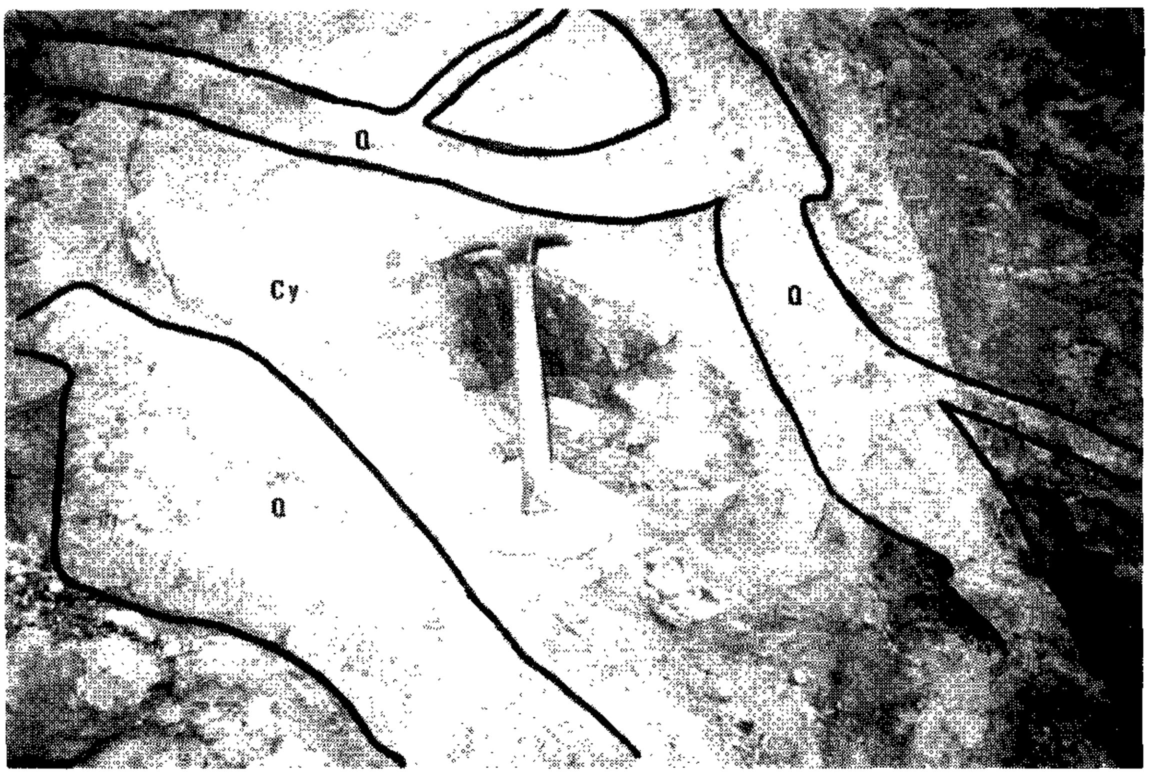


Figure 6. Zone V trench, looking southwest. Note stockwork of auriferous cockscomb quartz-sulphide veins (Q) cutting bleached, clay-altered sandstone (Cy).

Ore-grade gold values also occur in various types of gouge including black, foliated carbonaceous material that often contain fragments of fractured quartz-sulphide vein together with disseminated fine grained pyrite and arsenopyrite (sample GR97-56, Table 2). An XRD analysis from DDH 97-08 indicates that graphite, muscovite, chlorite, and quartz are present, with possibly some realgar and ankerite.

Gold values also occur in the greyish-white, clay-altered sandstone wallrock lying adjacent to quartz veins (samples GR97-48 and 49, Tables 1 and 2; Figure 6). Whole rock data show these rocks to contain abundant SiO_2, Al_2O_3, Fe_2O_3, and K_2O. This is consistent with XRD analyses indicating the presence of illite/muscovite, quartz, scorodite, kaolinite-smectite and pseudorutile.

LITHOGEOCHEMISTRY

Most drill core from the Second-Ulcer property has been subjected to comprehensive fire assays and multi-element ICP analyses and these results are presented by Dürfeld (1992, 1996). A review of these data shows that in addition to gold, the mineralization at Zone V contains high quantities of silver (to >200 ppm), arsenic (to >10000 ppm) and lead (to >1%). Locally, the gold-rich zones may be moderately to highly enriched in bismuth (to 329 ppm), cadmium (to >100 ppm), copper (to 3216 ppm), antimony (to 225 ppm), zinc (to >1%), and tungsten (to 61 ppm). The Ag/Au ratio at Zone V is variable, ranging between 0.1 and 25.3 but averages 2.0, based on 47 fire assays from drill core.

The highest gold, silver and associated metal values in Zone V correlate with the quartz-carbonate-sulphide veins, carbonaceous material and gouge. In general, the content of all metals increase sharply below the hangingwall of the uppermost, thick, brecciated, quartz and sulphide-bearing, carbonaceous thrust fault zone in each hole. In most holes there are upper and lower mineralized zones separated by up to 20 metres of barren, weakly to unaltered sandstone. In some holes, consistently anomalous gold values (>500 ppb) extend for as much as 35 metres, across the entire thrust zone.

As part of this study, a small number of multi-element geochemical analyses were completed on mineralized, weakly mineralized and unmineralized samples collected from Zones V, I and IV (Table 2). Mineralization at Zone V is highly enriched in Au, Ag, As and Pb, and moderately enriched in Sb, Cu, Zn, Cd, Bi, Se, Tl and Hg.

By contrast, the altered rocks from Zone IV contain high levels of Sb and Hg but only weak to moderate amounts of As, Pb and Zn and background values in Au, Ag and Cu. The high Sb and Hg values and the presence of chalcedonic silica and kaolinite alteration suggest that Zone IV formed part of a epithermal hot spring system, and perhaps lay above the level where an enrichment in Au-Ag-Cu-Pb-Zn values could be expected.

Intrusive sills in Zone V are generally devoid of anomalous metal values, although 800 metres to the south, at Zone I, drillholes have intersected mineralized sills at the same stratigraphic position as Zone V. These sills are sericitized and silicified quartz-feldspar porphyries and are cut by auriferous quartz-arsenopyrite-pyrite veins and carbonaceous material.

DISCUSSION

The Zone V gold-silver-base metal occurrence is a structurally controlled, low sulphidation, epithermal deposit similar to those described by White and Hedenquist (1995). Evidence for this origin include (1) the predominant occurrence of gold in coarsely bladed, cockscomb, cavity-filled quartz-carbonate-sulphide veins, (2) the association with sericite-pyrite and local clay (illite, smectite, kaolinite) wallrock alteration, and (3) the consistent association of Au-Ag-As-Pb with local zones of moderate to highly anomalous Bi, Cd, Cu, Hg, Sb, Se, Tl, W, and Zn values. The deposit is unusual in its occurrence in a thrust fault zone, its feldspathic arenite host rocks, and the abundance of carbonaceous material. In addition, its Ag/Au ratio of about two is anomalously low for epithermal deposits which are generally more silver-rich.

The timing of mineralization in relation to intrusion of porphyry sills, thrust faulting and alteration is so far poorly constrained. In the Watson Bar gold belt regionally extensive iron carbonate alteration is spatially, and possibly temporally, associated with a belt of small porphyry bodies. Sills at Zone V are unmineralized, only weakly altered, and exhibit no obvious association with the gold mineralization. However, at Zone I, to the south, similar quartz-feldspar porphyry sills are silicified, sericitized and cut by auriferous quartz-sulphide veins. Therefore, we believe that the main phase of Au mineralization in the area is genetically related to the sills.

The thrusting event at Zone V is probably in part older or coeval with, and in part younger than the mineralization. Some of the veins have the appearance of sygmoidal tension veins which have grown in place during movement on the thrust (Figure 5). These veins dip shallowly south, are oblique to the thrust surface, and consist of cockscomb quartz-carbonate-sulphide veins separated by thin gouge layers. The cockscomb quartz veins are delicate and it seems unlikely that blocks of this material could have remained intact during extensive thrusting. Other evidence, however, suggests that some of the thrust movement took place after mineralization, such as the presence of (1) brecciated vein material in sheared carbonaceous gouge, and (2) large, rounded and milled blocks of unaltered sandstone intermixed with blocks of altered and mineralized rock (Figures 5, 6). Although the amount of movement is unknown, the upper plate of the thrust apparently moved in a northerly or northeasterly direction. Thus, the source of the mineralized blocks was probably to the south or southwest of the current Zone V drilling.

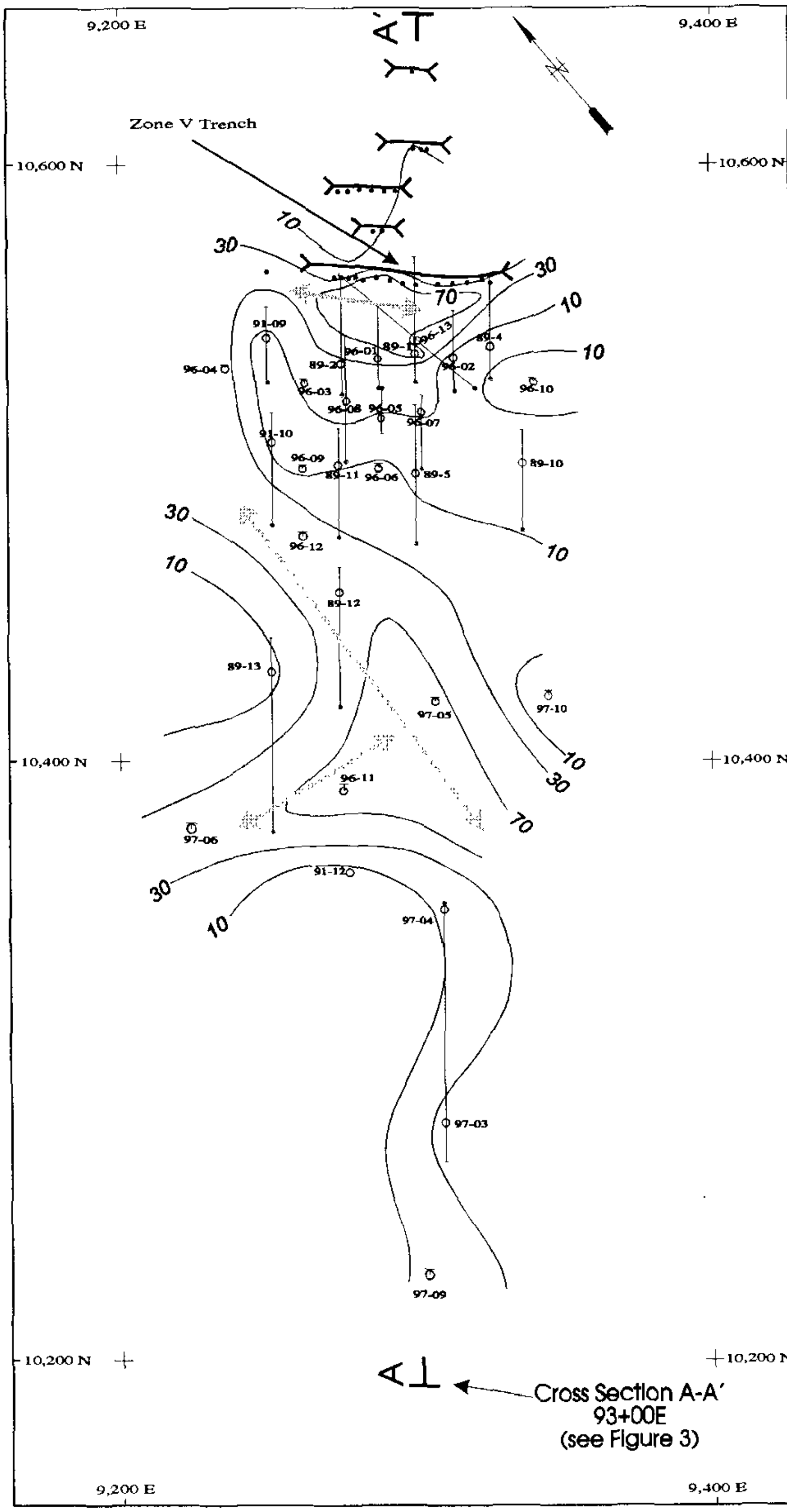


TABLE OF DRILL INTERSECTIONS

Drill Hole	Length (metres)	Gold (ppm)	ppm x metres
89-1	4.00	24.45	97.8
89-2	8.50	1.64	13.9
89-4	0.60	3.08	1.9
89-5	1.30	1.77	2.3
89-10	1.00	0.46	0.5
89-11	6.00	0.66	4.0
89-12	10.00	3.58	35.8
89-13	1.00	1.48	1.8
and	4.00	0.78	3.1
91-09	2.00	0.31	0.6
91-10	0.60	16.00	9.6
91-12	3.00	2.96	8.9
96-01	25.33	1.37	31.5
96-02	2.00	4.26	8.5
96-03	18.33	0.77	14.1
96-04	6.00	5.32	31.9
96-05	5.00	1.65	8.2
96-06	5.33	2.10	11.2
96-07	1.33	4.93	6.6
and	4.24	1.43	6.1
96-08	20.33	1.18	24.0
96-09	1.00	4.11	4.1
96-10	0.66	25.83	17.3
96-11	3.66	23.84	87.3
and	4.00	1.33	5.5
96-12	1.33	9.38	12.5
and	8.33	4.11	34.3
96-13	4.66	13.77	64.2
97-03	4.66	7.75	36.2
97-04	7.00	1.36	9.6
and	10.00	0.86	8.6
97-05	9.50	8.55	81.1
incl.	3.50	19.20	67.2
97-06	5.00	6.48	32.4
incl.	*1.00*	*25.68*	25.7
and	1.00	1.40	1.4
and	4.00	1.12	4.5
97-09	5.50	1.89	10.4
97-10	1.00	0.65	0.7

Legend

Surface Trace of Diamond Drill Hole

Pierce Point of Drill Intersection

Location of Trench Channel Sample

Trench

Trend of enhanced grade times thickness values

Drill Hole Plan Showing Contoured Grade x Thickness

Contour Intervals:

10
30
70

(ppm Au x metres)

Stirrup Creek Gold Ltd.

ZONE V
WATSON BAR PROPERTY

DRILL HOLE PLAN

Metres
0 20 40 60

Date: 28 OCT-97 | NTS: 92O/1E | FIGURE: 7

Durfeld Geological Management Ltd.

Figure 7. Grade times thickness plot of drill hole pierce points in Zone V showing northerly, easterly and southeasterly enrichments.

CONCLUSIONS

This study has the following implications for exploration at Zone V and the Watson Bar gold belt:

•Low sulphidation, epithermal precious-metal mineralization, comprising the Watson Bar gold belt, occurs over a 25 kilometres long area. Regionally, the occurrences are spatially associated with small intrusive bodies and widespread iron carbonate alteration. On a local scale, however, some occurrences such as the Zone V mineralization, are associated with sporadic sericite-pyrite and clay alteration which overprints the older iron carbonate alteration. These more advanced alterations are a better guide to gold mineralization.

•The mineralization discovered at Zone V indicates that thrust faults are an excellent structural host for mineralization in the Watson Bar gold belt. The Watson Bar thrust and other low angle structures in the belt have the potential for similar mineralization.

•A strong association exists between the auriferous quartz-sulphide veins and sheared carbonaceous material at Zone V. It is possible that the carbon has acted as a chemical trap for gold and other metals. This carbonaceous material may represent sheared argillaceous sedimentary rocks, or alternatively, it may have formed through hydrothermal transportation and re-deposition of carbon during or prior to gold mineralization.

•Barren silicification and kaolinite alteration with anomalous Hg, Sb and As at Zone IV may represent epithermal mineralization formed at a very high level. Blind epithermal deposits containing Au, Ag, Cu, Pb, and Zn may underlie these barren alteration zones.

•Mineralization discovered at Zone V provides evidence that the Watson Bar gold belt has the potential for hosting both high-grade, bonanza veins, as well as bulk tonnage gold deposits.

ACKNOWLEDGEMENTS

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