GEOCHEMICAL, GEOPHYSICAL and GEOLOGICAL

ASSESSMENT REPORT

ON

THE PICK CLAIMS 1 and 2

and

THE CLIFF CLAIMS 1, 5 and 78

NANAIMO MINING DIVISION

BRITISH COLUMBIA

N.T.S. - 92L11W and 12E

Latitude 50 37'

Longitude 127 25'

OWNER AND OPERATOR

John M. Mc Andrew, Prospector - Consulting Geologist AL STREET 8961 Ursus Crescent, Surrey 21 - 18. 19 - 19 - 19 British Columbia, V3V 6L3 Par Sem Ribing with BY 1 1 2000 JOHN M. Mc ANDREN, P. ENGR. 1 <u>[</u>] à Field Examination Period: -4 October 3 - November 1, 1989 . مەربى

Submitted: December 14, 1989





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INTRODUCTION

During the period October 3 to November 1, 1989 geochemical, geophysical and geological surveys were conducted on claims Pick 1 and 2 and Cliff 1, 5 and 78.

The purpose of the surveys was to implement the recommendations of Geochemical, Geophysical and Geological Assessment Report, number 18,238, submitted January 11, 1989, <u>ie</u> 1) Determine if the Swamp Showing extends to the southwest. 2) Attempt to expose the inferred Quatsino limestone - intrusive contact on the Pick claims. 3) Find out what is causing the remaining unexplained anomalies and 4) Exploratory and development trenching to expose known and suggested skarn zones. The drilling recommended in the aforementioned report was beyond the financial resources of the author.

The Cliff Property is 3.5 kilometers due north of Rupert Inlet, Vancouver Island. The claims lie at elevations ranging from 60 to 320 meters above sea level.

The Port Hardy - Coal Harbour Highway goes through the west side of the property. Gravel logging roads Branch Road 6, Branch Road 7 and MacMillan - Bloedel provide access to the north and south parts of the claims.

The owner, John M. Mc Andrew, of 8961 Ursus Crescent, Surrey, British Columbia, was also the operator.

INTRODUCTION (contd)

The property consists of the following claims:

CLAIM	RECORD #	UNITS	RECORDED		
Cliff 78	301	8	September	21,	1978
Cliff 79Fr.	513	1	December	19,	19 7 9
Cliff 1-8	736-743	8	December	15,	1980
Pick 1-4	744-747	9	January	9,	1981
Pick 5Fr.	748	1	Janua ry	9,	1981

27 Units

As mentioned in previous reports, selective open pit mining of copper-silver-zinc ore, from the Rainbow and Cranberry Showings, could have started years ago. BHP Utah Mines, which has an operating mill 2 miles due south of the Cliff claims, would be the logical place to ship ore. The author has approached them many times but they did not want to do business. This is difficult to understand since the manager in a recent TV interview stated they would be out of ore by 1996 and had just spent fifty million dollars on a coffer damiso they could extend their pit into Rupert Inlet. The Swamp Showing indicates good potential for the development of a small tonnage, high grade copper-zinc-lead deposit with silver and gold values.

SUMMARY of WORK

24 soil samples were geochemically analysed for copper and zinc. Four rock chip samples were assayed for copper, silver and gold and five for gold only.

SUMMARY of WORK (contd)

The total meters of line surveyed with the proton magnetometer, over, south and southwest of the Swamp Showing was 934.

Geological mapping was done at scales of 1:100, 1:500, 1:1000 and 1:2500 and covered an area of approximately 7 claim units. Geology in the area of the Rainbow Showings was replotted on the topographic map to give a more precise fit.

3 kilometers of control lines were established on the Cliff and Pick claims by brunton and chain. Because of the dense undergrowth, particularly salal, lines had to be cut for access and control for areas investigated, without a pre-existing grid.

SCHEDULE of SURVEYS

The field work for the surveys was done by John M. Mc Andrew, P. Engr. assisted by John Struzewski, miner and driller.

Oct. 2* Drove to Property

		CLAIMS	TYPE of SURVEY	
Oct.	3	Cliff 1 & 78	Geochemical sampling	3
	4	Cliff 78	1 1 11	
	5	Cliff 1 & 78	17 17	
	6	Pick 1	Geological mapping,	TRs 89 - 1, 2 & 3 (S)
	7	Cliff 1 & 78 & Pick 1	Magnetometer (McA),	Trench 89 - 3 (Struzewski)
	8	Cliff 78	11 11 2	Test Pit 89-1 (S)
	9	Pick l	Geological mapping,	Trench 89-3 (S)

SCHEDULE of SURVEYS (contd)

		CLAIM	<u>3</u>	TYPE o	of SU	RVEY				
0ct. 1	10	Cliff	78	Geolog	gical	mapping	, TPs	89-2 &	3	
-	11	11	11	11		11				
]	12	Ħ	11	Geol.	map.	& Geoch	emica.	l sampl	ing	
-	13	77	Ħ	Geolo	gical	. mapping	g, Tre	nches89	-4 & 5	(S)
-	14	11	Ħ	Geol.	map.	,TPs 89-	-4 & 5	, Trenc	h 89-6	(S)
-	15	Cliff	5	11	11 &c	Geochen	1. samj	p., TPs	89-6	& 7
-	16	Cliff	78	Geolo	gical	mapping	z, Tes	t Pits	89 -8 &	9
-	17	11	11	Ħ		11				
-	18	Pick 2	1 & 2	Geol.	map.	, TP 89-	-10, T	rench 8	9 -7 (s)
:	19	Pick 3	ı	11	Ħ	, Trench	1 89-8	(8)		
:	20	Pick 2	2	**	11	, Trench	n 89-9	(8)		
:	21	Cliff	78	11	Ħ	, Trench	1 es 8 9	-10, 11	& 12	(S)
:	22	**	11	11	Ħ	, Trench	1 89-1	1 (8)		
:	23	W	Ħ	Geolo	gical	. mapping	3			
;	24	Ħ	Ħ	Ħ		11				
:	25	**	Ħ	11		Ħ	, Tre	nch 89-	13 (S)	
:	26	11	Ħ	**		**	, TRs	89-13	& 14 (S)
	~ ~	Ħ	#	**		#	Шра	80-12	& 7 <i>1.</i> (g)
	~/ 2호	Diat	 1	1		#	, INB TTR	80-15	& 14 (& 16 (S)
	20	C1144	- 78	**		11	, Tre	nch $8Q=$	17 (s)	-,
	30	M	#	11		**	TRA	89-13	& 14 (8)
	<i>3</i> 1	Ħ	11	tt		11	, TRs	89-13,	14 &	18 (S)
Nov.	1	Cliff	78	AM Ge	ol. m	ap., PM	Drove	to Sur	rey*	
NOTE:	* No	ot app	licable	to asse	ssmen	it.				

GEOLOGY

GENERAL

The Property lies within a series of Upper Triassic to Lower Jurassic eugeosynclinal rocks consisting of the Karmutsen and Quatsine Formations and the Bonanza Subgroup of the Vancouver Group. These rocks have been intruded by late Jurassic to Tertiary (?) predominately hornblende granodiorite and quartz diorite plutons and dykes of andesite, basalt and hornblende porphyry.

Rocks of the Karmutsen Formation consist largely of massive basalt, andesite flows and minor tuff.

Conformably overlying the Karmutsen is approximately 150 meters of Quatsino limestone which is intruded by a large stock of hornblende granodiorite in the west portion of the Property. The limestone exhibits skarnification, recrystallization to marble or silicification along intrusive and Karmutsen contacts. Chalcopyrite, bornite, sphalerite, galena and magnetite mineralization, carrying silver and gold values, commonly occurs in the skarn zones.

The Bonanza Subgroup can be subdivided into a sedimentary unit and an upper volcanic unit. The sedimentary section, also referred to as the Parsons Bay unit, consists of thin bedded black argillaceous and carbonaceous limestones, calcareous shales, siltstones and greywackes. Basaltic and andesitic breccias and flows, tuffs and tuff breccias comprise the bulk of the upper part of the Bonanza Subgroup.

Structurally this is a region of block faulting with northwesterly and northeasterly trends being the most prominent.

GEOLOGY (contd)

PROPERTY GEOLOGY

A number of test pits and trenches were successful in uncovering bedrock in areas of anomalous and geologic interest. Descriptions of these rock types follows.

Sedimentary Rock

Limestone - The Quatsino limestone is medium to dark grey, slightly argillaceous, very fine to medium grained, locally irregular siliceous nodules stand in relief on weathered surfaces.

Volcanic Rocks

<u>Andesite</u> - The Karmutsen andesite is medium to dark green to grey, locally amygdaloidal and weakly to strongly magnetic. Amygdules contain quartz, calcite, epidote, chlorite and occasionally minute disseminations of chalcopyrite and bornite. White feldspar phenocrysts occur locally as well as minor disseminated bornite and chalcopyrite.

<u>Basalt</u> - The Karmutsen basalt shares many of the andesite characteristics and it is often difficult to differentiate one from the other in the field. The basalt is usually aphanitic to fine grained and dark green to black and these characteristics were used in mapping. The basalts are largely flows but intrusive dykes do occur.

<u>Tuff</u> - A white to light tan, fine grained, siliceous, highly fractured tuff occurs in the northeast corner of Pick 2. Locally it carries disseminations and seams of pyrite and abundant iron oxide.

PROPERTY GEOLOGY (contd)

Intrusive Rocks

<u>Andesite</u> - Light to dark green, aphanitic to fine grained andesite dykes are common on the Cliff claims. They appear to be genetically related to the skarn mineralization since where they intrude limestone skarn invariably occurs along their contacts.

At the Branch Road 7 Showing, one of these dykes, 8 meters wide, not previously noted, parallels the skarn zone to the south.

Hornblende Granodiorite - The hornblende granodiorite is leucocratic, medium to coarse grained, moderately magnetic and fresh looking, away from contacts with intruded rocks.

Metamorphic Rock

<u>Amphibolite</u> - In Trench 89-14 a zone of dark green to black, tough, fibrous amphibolite, 0.5 meter wide occurs between marbleized limestone and skarn.

Structure

Major faults on the Cliff claims strike east-west and northeasterly. The maximum displacement along one of these faults is 120 meters. Some faults may have served as channelways for mineralizing solutions. Vertical displacements, observed to date, do not exceed 11 meters.

Two vertical profiles G-H and I-J at scales of 1:1500 and 1:1000 are attached to the Appendix. The former, illustrates the

Structure (contd)

geology from Little Joe Diamond Drill Hole 5 to the area north of the Rainbow Showing 3 and the latter, the geology from Little Joe Diamond Drill Hole 6 to the area south of Rainbow Showing 1.

Alteration

The Karmutsen volcanics are commonly altered to epidote, chlorite, sericite and calcite. Epidote characteristically stands in relief as nodules on weathered surfaces and occurs in veins with quartz and calcite.

Contact with intrusives has caused silicification, pyritization and, or skarn consisting of epidote, yellow, brown and red garnet, amphiboles (tremolite, actinolite, hornblende), pyroxene, diopside, ilvaite and hedenbergite within the vocanics and sediments.

Mineralization

Described under Trenching and Test Pitting.

Trenching

Trench	89-1	(Pick	1)	-	lmdxlmwx2mN-S	
11	89-2	**	11		lmdxlmwx2mN-S	
11	89-3	11	Ħ	-	2mdxlmwx2mE-W	
Ħ	89-8	11	11	-	lmdxlmwx3mN-S - These trenches were dug in	

an attempt to expose an inferred limestone - hornblende granodiorite contact, in the hope that auriferous, polymetallic skarn mineralization, similar to that at the Swamp Showing, would occur at said contact. Trenches 89-1 to 3 were dug at the top and base of a small hill which corresponds to a magnetic high and where

overburden was assumed to be thin. After penetrating organic material ranging from nil to 0.1 meters and a BF horizon from 0.1 to 1 meter thick a consolidated glacial drift consisting of fine to coarse, grey sand, pebbles and strongly magnetic (strong pull on hand magnet) andesite boulders, up to 0.3 meters in diameter, exceeding 1 meter (Trench 89-3) was encountered. Trench 89-8 struck glacial drift at a depth of 1 meter. Overburden in this area probably exceeds 5 meters.

Trench 89-4 (Cliff 78) - 1mdx0.5mwx10mN-8 # 89-5 " " - 1mdx0.5mwx5mN-S - These trenches were

an attempt to expose bedrock mineralization in areas of magnetite and skarn loose. Trench 89-4 contains abundant loose mineralized with magnetite, pyrite and iron oxide. Grab samples M20 and M21, of this material, assayed 0.01 g/tonne (.001 oz/ton) and 0.08 g/tonne (.002 oz/ton) respectively. The south portion of the trench contains numerous pieces of skarnified limestone. Trench 89-5 exposed a pale to medium green, fractured andesite dyke, greater than 4 meters wide, containing stringers of magnetite, in contact with a highly marbleized limestone. The northeasterly extension of this dyke, located 90 meters away, is 25 centimeters thick, dips 40 degrees southeasterly and carries abundant disseminations and seams of pyrite. A grab sample, of this pyritic rock assayed .02 $\frac{M19}{g}$ /tonne (.001 oz/ton) gold. No copper mineralization was found in either of these trenches.

Trench 89-6 - 1.3mdx0.5mwx4mN-S - At this site a soil sample ran (Cliff 78) 46 ppm molybdenum. At a depth of 1 meter grey glacial drift was exposed, after considerable effort with the pick, the trench was abandoned at a depth of 1.3 meters. It is highly unlikely that metallic ions could penetrate the drift and the soil anomaly is probably not reflecting bedrock conditions and is transported. <u>Trench 89-7</u> - 2mdx0.5mwx2mN-S - At this site soil sample P226 ran (Pick 2) 104ppm copper and 93 ppm zinc. At a depth of 2 meters glacial drift was encountered again. The soil sample is probably not reflecting bedrock conditions.

Considering the widespread , erratic distribution of the glacial drift, which can range from nil to greater than 50 meters thick, one wonders at the validity of many of the soil samples taken on the Pick and Cliff claims in the past. <u>Trench 89-9</u> - (Pick 2) - 1.3mdxlmwx3mN-S - The purpose of this trench was to examine a magnetic high. Grey glacial drift was encountered at a depth of 1 meter. Numerous medium green, strongly magnetic hornblende porphyry boulders, up to 0.4 meters in diameter, were dug out of this trench. The magnetic exceeding 58,000 gammas, due south, straddling Little Joe Creek, may be indicating a buried hornblende porphyry intrusive.

Trench 89-10 - (Cliff 78) - Indxlmwx2mE-W <u>"89-11</u> - "" - Indxlmwx1OmE-W <u>"89-12</u> - " " - Indxlmwx3mE-W - This trenching was an attempt to expose the southwest extension of the Swamp Showing.

Trench 89-10 was to test the area of soil sample M6, which ran 4mls with the Bloom test (later analysis: 400ppm copper and 697ppm zinc). Bedrock could not be reached because of water flooding the trench. Many dark green, moderately to strongly magnetic andesite boulders occupied the trench. Soil sample M26, from the 0.5 meter thick BF horizon, ran 404ppm copper and 166ppm zinc. Both M6 and M26 are directly down slope from the Swamp Showing and are probably due to " salting " by the showing.

Trench 89-11 exposed a vertical hornblende granodiorite andesite contact, which strikes northwesterly. The dark green, highly fractured, siliceous, iron oxide stained, moderately to strongly magnetic andesite has a chilled, aphanitic texture at the contact and is appreciably more magnetic. M27, from the 0.3 meter thick BF horizon at the east end of the trench, ran 113ppm copper and 175ppm zinc.

Trench 89-12 contains many large boulders of hornblende granodiorite and andesite, understandable considering its proximity to the contact. One iron oxide stained skarn surface boulder, 0.15 meter in diameter, probably from the Swamp Showing, contains minor disseminated sphalerite and galena. M28 from the BF horizon ran 27ppm copper and 36ppm zinc.

Trench 89-13 - (Cliff 78) - 0.5mdxl.5mwx8mN15W <u>"89-14</u> - "" - 0.5mdxl.5mwx14.5mE-W <u>"89-17</u> - "" - 0.5mdx0.5mwx8mN15W <u>"89-18</u> - "" - 1mdxl.5mwx3.5mN75E - These trenches were blasted out of bedrock so that skarn and associated andesite dykes, of the Rainbow 2 and 3 Showings could be properly sampled.

Trench 89-13 (Refer to attached Dwn. No. 2) reveals the contact of a pale green, aphanitic andesite dyke striking N25^{*}E and dipping 50 degrees northwest and a highly oxidized, leached and vuggy skarn carrying no primary sulphides but abundant magnetite locally. Chip sample 6910 extending 1 meter southeast of this trench, into an area of previous trenching, showed pronounced zebra banding, abundant earthy limonite and hematite, appreciable disseminations and seams of chalcopyrite and assayed 2.0% copper, 24.4g/tonne (0.7loz/ton) silver and .06g/t (.002oz/t) gold.

Trench 89-14 (Dwn. No. 3) shows a 0.8 meter thick, northerly striking andesite dyke, dipping vertically (?), bounded to the east by a 6 meter wide skarn (bands of skarn alternating with magnetite which makes up from 30 to 100 percent of the rock locally) and bounded to the west by 6 meters of skarn consisting of yellow and red garnet, earthy limonite and hematite, fibrous dark green to black amphibole, disseminations and seams of magnetite and calcite and disseminations, gobs and seams of chalcopyrite, malachite and azurite. Three 2 meter wide chip samples were taken across this zone they assayed as follows:

6907 - 0.47% copper, 8.lg/t (.24oz/t) silver, .06g/t(.002oz/t) Au 6908 - 1.09% " , 20.3 " (.59 ") " , .05 " (.001 ") " 6909 - 0.84% " , 14.2 " (.41 ") " , .03 " (.001 ") "

Trench 89-18 (Dwn. No. 2) exposed a skarn - marbleized limestone contact striking N45°E and dipping 70 degrees southeast. The skarn is zebra banded, porous, iron oxide stained and magnetic but lacks primary copper sulphides.





<u>Trench 89-17</u> - (Cliff 78) - 0.5mdx0.5mwx8mN15W - uncovered a zone of skarn, 3t meters wide, striking N75[®]E and dipping 40 degrees southeast (the southeast exposure is a dip slope exceeding 1 meter). Although it contains no primary copper sulphides, a 0.5 meter thickness, at the northwest marble contact, contains abundant disseminations, massive blobs and stringers of pyrite and magnetic pyrrhotite, a chip sample of this band assayed .17g/t (.005oz/t) gold.

<u>Trench 89-15</u> - (Pick 1) - lmdxlmwx2mN-S <u>Trench 89-16</u> - (""") - 1.5mdxlmwx2mE-W - These trenches were to test magnetic highs exceeding 57,000 gammas. Trench 89-15 revealed a dark grey limestone, at a depth of 1 meter. Trench 89-16 went through grey glacial drift from 1.2 to 1.5 meters before being abandoned. Many medium green, stongly magnetic andesite boulders, up to 0.3 meter in diameter and carrying minor disseminated pyrite, occur in this trench. Fill in Road 9, due west of this site, contains abundant stringers of magnetite.

GEOCHEMICAL SURVEY

Soil samples were collected, south and southwest of the Swamp Showing, to determine if this mineralized contact extended southwesterty. Additional samples were taken while examining areas of geologic and anomalous interest.

All samples were field tested using a Bloom kit and later brought in for analysis. Min-En Laboratories, of North Vancouver, did the geochemical analysis and assaying; their analytical reports



GEOCHEMICAL SURVEY (contd)

are attached to the back of this report along with their analytical methods and Bloom kit test.

Soil samples were collected from the top of the BF horizon. This horizon, which ranges from 0.1 to 1 meter thick, occurs at a depth of from 0.1 to 1 meter. It has a characteristic pale yellow to orange brown to maroon colour due to the presence of earthy limonite and hematite; locally it can contain a high percentage of clay and usually has an earthy-sandy texture.

Overburden on hills and ridges is probably less than 2 meters thick and soil samples in these areas probably reflect bedrock mineralization but without knowing the thickness of the glacial drift, at a particular site, would make evaluation of soil sample results difficult. This tightly consolidated drift is erratically distributed over the claims.

Geochemical Results

Since all the known showings contain copper and/or zinc mineralization soil samples were analysed for these 2 elements.

Statistical analysis of geochemical results has established anomalous values for copper and zinc to exceed 100 parts per million on the claims. Based on this only 2 highly anomalous soil samples M6 and M26 were collected in 1989. The former ran 400ppm copper and 697ppm zinc and the latter, 404ppm copper and 166ppm zinc. Both of these samples were taken directly down slope from the Swamp Showing and are believed to have been caused by runoff from the showing.

Geochemical Results (contd)

Since the andesite bedrock in Trench 89-11 beneath M27, which ran 113ppm copper and 175ppm zinc, carries no copper or zinc mineralization, this anomalous reading is probably due to transportation from the Swamp Showing.

M17's proximity to the West Showing explains results of 80ppm copper and 158ppm zinc.

M23, 24 and 25, taken over Apex Airborne's air EM Anomaly 15 (refer to attached Dwn. No. 3), which ran 124, 186 and 124ppm copper respectively are not thought to be economically significant. It was difficult to ascertain if the many outcrops of dark green to black, massive, aphanitic to fine grained, strongly magnetic basalt, in the center of the anomaly "intrusive or extrusive rock. If intrusive, minor copper mineralization may have come in at the same time.

MAGNETOMETER SURVEY

A magnetometer survey was conducted south and southwest of the Swamp Showing in an attempt to determine if the mineralized contact continued to the southwest. The instument was also used as a prospecting tool to locate the highest readings within magnetic anomalies, previously defined, prior to trenching or test pitting.

A GEM Systems GSM 8 proton magnetometer, serial no. 1593, was rented from White Geophysical Inc. of Richmond, British Columbia. Professional engineer John M. Mc Andrew conducted the survey.

Magnetic conditions were so stable and diurnal variations so minor (in a period of l_{\pm}^3 hours a Swamp Road reading varied 1 gamma), during the day of the survey, that readings were plotted as

MAGNETOMETER SURVEY (contd)

recorded.

Readings were taken along the Swamp Showing Road and over areas underlain by hornblende granodiorite at 25 meter intervals, over the assumed southwestern projection of the Swamp Showing (which averages 5 meters wide, at surface) at 2 to 5 meter intervals. Details of the October 7th survey are tabulated below.

Claims	3	Line H	rom	То	Distance	in meters)
Cliff	1.78	Swamp Sh. Rd.	0+00	2+75N		275
Cliff	78	$2+75\overline{N}$ to				
	·	DDHs 5 & 6	2+75N	2 + 99N		24
11	11	DDHs 7&8 to				
		DDHs 1,2&3 to	DDHs	opp os .		
		ODDOS. 2+75N	7&8	2+75N		40
11	Ħ	6700N	22+75W	22+00W		75
11	**	22+00W	6+00N	5+50N		50
Ħ	#	5 4 50N	22+00W	23+00W		100
Cliff	1.78	5+00N	23+50W	22+00W	•	150
Cliff	78	22+00W	5+00N	4+50N		50
Cliff	1,78	4+50N	22+00W	23 + 70W	-	170
						934 meters

Magnetometer Results

2 lines were run over the Swamp Showing to determine what order of magnetometer readings could be expected over this type of mineralization. One line was run from the collars of DDHs 83-7 and 8 over the collars of DDHs 1,2 and 3 to a point opposite station 2+75N onthe Swamp Showing Road. Over the exposed and marble capped mineralization, readings ranged from 57,054 to 57,592 gammas. A reading, 3 meters north of this line on massive sulphides, was 59,164 gammas. The other line, from station 2+75N to the collars of DDHs 83-5 and 6, showed a marked decrease in

Magnetometer Results (contd)

magnetic response and none of the readings exceeded 56,641 gammas. A reading, 3 meters north of the aforementioned line at station 34, directly over massive sulphides, was 58,010 gammas.

Using the readings on the 2 lines described, as a basis of reference, none of the many readings, south and southwest of the Swamp Showing (see Map 3), appear to be indicating a zone of sulphide mineralization either related to the Swamp Showing or along the concealed portion of the hornblende granodiorite - andesite contact. On the magnetometer map the 56,500 gamma contour defines this contact since all readings over hornblende granodiorite outcrops exceeded this number.

EVALUATION of PREVIOUSLY UNEXPLAINED ANOMALIES on the PICK and CLIFF CLAIMS

Drawing Number 5, inthe Appendix, outlines the anomalies examined on the Cliff claims during 1989.

The remaining anomalies, on the Pick and Cliff claims, were explained by geosurveys followed by test pitting or trenching, the results of which, have been plotted on attached drawings or accompanying maps.

Findings in the test pits are described in the following tabulation. Trenching results were discussed under Geology.



Test Pit Number	Claim	Location	Dim.)	To Test	Findings
89-1	Cliff78 (Mapl)	L11-130W 255m. N of Br Rd7	ldx.5xl	Mag. Anom. 3,500	Str. magnetic basalt, few diss. and seams of pyrite.
89-2	11	Lll+50W 70m N of Br Rd7	.5dxlxl	For limes. contact	Mod. magnetic basalt.
89 -3	17	L12W 50m N of Br Rd7	ldx.5xl	19 IT	12 12 12
89-4	11	L9W 90m Nof Br Rd7	ldx.5xl	Hbl porphyry	Hematite stained, sugary textured and esite.
89-5	Ħ	L9W 20m N of Br Rd7		87	Medium green andesite.
89–6	Cliff5 (D.No4)	SW corner of Cliff 5	.5dx.5x.5	Anomaly EM 15	Str. magnetic basalt loose.
89-7/	11	¥¥.	•5dx•5x•5	Ħ	Strongly magnetic basalt.
8 9 8	Cliff78 (Mapl)	L3+15W 245m N of Br Rd7	•5max•5x•5	Soil > 100ppm Cu	Pale grn. amygd. andesite, qtz. & epidote in amygd. plus odd speck of chalcopyrite.
8 9- 9	17	L3+15W 235m N of Br Rd7	2md.x. 5x2	n	Medium green andesite.
89-10	Pick 2 (D.No.8)	127W 5+00S)	ldxlxl	For intr. contact	Iron oxide stained, highly fractured marbleized limestone.

Soil samples M11 and M12 and Test Pits 89-2 and 3 along exploratory lines between the quartz diorite and limestone, southeast of the Drillsite Showing (Map 1), did not indicate a concealed, mineralized contact between these two rock types.

Soil samples M13 to M17 failed to indicate a concealed, northeast extension of the West Showing. Debris was scraped off the northeast end of the showing, which bulges to a width of 5 meters but terminates in limestone, due southwest of sample M17 (Map 1). M18, a grab sample of local pyrite and arsenopyrite within the highly oxidized skarn, assayed 0.02 gram/tonne gold.

CONCLUSIONS

Based on Geology

Because of glacial drift exceeding 5 meters thick, a major swamp and the MacMillan-Bloedel Road fill it is highly unlikely that hand or mechanical trenching would expose the inferred hornblende granodiorite - Quatsino limestone contact on the Pick claims.

The unmineralized hornblende granodiorite - andesite contact exposed in Trench 89-11, due southwest of the Swamp Showing, suggests that the andesite, in this area, is a poor host for mineralization.

Rock trenching of the Rainbow 2 and 3 skarm zones showed the marked zonation of the economic mineralization which ranges from barren to high grade copper mineralization and from magnetite and chalcopyrite rich zones to zones predominately magnetite, chalcopyrite or pyrrhotite. Abundant iron oxide, malachite and azurite and the porcus, vuggy nature of the surface mineralization indicates copper values have been lost due to oxidation and leaching, to what percentage could be determined only by testing the primary sulphides below the zone of oxidation.

The pale to medium green, aphanitic to fine grained andesite dykes, carrying local disseminations and stringers of chalcopyrite, are directly related to the skarn mineralization. The 0.8 meter wide dyke, exposed in Trench 89-14 at the Rainbow 3 Showing, illustrates the major skarnification that can develope along the margins of even a narrow dyke is. 6 meters on each side. At the

Based on Geology (contd)

Branch Road 7 Showing, where a dyke 8 meters wide occurs, just how large is the skarn zone, ranging from 0.08 to 2.85 percent copper (DDH-N7, Dwn. No.9, Appendix), along the dyke's south edge, covered in part by road fill?

Based on Geochemistry

Except for soil samples M6 and M26, which were probably " salted " by the Swamp Showing upslope, none of the samples south and southwest of the Swamp Showing indicate a concealed zone of copper - zinc mineralization. Since there is a steep slope from the Swamp Showing Road to the large swamp to the southeast overburden buildup could be considerable, going down slope, and some samples may not be reflecting bedrock conditions.

The erratic distribution and thickness of the tightly consolidated glacial drift on the Pick and Cliff claims will always present a problem when evaluating soil sample results.

Based on Magnetometer Survey

Magnetometer surveys do not always indicate zones of skarn mineralization since many rock types are weakly to strongly magnetic and some skarn zones contain very little magnetite.

Some of the magnetic highs on the Pick claims are apparently due to trains of strongly magnetic boulders of andesite, basalt or hornblende porphyry. The numerous boulders of porphyry, up to 0.4 meter in diameter, in Trench 89-9 suggest that the anomaly exceeding 58,000 gammas, straddling Little Joe Creek, indicates a buried

Based on Magnetometer Survey (contd)

hornblende porphyry intrusive.

The pronounced drop in magnetic response, on the Test Line from Station 2+75N on the Swamp Showing Road to the site of DDHs 83-5 and 6, suggests a proximity to the south limit of the Swamp Showing and it's marbleized limestone host. The andesite outcrop, due east of the drill site, and the andesite, exposed in Trench 89-11, support this contention.

The 56,500 gamma contour was used to define the buried contact of the hornblende granodiorite - andesite contact and the 56,000 gamma contour defines the concealed porhyritic basalt andesite contact south and southwest of the Swamp Showing. Using this criterion, an interesting geological pattern occurs in the south and east portions of the area south of the Swamp Showing. A north-south " tongue " of hornblende granodiorite intrudes the andesite from the south and due north of this an area of porphyritic basalt is partially outlined. It has been the author's experience that the area, at the tip of, such a tongue is a good place to look for mineralization. Is the 0.1 meter dyke of hornblende granodiorite, which carries disseminated chalcopyrite and assayed 1.06% copper (1988) and occurs in the only outcrop of porphyritic basalt, related to the intrusive, due south?

Based on Test Pitting

Test pitting exposed many areas of magnetic basalt but no zones of economically significant skarn.

RECOMMENDATIONS

The remaining anomalies have been examined and the Property now requires extensive development trenching and drilling to determine reliable tonnage estimates. The following program is recommended:

- 1) Development trenching and drilling should start on the Rainbow, Cranberry and Branch Road 7 Showings since they have the best potential for worthwhile tonnages. The andesite dykes, associated with these skarns, should serve as excellent marker units during the trenching and drilling. No drill hole stepouts should exceed 20 meters.
- 2) 1989 geosurveys confirmed that Energex's 1983 drilling fairly well defined the limits of the Swamp Showing ie. approximately 7,000 tonnes of high grade copper, zinc, lead and silver mineralization with gold and molybdenum values.
- 3) Soil sampling and trenching, due south of the Swamp Showing, would probably fail to test the area where the " tongue " of hornblende granodiorite intrudes andesite for mineralization, due to excessive overburden, and diamond drilling may be required.

A major concealed porphyritic intrusive may have been the source of much of the copper mineralization on the Cliff claims. The large swamp, southeast of the Swamp Showing, could cover such an intrusive.

4) Diamond drilling will be required to test the inferred hornblende

RECOMMENDATIONS (contd)

granodiorite - Quatsino limestone contact for mineralization, on the Pick claims.

5) Should Utah or Westmin change their policy on treating custom ore, shipments could be made from the Rainbow, Cranberry and Swamp Showings.

Respectively submitted by

In the Chuch

8961 Ursus Crescent Surrey, British Columbia December 14, 1989

John M. Mc Andrew, P. Engr. Prospector - Consulting Geologist

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McAndrew, J.M.	(1989)	Geochemical, Geophysical and Geological Assessment Report 18,238 om Pick Claims 1, 2 and Cliff Claims 1, 5 and 78.

CERTIFICATION OF JOHN M. Mc ANDREW

8961 Ursus Crescent, Surrey, B.C. V3V 6L3 Phone 591-6512

- 1. Registered as a Professional Engineer by the Association of Professional Engineers of British Columbia, Canada.
- 2. B. Sc. in Geology from the University of Alberta, Educaton, Alberta; post graduate courses in surveying, McGill University, Montreal, Quebec.
- 3. Prior to consulting the author spent seventeen years in exploration, property evaluation, mine geology and production with the following companies: Anaconda American Brass Limited - Copper, Molybdenum, Tungsten. Silver Titan Mines - Silver, Lead, Zinc. Columbia Iron Mining Co. - Coal. Newmont Exploration Ltd. - Nickel, Copper. Iron Ore Company of Canada Ltd. - Direct Shipping Iron Ore. N. W. Byrne Company - Gold. Quebec Cartier Mining Co. Ltd. - Concentrating Iron Ore. Eldorado Mining and Refining Co. - Uranium. International Nickle Co. - Nickel, Copper. Risby Tungsten Mines Ltd. - Tungsten.

Addendum:

1977, 79, 81, 82 Instructing at British Columbia School for Advanced Prospectors.

Dated this 14 day of December, 19 89, in Surrey , British Columbia

JOHN M. MCANDREW, P. Engr.

Prospector - Consulting Geologist

ITEMIZED COST STATEMENT

Cliff and Pick Claims Grouped (# 1434) September 9, 198	3
1) Maps, drafting supplies, stationary and xerox -	\$ 65.47
2) Field equipment -	467.18
3) Room & board, 2 men Oct. 2 - Nov. 1, 1989 (31 days)	1,370.48
4) Transportation, ferries and vehicle -	232.65
5) Rental of Proton Magnetometer Oct. 2 - 16 (2 weeks) Air freight return of magnetometer Rental of compressor, drill & 200' of hose	180.00 46.50 158.25
6) 9 assays Au (\$76.50), 4 assays Ag, Cu (\$50.00), 9assay sample prep. (\$33.75), 24 soil geochem. Cu, Zn (\$90.00), 24 soil sample prep. (\$24.00) -	274.25
7) Wages, John M. Mc Andrew, Professional Engineer October 3 - November 1 (29.5 days, \$400/day) -	11,800.00
John Struzewski, Assistant, miner and driller October 3 - November 1 (29.5 days, Oct.6,7&9- TRs89-1,2&3; Oct.8-TP89-1; Oct.13-TRs89-4&5; Oct.14-TR89-6; Oct.18-TR89-7; Oct.19-TR89-8; Oct.20-TR89-9; Oct.21&22-TRs89-10,11&12; Oct.25-31-TRs89-13,14,15,16,17&18, \$100/day)	2,950.00
8) Report Preparation, John M. Mc Andrew, P. Engr.	
November 27 - 30 - 4 days	
December 1 - 8 - <u>8</u> "	4,800.00
12 days at \$ 400/day	
TOTAL COSTS	\$ 22,344.78

MIN-EN Laboratories Ltd. Specialists in Mineral Environments Corner 15th Street and Bewicke 705 WEST 15th STREET NORTH VANCOUVER, B.C. CANADA

ANALYTICAL PROCEDURE REPORTS FOR ASSESSMENT WORK

PROCEDURES FOR Mo, Cu, Cd, Pb, Mn, Ni, Ag, Zn, As, F

Samples are processed by Min-En Laboratories Ltd., at 705 W. 15th St., North Vancouver Laboratory employing the following procedures.

After drying the samples at 95°C soil and stream sediment samples are screened by 80 mesh sieve to obtain the minus 80 mesh fraction for analysis. The rock samples are crushed by a jaw crusher and pulverized by ceramic plated pulverizer.

1.0 gram of the samples are digested for 6 hours with HNO_2 and $HC1O_1$, mixture.

After cooling samples are diluted to standard volume. The solutions are analyzed by Atomic Absorption Spectrophotometers.

Copper, Lead, Zinc, Silver, Cadmium, Cobalt, Nickel and Manganese are analysed using the CH_2H_2 -Air flame combination but the Molybdenum determination is carried out by C_2H_2 -N₂O gas mixture directly or indirectly (depending on the sensitivity and detection limit required) on these sample solutions.

For Arsenic analysis a suitable aliquote is taken from the above 1 gram sample solution and the test is carried out by Gutzit method using Ag CS_2N $(C_2H_5)_2$ as a reagent. The detection limit obtained is 1. ppm.

<u>Fluorine analysis</u> is carried out on a 200 milligram sample. After fusion and suitable dilutions' the fluoride ion concentration in rocks or soil samples are measured quantitatively by using fluorine specific ion electrode. Detection limit of this test is 10 ppm F.

MIN-EN Laboratories Ltd. Specialists in Mineral Environments

Corner 15th Street and Bewicke 705 WEST 15TH STREET NORTH VANCOUVER, B.C. CANADA V7M 1T2

GEOCHEMICAL ANALYSIS PROCEDURE FOR Pb, Zn and Ag:

Samples are dried at 95°C. Soils and stream sediments are screened by 80 mesh sieve to obtain the minus 80 mesh fraction for analysis.

All rock samples are crushed by jaw crusher and pulverized by ceramic plated pulverizer.

- 1. 1.000 gram sample is weighed into 25x200 test tube.
- 2. Add 2 ml of HNO₃ and let it set for 15 minutes and then add 5 ml of $HC10_{L}$.
- 3. Place test tubes on sandbath for 6 hours and elevate temperature to 200°C.
- 4. Take the test tubes off cool and dilute to 25 ml.
- 5. Read samples on Atomic Absorption Spectrophotometer.
- 6. Background correction can be carried out on Pb and Silver if it is requested.
- 7. Standards are digested along with each set of samples and calibrations checked.

MIN-EN Laboratories Ltd.

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GOLD GEOCHEMICAL ANALYSIS BY MIN-EN LABORATORIES LTD.

Geochemical samples for Gold processed by Min-En Laboratories Ltd., at 705 W. 15th St., North Vancouver Laboratory employing the following procedures.

After drying the samples at 95°C soil and stream sediment samples are screened by 80 mesh sieve to obtain the minus 80 mesh fraction for analysis. The rock samples are crushed and pulverized by ceramic plated pulverizer.

A suitable sample weight 5.0 or 10.0 grams are pretreated with HNO_3 and $HClO_4$ mixture.

After pretreatments the samples are digested with <u>Aqua Regia</u> solution, and after digestion the samples are taken up with 25% HCl to suitable volume.

Further oxidation and treatment of at least 75% of the original sample solutions are made suitable for extraction of gold with Methyl Iso-Butyl Ketone.

With a set of suitable standard solution gold is analysed by Atomic Absorption instruments. The obtained detection limit is 0.005 ppm (5ppb).

MIN-EN Laboratories Ltd. Specialists in Mineral Environments

Corner 15th Street and Bewicke 705 WEST 15TH STREET NORTH VANCOUVER, B.C. CANADA V7M 1T2

BLOOM TEST

November, 1980.

EXCHANGEABLE HEAVY METALS IN SEDIMENTS

COLD AMMONIUM CITRATE TEST

Preparation of Field Solutions:

Stock Dithizone Solution (0.01%): with graduate measure 100 ml of Toluene into 8-oz. polyethylene screw-topped bottle, and mark bottle at this level with china marking penicl for future reference; shake in contents of one vial of dithizone; shake, wrap bottle in aluminum foil to keep out light, and allow to stand for at least 1 hour before using.

Field Dithizone Solution (0.001%): add one part of stock dithizone solution and nine parts of toluene to polyethylene wash bottle, shake to mix, wrap with aluminum foil to keep out light. These liquids may be measured in the field with one of the marked cluture tubes; a supply of toluene may be carried in the field in a 32-oz. polyethylene screw-topped bottle.

Field Buffer Solution: with graduated cylinder, measure one part of 5X Buffer and four parts of metal-free water into 32-oz. polyethylene screw-topped bottle; shake to mix as needed; transfer portions of this reserve supply to polyethylene wash bottle for field use.

PROCEDURE:

- 1. Measure out one scoopful of sample, (approx 0.25 gm) leveled with spatual or pen-knife, and tap into marked culture tube.
- 2. Add Field Buffer Solution to 3 ml mark.
- 3. Add 1 ml of Field Dithizone Solution, bringing level to 4 ml mark.
- Insert a polyethylene stopper from one of the vials into the end of the culture tube, and shake briskly fifty times (15 seconds).

PROCEDURE CONTOD:

- 5. Allow Dithizone Solution to collect at surface of liquid and observe color. If green, record 0; if blue green, record ½; if blue, record 1; if purple or red, proceed with Step 6.
- 6. Add 1 ml more of Field Dithizone Solution, bringing level to 5 ml mark, and shake briskly 20 times (five seconds). If color is blue, record 2; if purple or red, repeat the shake-out adding Dithizone Solution in increments of 2,4,4 and 4 until blue end-point is reached; record total volume of Dithizone Solution needed to reach blue end-point; if the blue end-point is over-shot, the recorded value may be interpolated.

NOTES:

- Although this procedure does not differentiate between zinc, lead or copper, it is considerably more sensitive to zinc than to the other metals. Thus in general, a high heavy-metal value indicates a high zinc content.
- 2. For a 0.25 gm sample in this test, one ml of dithizone at the blue end-point is roughly equivalent to 1 part per million of exchangeable heavy metals expressed as zinc, this factor will vary with the texture of the sample and the timing of the shake-out.
- 3. It is important to standardize the timing of the shake-out in the procedure, as increasing the time of the sequence will give higher values.
- 4. Serious contamination in the course of the procedure is possible by inadvertent contact with the fingers or contaminated objects; all high values should be checked by repeating the entire procedure.
- 5. Dithizone solution decomposes in light to a yellow solution; this effect may be minimized by keeping all dithizone solutions in the dark, either under cover or in bottles wrapped in aluminum foil.

EQUIPMENT:

250 ml. SqUEEZE BOTTLES + DAPS (PENCOUTS) 4

1 graduated cylinder /co/m(.

- 1 Deeminac
- 1 wash bottle 250m(
- 10 -20x150 mm culture tubes & stoppers
- 2 aluminum scoops
- 1 test tube brush
 - aluminum foil

REAGENTS:

5001 1 AN SIER

2x500 ml Toluene (GC355 674 lx200 ml 5X Buffer 3x10 mg Dithizone



CHEMISTS · ASSAYERS · ANALYSTS · GEOCHEMISTS

VANCOUVER OFFICE:

VANCOVER OF THEL. 705 WEST 15TH STREET NORTH VANCOUVER, B.C. CANADA V7M 1T2 TELEPHONE (604) 980-5814 OR (604) 988-4524 TELEX: VIA U.S.A. 7601067 • FAX (604) 980-9621

TIMMINS OFFICE: 33 EAST IROQUOIS ROAD P.O. BOX 867 TIMMINS, ONTARIO CANADA P4N 7G7 TELEPHONE: (705) 264-9996

<u>Assay Certificate</u>

9V-1522-RA1

Company: JOHN M.MCANDREW Project: CLIFF 89 Attn: JOHN M.MCANDREW

Date: NOV-18-89

Copy 1. JOHN M. NCANDREW, SURREY, B.C.

He hereby certify the following Assay of 9 ROCK samples submitted NOV-16-89 by JOHN M.MCANDREW.

Sample	AU	AU	AG	AG	CU		
Number	G/TONNE	OZ/TON	G/TONNE	OZ/TUN	7.		
SUUTE CONTRACTOR CONTRACTOR AND A CONTRACTOR OF A CO	ala mandara a ang kalingkan ang kalina ka	en un contra trabation determin	المراجع والالاية (1997) (1997) (1997). المراجع والالاية (1997) (1997) (1997)	na yanan da dalamay	an shekar an shekar i shekar shekar s	e a de recepción da seconda en	un un för säkere i sinder konstruktion.
M18	.02	.001					
M19	.02	.001					
M20	.01	.001					
M21	.08	.002					
6906	.17	.005					
6907	.06	 .002	8. i	. 24	. 466	anna militä ainur ainun toitet Viiner Lenne aintet Ainita kuitet viitet viitet viitet	
6908	.05	.001	20.3	.59	1.090		
6909	" O 3	.001	14.2	. 41	. 840		
6910	.06	.002	24.4	.71	2.030		

Certified by

MIN-EN LABORATORIES



VANCOUVER OFFICE: 705 WEST 15TH STREET NORTH VANCOUVER, B.C. CANADA V7M 1T2 TELEPHONE (604) 980-5814 OR (604) 988-4524 TELEX: VIA U.S.A. 7601067 • FAX (604) 980-9621

TIMMINS OFFICE: 33 EAST IROQUOIS ROAD P.O. BOX 867 TIMMINS, ONTARIO CANADA P4N 7G7 TELEPHONE: (705) 264-9996

<u>Geochemical Analysis Certificate</u>

9V-1522-SG1

Company: JOHN M.MCANDREW Project: CLIFF 89 Attn: JOHN M.MCANDREW Date: NOV-17-89

Copy 1. JOHN M. MCANDREW, SURREY, B.C.

He hereby certify the following Geochemical Analysis of 24 SOIL samples submitted NOV-16-89 by JOHN M.MCANDREW.

Sample Number	CU PPM	ZN PPM	
MO1	54	53	
M02	46	25	
MO3	42	31	
M04	20	24	
M05	16	17	
M06	400	697	
M07	44	37	
MOB	54	33	
M09	53	40	
M10	48	36	
M11	29	48	
M12	80	59	
M13	54	37	
M14	76	59	
M15	40	31	
M16		55	
M17	80	158	
M22	78	12	
M23	124	18	
M24	186	14	
M25	124	26	
M26	404	166	
M27	113	175	
M28	27	36	

Certified by

MIN-EN LABORATORIES

APPENDIX













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the ar an extension of the state of the sta		UDHN M. MCANDREW CLIFF CLAIMS, NANAIMO, M.D. PORT HARDY, B.C. N.T.S. 92LIIW + 12E L.50° 37'
orand onligo - In-innet-thyritotek		SCALE: 1: 500 APPROVED BY: JOHN M. MCANDREW DATE: 1, 12, 1989 P.ENGR. SURREY, B.C.
		MAGNETOMETER SURVEY + Geology
		13 10 5 20 METERS MAP3



17 X 22 PRINTED ON NO. 1000H CLEARPRINT .

TRUE LEGEND LATE JURASSIC TO TERTIARY (?) HORNBLE NDE // % % // GRANODIORITE SKARN MINERALIZATION - CP, Bn, SL, GAL, Mag, Ag, Au 4 Mb UPPER TRIASSIC AND LOWER JURASSIC LIMESTONE XXANDE SITE 14 BASALT FELDSPAR PHENOCRYSTS IN BLACK 94 APHANITIC MATRIX; FLOW OR INTRUSIVE ? OUTCROP BOUNDARY & BEDDING INFERRED CONTACT 1.P., L.P. INITIAL & LEGAL POSTS, ALL POSTS & CLAIM BOUNDARIES -0-ESTABLISHED BY BRUNTON + CHAIN. SWAMP 4 BOUNDARY * -----HORNBLENDE GRANODIORITE FLOAT XH-G BF SOIL SAMPLE MG DBT4 BLOOM TEST 4 mls PPM Copper 11 ZINC 400 697 GEOLOGICAL BRANCH ASSESSMENT REPORT TO ACCOMPANY ASSESSMENT REPORT BY J.M. MCANDREW, P.ENGR., SUBMITTED DECEMBER 14, 1989 . JOHN M. MCANDREW CLIFF CLAIMS, NANAIMO, M.D. PORT HARDY, BC. N.T.S. 92LIIW + 125 1.60" 37' SCALE: | : | 0 0 0 APPROVED BY: DRAWN BY MAR JOHN M. MCANDRE W DATE: 1, 12, 1989 P. ENGR. Surrey, B.C. GEOCHEMICAL SURVEY 40 NETERS 20 10 30 MAP2

