

Atlin  
880410

Yellow Jacket

ANALYTICAL CHEMISTRY SECTION  
-ES LABORATORY

DRILL CORE  
REPORT OF ANALYSIS

CLIENT: S. BALLANTYNE

PROJECT: 79000

SAMPLE NO:	104N 859518	859 104N00859 859519	104N -520	859 -521	// -522	// -523	// -524	// -525	// -526	104N 859527	104N 859503
02	% : 50.5	27.0	39.8	36.5	34.8	56.6	38.1	41.5	41.3	43.0	3.69
02	% : 1.76	0.33	0.02	0.01	0.01	0.02	0.01	1.63	0.10	0.01	0.04
203	% : 14.0	3.53	0.85	0.61	0.54	1.41	0.78	14.6	1.97	0.91	0.82
203T	% : 13.6	26.6	3.84	5.41	7.11	4.33	6.74	9.31	6.98	7.42	4.81
203	% : 2.5		0.0	1.5	2.0	0.8	0.9		3.3	1.8	0.0
0	% : 10.0		3.5	3.5	4.6	3.2	5.3		3.3	5.1	4.5
0	% : 0.21	2.24	0.17	0.12	0.13	0.09	0.11	0.10	0.11	0.07	0.18
0	% : 5.24	2.67	14.6	24.7	35.4	25.3	29.9	12.5	28.9	39.3	19.2
0	% : 5.74	11.4	16.0	6.95	0.63	2.65	4.45	4.62	6.47	0.21	28.3
20	% : 4.96	0.34	0.01	0.01	0.01	0.01	0.01	3.53	0.01	0.01	0.02
0	% : 0.44	1.08	0.05	0.03	0.01	0.03	0.03	0.99	0.01	0.02	0.12
10T	% : 2.3	5.0	1.1	1.3	3.2	6.1	2.7	5.6	4.8	11.7	
2T	% : 0.5	9.8	24.5	25.9	20.7	4.1	18.9	4.3	11.2	0.4	43.0
05	% : 0.14	2.22	0.01	0.01	0.01	0.02	0.01	1.20	0.01	0.02	0.02
	% : 0.72	1.04	0.24	0.16	0.02	0.00	0.58	1.30	0.00	0.03	0.37
PPM :	70	48000	30	20	10	0	50	1400	20	30	70
PPM :	0.8	3.0	0.3	0.2	0.1	0.2	0.3	1.8	0.3	0.1	0.6
PPM :	45	31	67	71	100	55	81	37	80	110	60
PPM :	41	58	1500	1400	960	1400	1700	360	2100	2800	1400
PPM :	83	49	26	29	48	26	33	390	78	77	18
PPM :	6	740	4	2	4	5	4	110	7	6	5
PPM :	36	120	1200	1400	2100	990	1300	110	1400	1700	1200
PPM :	200	60	16	5	9	7	9	7	1	5	97
PPM :	300	110	38	33	38	27	42	200	60	41	59
PPM :	3.3	9.1	0.1	0.0	0.1	0.3	0.1	2.0	0.3	0.1	0.3
PPM :	120	1900	52	55	53	48	59	70	60	83	120
TOTALS	99.1	98.4	101.1	101.6	102.4	100.5	102.1	101.4	101.8	103.0	100.4

REMARKS:

- \* ALL ANALYSIS BY ICP, EXCEPT FE, H2O, CO2T, CO2, C, S AND LOI BY CHEMICAL METHODS.
- \* FE203 IS CALCULATED USING  $FE203 = FE203T(ICP) - 1.11134 * FE0(VOLUMETRIC)$ .
- \* ICP-MJ1 DATA ARE OBTAINED ON 0.5 G OF SAMPLE FUSED WITH LITHIUM METABORATE, DISSOLVED IN 5% HNO3 AND DILUTED TO 250 ML.
- \* ICP-TR1 DATA ARE OBTAINED ON 1.0 G OF SAMPLE (ACID + FUSION OF RESIDUE) DISSOLVED IN 10% HCL AND DILUTED TO 100 ML.

Note: This ICP analysis is based on a total dissolution before the different finishes.

*control reference*  
*quartz - iron carbonyl*  
*quartz - magnetite carbonyl*  
*quartz - talc magnetite*  
*quartz - talc magnetite carbonyl*  
*quartz - talc - carbonyl*  
*quartz - magnetite - carbonyl*  
*quartz - magnetite*  
*Yellow Jacket magnetite*  
*just brought by bit lost.*  
*Outcrop*  
*hydroxide Yellow Jacket*

## LOCAL GEOLOGY

IN THE ATLIN AREA THE MOST STRIKING ASPECT OF GOLD MINERALIZATION, AS SEEN IN OUTCROP EXPOSURES, IS ITS ASSOCIATION WITH QUARTZ AND A PERVASIVE CARBONATE ALTERATION ENVELOPE.

ECONOMIC CONCENTRATIONS OF GOLD ARE FOUND IN QUARTZ-FILLED TENSION GASHES OR QUARTZ STOCKWORK-LIKE VEINLETS WHICH MAY PINCH AND SWELL OR DISAPPEAR BOTH ALONG STRIKE AND DOWN DIP. PROBABLY OF GREATER IMPORTANCE ARE THE PERSISTENT QUARTZ-VEIN SYSTEMS OF UP TO 1 - 2 m IN WIDTH TRACEABLE IN SOME CASES FOR 2 Km ALONG STRIKE. FINE CHALCEDONY IS SOMETIMES PRESENT AS RIMS ON BRECCIA FRAGMENTS OR AS OPEN SPACE FILLINGS IN THE VEINS AND ADJACENT ALTERATION ENVELOPE. ALL OF THESE QUARTZ SYSTEMS OCCUR IN AND AROUND FAULTS AND/OR SHEARS OR CONTACTS BETWEEN ULTRAMAFICS, ANDESITES-GREENSTONES OR DYKES. THIS COULD BE INTERPRETED AS INDICATIVE OF FLUID CONDUIT CHANNELING OF MINERALIZING HYDROTHERMAL? SOLUTIONS.

CARBONATIZATION IS MOST OBVIOUS IN THE ULTRAMAFIC ROCKS ALTHOUGH IT IS ALWAYS ALSO PRESENT WHERE THE VEINS CONTACT ANDESITE OR GREENSTONE. USING A TERM DEFINED BY SOVIET GEOLOGISTS SUCH AS GOUCHARENKO (1970), BOYLE (1979) DESCRIBED HEAVILY CARBONATIZED, SERICITIZED AND PYRITIZED ULTRAMAFIC ROCKS AS LISTWANITES. RECENT WORK BY BUISSON AND LEBLANC (1985) USE THE SPELLING LISTWAENITE. IN OUR OPINION THE TERM SHOULD NOT BE USED IN THE ATLIN GOLD CAMP. THE TYPICALLY INTENSELY CARBONATIZED ULTRAMAFICS ARE QUARTZ-TALC-CARBONATES WITH MINOR GREEN CHROMIUM MUSCOVITE (MARIPOSITE-FUCHSITE?) AND CHROMITE BUT THEY CONTAIN VERY LITTLE PYRITE.

THE ALTERED ULTRAMAFICS SHOW A WIDE DIVERSITY OF MINERALOGICAL, TEXTURAL AND COMPOSITIONAL DIFFERENCES WITHIN THE ATLIN TERRANE. THE COMPLEXITY IS OBVIOUS ON THE LOCAL PROPERTY OR VEIN SYSTEM SCALE, HOWEVER, A GRADATIONAL ALTERATION ASSEMBLAGE IS PROPOSED. IMMEDIATELY ADJACENT TO THE QUARTZ VEINS ARE THE SUBORDINATE LITHOLOGIES MARIPOSITE?-CARBONATE TO QUARTZ-CARBONATE. THEY ARE FOLLOWED BY A BROADER ALTERATION ENVELOPE OF QUARTZ-TALC-CARBONATES AND TALC-CARBONATE ROCKS IN CONTACT WITH SERPENTINITES OR RELATIVELY UNALTERED DUNITES AND PERIDOTITES. THE MAJORITY OF CARBONATES PRESENT ARE Mg, Fe AND Ca RICH (IN ORDER OF ABUNDANCE) BUT OVERPRINTING OF THE ALTERATION ASSEMBLAGE AND QUARTZ OPEN SPACE FILLING WOULD INDICATE COMPLEX AND PERHAPS EPISODIC MINERALIZING EVENTS.

SOME PRELIMINARY ORE MINERALOGY AND LITHOGEOCHEMICAL INVESTIGATIONS OF THE VEINS AND ALTERATION ASSEMBLAGE ARE ALSO SHOWN IN THIS POSTER.

THE GLACIAL GEOLOGY OF THE TERRANE IS COMPLEX AND IS REFLECTED IN THE DIVERSE TOPOGRAPHY. THOSE FEATURES WHICH ARE OF PARTICULAR INTEREST TO THE PRESERVATION OF GOLD-BEARING PLACER GRAVELS AND THE UTILIZATION OF LAKE SEDIMENT GEOCHEMISTRY FOR REGIONAL GOLD PROSPECTING ARE AS FOLLOWS:

- 1) CONTINENTAL GLACIERS MOVED UP THE MAJOR VALLEYS, RESULTING IN PONDING FOLLOWED BY DEPOSITION OF LACUSTRINE SEDIMENTS AND THEN ICE SHEET DEBRIS. THE GLACIERS RAFTED OVER FROZEN SEDIMENTS AND/OR SCOURED THE VALLEYS (BLACK, 1953; MILNER, 1983).
- 2) EXTENSIVE DEPOSITS OF GLACIOFLUVIAL SEDIMENTS AND TILL FORMED AS THE GLACIERS RETREATED. THESE DEPOSITS CAN REACH DEPTHS OF OVER 100 METRES (BLACK, 1953).
- 3) ISOSTATIC REBOUND AND REROUTING OF RIVERS ACCOMPANIED THE GLACIAL RETREAT. THIS RESULTING IN THE INCISING OF STREAMS AND THE REWORKING OF MANY OLDER SEDIMENTS. EXTENSIVE STREAM CAPTURE AND ABANDONMENT OF FORMER STREAM CHANNELS IS EVIDENT. MUCH OF THE DRAINAGE PATTERN DISRUPTION HAS RESULTED IN LOW-LYING SWAMPY AND LAKE COVERED AREAS ESPECIALLY ALONG THE TESLIN SUTURE ZONE ON THE EASTERN BOUNDARY OF THE ATLIN TERRANE (AITKEN, 1959).

CACHE CREEK AND ATLIN INTRUSION ROCK SAMPLES (162) OF VARYING COMPOSITION (META-ANDESITE, GABBRO, SERPENTINITE, PERIDOTITE, DIABASE) AND ALTERATION (GREEN-MICA RICH QUARTZ-CARBONATE, I.E., LISTWANITES, TALC-MAGNESITE, QUARTZ-Mg-Fe-Ca CARBONATE, QUARTZ-VISIBLE GOLD VEINS) WERE ANALYZED FOR THALLIUM, PALLADIUM AND PLATINUM. LITTLE OR NO THALLIUM OR PLATINUM WAS DETECTED IN THE ROCKS OR VEINS. PYRITE ABUNDANCE APPEARED TO CONTROL PALLADIUM CONCENTRATIONS BUT ONLY SEVEN SAMPLES CONTAINED PALLADIUM BETWEEN 10 TO 35 PPB. HOWEVER IN THE ATLIN AREA NATURAL ALLOYS OF OSMIUM-IRRIDIUM AND RUTHENIUM IN NUGGET FORM WERE REPORTED BY HARRIS AND CABRI (1973). OUR PLACER INVESTIGATIONS CONFIRMED THE PRESENCE OF SIMILAR NUGGETS (GRAINS) IN THE FOUR CREEKS STUDIED.

BOYLE (1982) REPORTS THAT THE AVERAGE CONCENTRATION OF GOLD IN ULTRABASIC ROCKS IN 4 PPB. BUISSON AND LEBLANC (1985) INVESTIGATED GOLD IN CARBONATIZED ULTRAMAFIC ROCKS AND THEY REPORT GOLD VALUES IN LISTWANITES OF 0.02 - 1 PPM WHILE THE ASSOCIATED ULTRAMAFIC ROCKS CONTAINED 5 - 100 PPB GOLD. THEIR INVESTIGATION OF SEVERAL GOLD-BEARING LISTWANITES FROM THE UPPER PROTEROZOIC AND ALPINE OPHIOLITE COMPLEXES SHOWED THEM TO BE UNUSUALLY GOLD-RICH ROCKS (10 - 100 FOLD). OUR DATA DOES NOT SUPPORT THESE FINDINGS.

CARE WAS TAKEN NOT TO INCLUDE SAMPLES WHICH CONTAINED ANY QUARTZ VEINS OR VEINLETS. THE 18 RELATIVELY UNALTERED ULTRAMAFIC ROCKS HAD GOLD CONTENTS ( $\bar{X}$  = 1.7 PPB) RANGING FROM <1.0 - 9.3 PPB WHILE THE 43 CARBONATE-ALTERED-LISTWANITE ROCKS HAD AN AVERAGE GOLD CONTENT OF 5.3 PPB RANGING FROM <1.0 - 75.5 PPB. GOLD CONTENTS OF ECONOMIC CONCENTRATIONS APPEARS TO BE RESTRICTED TO THE QUARTZ-VEINS THEMSELVES. FIFTEEN QUARTZ, QUARTZ-CARBONATE VEIN SAMPLES WERE COLLECTED FROM THREE MINERALIZED VEIN SYSTEMS. GOLD CONTENTS RANGED FROM 0.009% - 216.0 G/T AND AVERAGED 21.8 PPM. WHOLE ROCK GOLD/SILVER RATIOS ARE HIGHLY VARIABLE AND MAY REACH AS HIGH AS 12 OR AS LOW AS 0.02 DEPENDING ON THE AMOUNT OF GOLD OR LEAD PRESENT.

FURTHER PERTINENT LITHOGEOCHEMICAL DATA IS SUMMARIZED IN THE FOLLOWING TABLE:

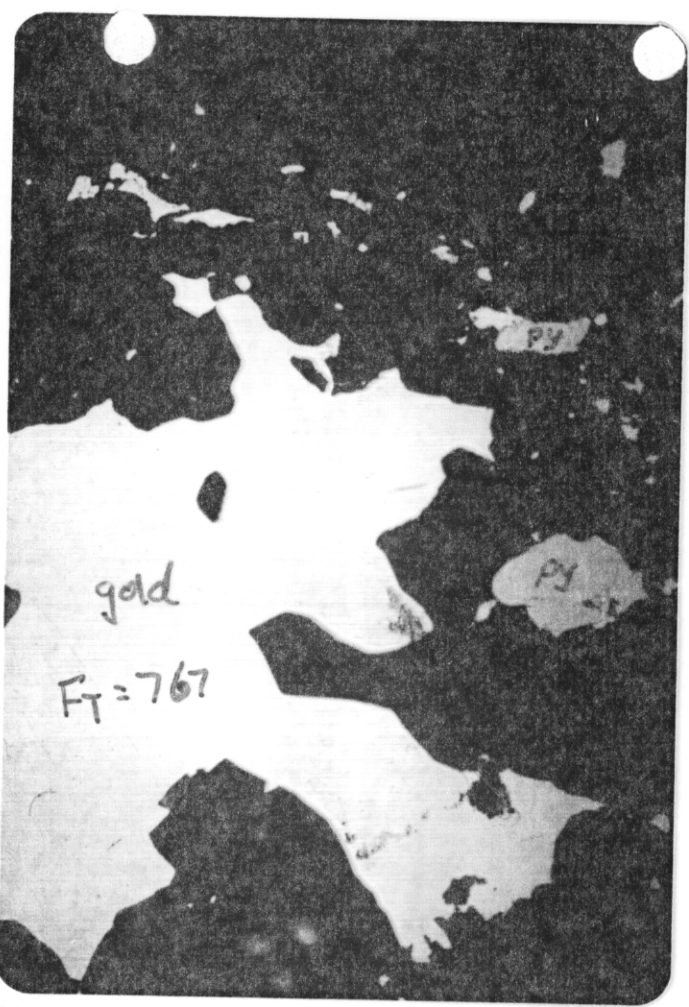
	Au ppb	Ag ppm	Pb ppm	As ppm	Bi ppb	Cu ppm	Zn ppm	Co ppm	Ni ppm	Cr ppm	CaO %	CO <sub>2</sub> T %	K <sub>2</sub> O %	MgO %	
UNALTERED ULTRAMAFICS															
n = 18															
$\bar{X}$	1.7	<0.5	11.0	7	<5.0	19	68	97	1917	2199	0.49	1.9	0.04	37.7	
RANGE MIN	<1.0	<0.5	-	-	<5.0	3	48	87	1700	690	0.03	0.2	-	34.8	
MAX	9.3	0.7	20.0	36	<5.0	52	110	110	2200	3400	2.48	9.3	0.06	41.4	
CARBONATE- ALTERED ULTRAMAFICS															
n = 43															
$\bar{X}$	5.3	<0.5	13.0	64	<5.0	24	68	68	1202	1645	3.05	4.9	0.37	27.0	
RANGE MIN	<1.0	<0.5	-	-	<5.0	1	18	18	90	110	0.07	-	0.01	1.7	
MAX	75.5	0.8	71.0	630	<5.0	110	140	100	2200	2900	25.80	16.2	3.62	42.2	
QUARTZ, QUARTZ- CARBONATE VEINS															
n = 15															
$\bar{X}$	ppm		%												
$\bar{X}$	21.83	26.8	0.83	289	122	85	25	13	37	18					
RANGE MIN	.009	<0.5	-	-	<5.0	1	1	-	-	2	NA	NA	NA	NA	
MAX	216.00	49.9	8.00	2300	1216	460	180	58	240	75					

THESE DATA SHOW THE REMOVAL OF Mg AND Ca, CO<sub>2</sub>, K ENRICHMENT DURING THE PROCESS OF CARBONATIZATION OF ATLIN INTRUSION ULTRAMAFIC ROCKS. Cu, Zn, Co, Ni, Cr REMAIN RELATIVELY UNCHANGED DURING THESE HYDROTHERMAL PROCESSES. OF IMPORTANT NOTE TO THE EXPLORATIONIST IS THE SOMEWHAT BROADER HALO OF Au-As-Hg ENRICHMENT IN THE ALTERED SAMPLES AND THE OBVIOUS Au-Pb-As-Bi ASSOCIATION WITHIN THE QUARTZ VEINS. FURTHER EVIDENCE FOR THESE GEOCHEMICAL CHARACTERISTICS IS REVEALED IN THE MINERALOGICAL SECTION OF THIS POSTER.

#1

Yellowjacket Mine  
Ivanhoe, Nevada  
Pine Creek, Alt. 8,000 ft.  
Vill. core sample.

The large, irregular, black  
of electrum is 70-100  
microns by 100 microns  
hosted in white quartz  
vein. Light gray black  
on right is pyrite with  
along axis width of 50  
microns. It and the  
smaller pyrite grains  
have it have associated  
old on the exterior of  
the pyrite grain. The  
electrum is homogeneous  
in composition. It always  
occurs with the quartz  
pyrite and the disseminated  
electrum in quartz veins.



Electrum have an average of 20% silver and 80% gold. A few pinpoints of Ni, Co, Fe, copper or other elements, which are contained in the electrum, at least 100 microns in diameter. Inclusions in the electrum are not noticed in this section.

#2



Disseminated, small, black electrum grains in quartz.



Yellow jacket Claim  
Canova Resources  
Pine Creek Atlin BC  
Drill core sample

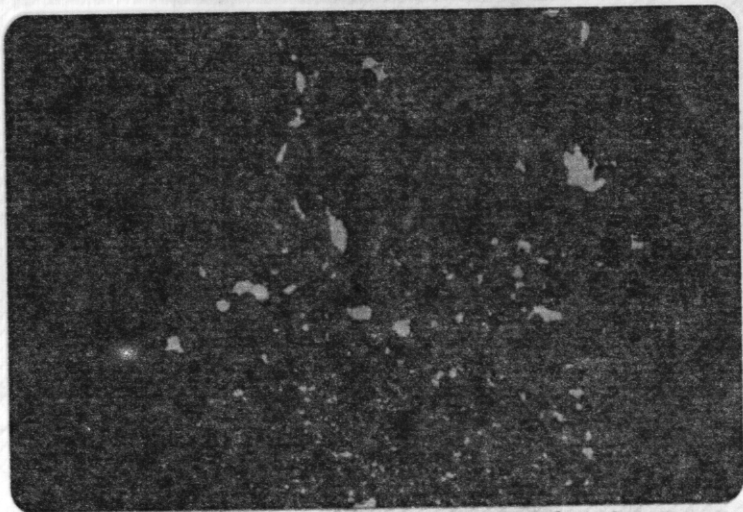
#1

The large irregular blebs of electrum is 70-400 microns by 400 microns hosted in white quartz vein. Light gray blebs on right is pyrite with a long axis width of 80 microns. It and the smaller pyrite grain above it have associated gold on the exterior of the pyrite grains. The electrum is homogeneous in composition. The large blebs, the electrum with pyrite and the disseminated electrum in quartz shown.

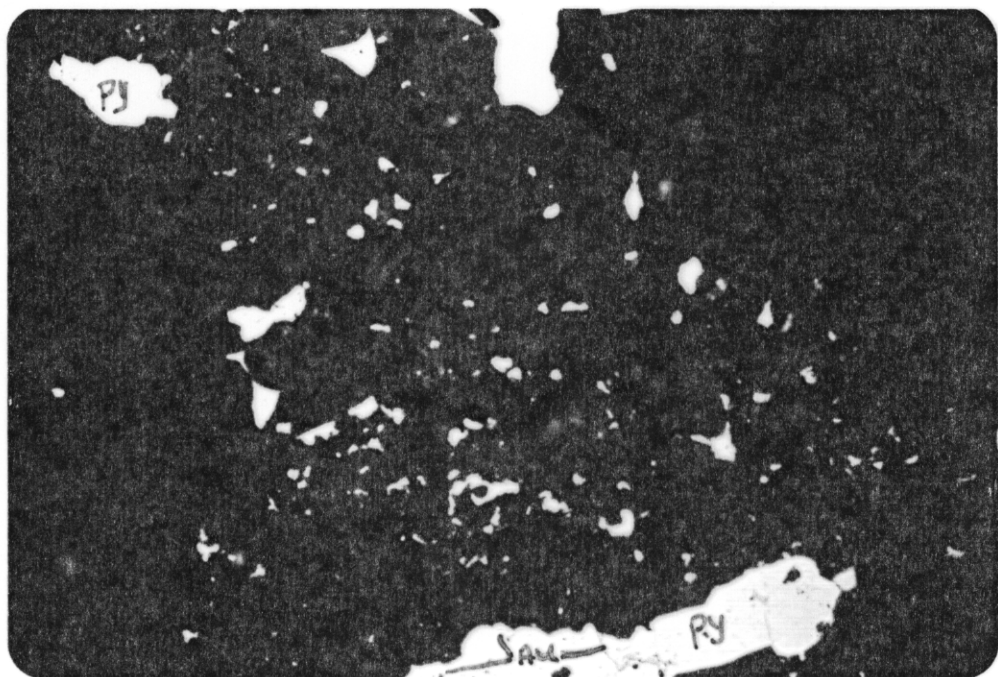


Below have an average 76.6% Au and 23.3% Ag for fineness of 766.8. No copper or other common gold associated trace elements are contained in the electrum at levels of detection of the microprobe. Inclusions in the electrum are not noted in these mounts.

#2



Disseminated micron sized electrum grains in quartz. The electrum after release from the quartz by cold HCl dissolution shows it to be of a porous, spongy filigree texture.



Electrum on exterior and interior fractures of Pyrite grain  
Disseminated electrum in quartz. All photos are at  
same magnification as sizes quoted for the first  
photo.

Gersdorffite ( $\text{NiAsS}$ ) is present as discrete grains  
in these mounts. It is up to 3.7% enriched in  
Sb (antimony) as detected on the microprobe.

Chromite grains and green chromium mica are  
present on fractures in the quartz.

All microprobe analyses by Dr. D. Harris G.S.C.



Electrum on exterior and interior fractures of pyrite grains. Disseminated electrum in quartz. All photos are at same magnification as sizes quoted for the first photo.

Gersdorffite ( $\text{NiAsS}$ ) is present as discrete grains in these mounts. It is up to 3.7% enriched in Sb (antimony) as detected on the microprobe.

Chromite grains and green chromium mica are present on fractures in the quartz.

All microprobe analyses by Dr. D. Harris G.S.C.