521157

CANADIAN SUPERIOR EXPLORATION LIMITED

REPORT ON GEOLOGICAL MAPPING

on the

COPPER CLIFF PROSPECT

LOCATION: 10 miles West of Lardeau, B.C.
Lat. 50°10' N; Long. 117°10' W
N.T.S. 82K/3E

CLAIM NAMES:

Reverted Crown Grants
Perth L8793 and Pyrite L8794
New Claim Record Nos.
18104 Oct. and 18105 Oct.

WORK PERIOD:

August 26 - September 1, 1976

D.R. Rae, B.Sc., M.Sc.
Vancouver, B.C.
October 28, 1976

CONTENTS

INTRODUCTION

The Copper Cliff property is a volcanogenic massive sulphide prospect held by Canadian Superior Exploration under option from Otaker Janout. Two men spent 7 days geologically mapping and prospecting the property.

SUMMARY

Rocks of the Kaslo group, a volcano-sedimentary unit of Permian and/or Triassic age host the showings.

The period August 26 - September 1, 1976 was spent mapping and prospecting the property to assess its potential as a massive sulphide prospect.

Four laterally restricted occurrences of massive sulphides were noted within a lens-shaped felsic volcanic-metasedimentary break between two andesite flow sequences.

Massive sulphides are predominantly pyrrhotite with lesser but variable amounts of chalcopyrite, sphalerite, pyrite and galena. Grades in general are low but highly variable such that individual hand specimens up to an estimated 3% Cu and 3 - 5% Zn were observed.

CONCLUSIONS AND RECOMMENDATIONS

Surface dimensions and tenor of showings are restricted but indicate a geologic target favorable for the development of a massive sulphide deposit.

The host horizon is open to the northwest and should be further prospected and mapped where topography permits using large scale air photos. In prospecting, emphasis should be placed on searching for rhyolite breccia as well as mineralization.

Diamond drilling is recommended.

PHYSIOGRAPHY AND ACCESS

The property lies within the Selkirk Mountain Range on the southern slopes of Mount Cooper, 10 miles west of Lardeau, B.C. The showings are situated at about the 4700' contour along a southeasterly flowing tributary to the main branch of Cooper Creek.

Cliff faces along this tributary made grid mapping impossible in areas and induced undoubted measurement inaccuracies where attempted.

Access is by helicopter.

HISTORY

Reference to work done on the claims dates back to 1907,[1] when 6 men spent approximately 5 months in development work. Two adits, the upper 14 feet long and the lower 90 feet in length evidence these efforts.

In October 1974 Otaker Janout of White Rock, B.C. acquired the claims and his son has prospected the claims periodically since that time.

There is no record or evidence of diamond drilling on the property.

CLAIM STATUS

Otaker Janout obtained the claims in October 1974 as the Perth and Pyrite Crown granted claims lapsed because of taxes owing. They presently hold the status of ordinary mineral claims and are grouped under the name Copper King.

(1) B.C.D.M. Report, 1907; p. 96
G.S.C. Summary Report, 1908; pp. 86-87

As per a letter of intent with Mr. Janout, Canadian Superior staked the PIPE 1-4 claims to protect the area about the Copper King group. The PIPE claims, consisting of 12 units each, were recorded on October 13, 1976 and are shown on the location map (Figure 1).

REGIONAL GEOLOGY

The property is located within the northwest striking Kalso Group of volcanics and sediments determined by the G.S.C. to be Permian and/or Triassic in age. On a regional scale the group has been anticlinally folded and later intruded by a Jurassic leuco quartz monzonite batholith and its satellite stocks.

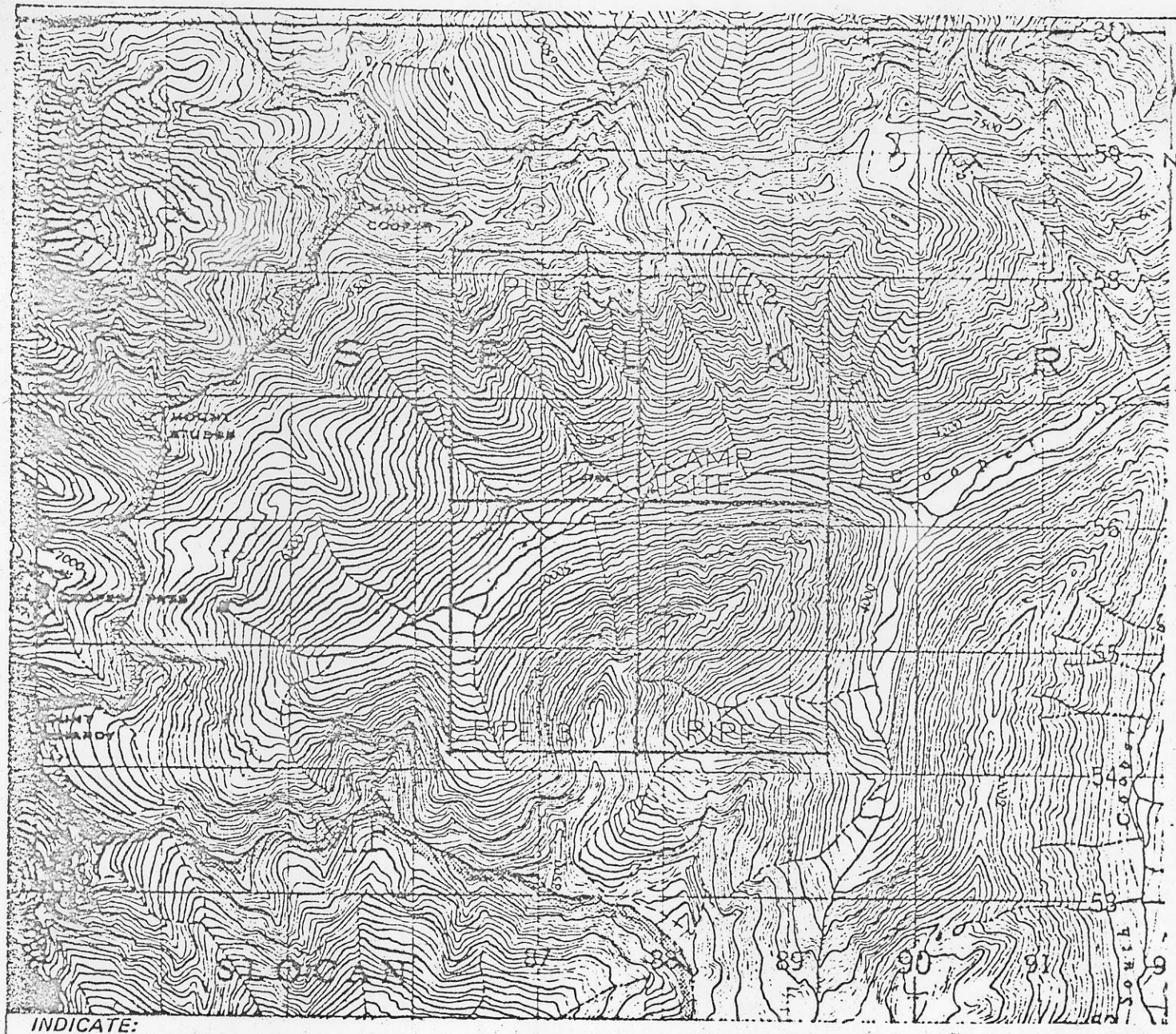
Windows of the older Milford and the younger Slocan Groups appear with the Kalso group suggesting the latter has been complexly folded.

The main mass of the Kalso Group in which the area of interest is contained is situated southeast of the Kuskanax Batholith. In this area the broad anticlinal structure plunges moderately to the southeast.

PROPERTY GEOLOGY

A detailed look at the showings and neighbouring geology was necessary to establish the environment in which the showings are situated. The 1" = 1 mile air photos available were of no value to this end. Consequently flagged chain and compass grid lines were established at attitudes permitted by the topography. These grid lines are shown on the accompanying geology map (Figure 2). This mapping method severely restricted both the amount and aerial position of the area that could be mapped and the absence of tie-lines induces obvious positioning inaccuracies to which the reader's attention is drawn. Use of enlarged orthophoto maps is suggested.

12/42 1/53



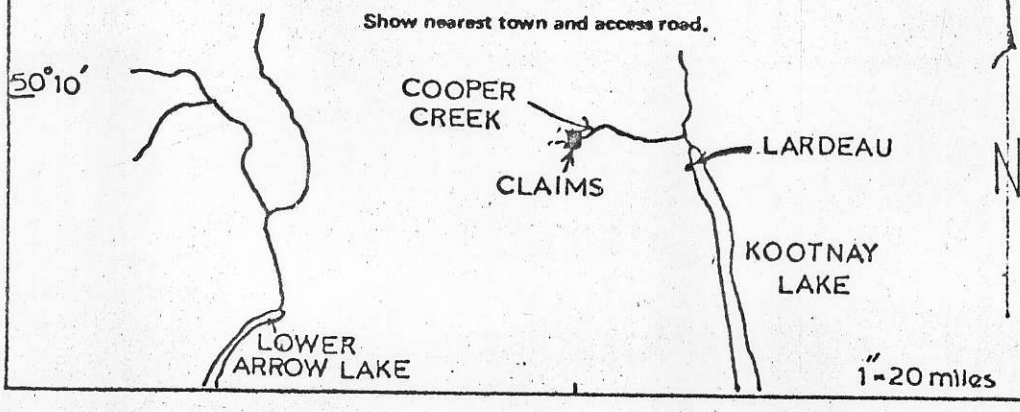
INDICATE:

Claim boundaries, permanent watercourses, access road and distance to nearest town, proposed roads, test pits, trenches, ground slope at trenches, drill sites, and camp sites.

117°10'

LOCATION MAP

Show nearest town and access road.



CROWN GRANTS 8793 & 8794

Name of property COPPER CLIFF

Claim No. 18105 & 18104

Owner OTAKER JANOUT

Date SEPT. 30, 1976

File No. _____

FIGURE 1

As shown in Figure 2, massive pyrrhotite mineralization is stratabound by a near vertical sedimentary-acid volcanic lens within Kalso volcanics. A metasedimentary unit of interbedded siliceous argillite and quartzite northeast of the andesites is similar to that described by the G.S.C. as a unit of the younger Slocan Group. Portions of Kuskanax stocks border the mapped area to the east and west. Dikes and sills of Kuskanax affiliation intrude the volcanics and sedimentary units.

LITHOLOGY

The Kaslo Group, as observed within the area mapped, has been subdivided into two distinct andesite flow units separated by a sedimentary-felsic volcanic formation. Type I andesite defines the western side to the group and is composed of fine to medium-grained green and white andesite flows of from 1' - 30' thick, separated by 6" - 5' pale green laminated dacite, chert and fine-grained metasediments. The proportion of interflow sediments to flow volcanics increases to the east. Type II andesite situated to the west is coarser in grain size (medium to coarse-grained), massive and was not observed to contain interflow sediments. A larger proportion of the mafics within this unit is amphibole perhaps reflecting its proximity to the stock mapped further to the east. Divisions within the sedimentary-felsic volcanic formation have not been mapped. Rock types noted include: laminated cherts, cherty argillites and fine-grained tuffs; narrow very fine-grained massive rhyolite flows (rare quartz eyes seen); pale green-yellow laminated pyritic chert or tuff?; rhyolite breccia probably better termed an agglomerate; and massive sulphide lenses containing generally less than 30% siliceous fragments. Sediments dominate the horizon volumetrically.

West of Type I andesites a metasedimentary unit of fine to very fine-grained grey to black siliceous argillite interbedded with quartzite appears similar to a unit assigned to the Slocan Group by the G.S.C. Individual beds are generally less than 6" thus imparting a ribboned appearance to many exposures.

Intrusives shown at the west and eastern margins of the mapped area in Figure 2 are representative of stocks of Kuskanax type. Quartz monzonite in composition, they contain 10 - 25% mg quartz, generally larger crystals of plagioclase, locally porphyritic and a very low mafic content.

Felsite dikes and sills are fine-grained compositional equivalents to the intrusive above.

STRUCTURE

Formations strike northwesterly and dip steeply to the east or west. Tops could not be determined from graded bedding or the presence of a pipe. If the interbedded argillite and quartzite unit west of the andesites is part of the younger Slocan series tops would then be to the west. However, pyrrhotite-chalcopyrite mineralization in the upper adit grades into massive mineralization from west to east with a sharp eastern contact suggesting tops are to the east.

ALTERATION

Volcanic flows have been altered from green schist to amphibolite facies. Chlorite and stringer sulphide 'pipe' alteration was looked for but not found.

Hydrothermal alteration effects by the intrusives is minimal.

MINERALIZATION

Four areas of mineralization are shown in Figure 2. In all of these pyrrhotite is by far the dominant sulphide. Subordinate amounts of chalcopyrite, sphalerite, pyrite and minor galena locally produce ore grade hand specimens but it is doubtful a bulk sample of all the sulphides observed would run in excess of 1% combined Cu-Zn.

The two southernmost showings at present are less than 1' wide and neither is traceable over more than a few feet. The most southerly of these appears to have been exhausted by a 12' long trench outside which abundant specimens rich in Cu and Zn are present.

Within the upper adit the thickest concentration of sulphides are found. From the back of the adit 6' of low grade pyrrhotite-pyrite-chalcopyrite-sphalerite mineralization within cherty argillite quickly grades into a 6' lens of essentially massive pyrrhotite. This lens is separated from another 2' wide sulphide lens by a bed of cherty argillite. The sulphides pinch out sharply over a 20' strike length to a 6" - 1' thick sulphide horizon which strikes up the hill for over 100' (as shown in Figure 2).

At the showing in the creek two 2' beds of massive pyrrhotite-pyrite (2-3% chalcopyrite) are separated by 1 1/2' of chert. The showing is visible over 15' of strike length but disappears under stream debris at either end. Examination of outcrop further along strike limits its maximum dimension to about 50'.

ECONOMIC GEOLOGY

The showings located to date are small in size and on average low in grade. However, their position within a pause in andesite flow activity represents a classic volcanogenic-massive sulphide environment and as such should be actively pursued. Assay results for 3 of the 4 showings discussed above are listed in Appendix III. Results are considerably higher than field estimates.

REFERENCES

- G.S.C., Summary Report, 1908; pp. 86-87.
- B.C.D.M. Report, 1907; p. 153.
- G.S.C., Memoir 161; 1929.
- G.S.C. Geology Map O.F. 288 (Wheeler and Reid).

APPENDIX I

COST STATEMENT

In support of an Affidavit on Application to Record Work on the Copper King Group of claims, Slocan Mining Division.

Costs incurred in support of geological mapping from August 26 to September 1, 1976 are as follows:

1.	Helicopter (Camp in)	$ 601.24	
	(Camp out)	534.88	$1,136.12
2.	Food		110.90
3.	Geological Mapping		
	D. Rae - 7 days @ $60.00/day	$ 420.00	
	J. Hemelspeck - 7 days @ $55.00/day	385.00	805.00
4.	Report Preparation		
	D. Rae - 2 days @ $60.00/day		120.00
	TOTAL		$2,172.02

APPENDIX II

CERTIFICATE

I, Donald R. Rae, of Vancouver, in the Province of British Columbia do hereby certify that:

1. I am a geologist residing at 1003 - 1933 Robson Street, Vancouver, British Columbia.

2. I am a graduate of the University of Toronto, Toronto, with a degree of B.Sc. (Hons.) (1970), and a degree of M.Sc. (1975) in Geology.

3. I have been practising my profession for four years.

D.R. Rae, B.Sc., M.Sc.

Vancouver, B.C.
October 28, 1976

In summary, the Copper Cliff may be interpreted as a massive volcanogenic sulphide occurrence in bedded cherts. Lineations suggest that the zone is closed to the south-east, but that it is open to the north-west. The limited vertical dimensions of the zone (100 feet ±) suggest a small target. Any increase in dimensions towards the north-west would have to be demonstrated by electromggnetic surveys.

A longitudinal sketch section parallel to the dip and strike of the zone is appended to illustrate the interpretation.

R.V. Beavon.

RVB:nl
Encl.

Reference: C.S.E. report on Geological Mapping of the Copper Cliff Prospect (1976) by D. Rae.

Just at the head of Kootenay lake the rocks form a low anticlinal arch with a slight plunge northward. The almost horizontal dip in the centre of the valley rapidly changes to steeper angles on the limits of the anticline on either side, and in a short distance from the valley becomes highly inclined, overturned, squeezed into tight S folds and faulted. On the Cooper Creek slope the prevailing dip will be, therefore, westward; on the Hamill Creek slope, eastward.

The sedimentary series, with included greenstone schists, and, especially near the head of the creek, granite dikes, extends to the head of Cooper creek where the granite massive, which forms the divide between the Lardeau and Columbia river, is encountered. Approaching the granite the sedimentary rocks are much contorted, crinkled on both a large and a small scale, and frequently faulted. Quartz is developed, especially as bedded veins and often in the saddles or inserted saddles of rock folds.

On the Great Britain claim at the head of the south fork of Meadow creek and at the north branch of Cooper creek, a considerable amount of work has been done, one tunnel having a length of 300 feet run in to prospect quartz 'veins' exposed on the cliff a short distance above the tunnel mouth. Some good ore has been obtained from the 'veins'—grey copper in kidneys in a quartz gangue.

The relationship of the quartz to the rocks is suggestive of a saddle reef, but complications are introduced by faulting, so that following the ore is difficult. On the opposite side of the gulch another tunnel has been run in 150 feet to develop a quartz lead mineralized with pyrite, siderite and sericite. Above this tunnel on the summit of the hill, bedded veinlets of quartz are abundant in the phyllites.

Up the south branch of Cooper creek, above the second forks, is an outcrop of acid granite strikingly porous (miarolitic). The sedimentary rocks invaded by this granite include some black limestone bands, some of which are altered to white marble, and some are beautifully interbanded with fine slaty layers.

A little farther up the south branch, on the west slope of the valley, is the Cooper Cliff group of claims, on which some work was being done. On the sides of a little gulch the exposed rocks are rust-covered from decomposing sulphides. The country rocks consist of greenstone and banded sedimentary rocks, which are upturned to an almost vertical position, with intruded sheets or dikes of granite-porphyry. Some of these are about, if not quite, parallel to the strike of the sedimentary rocks. (If they have been intruded between the strata they should be called sheets, but as it is not certain that this is the case, for any great distance, the commoner term dike may be employed). Near the dikes, and parallel to the strike of the rocks, are several bands of ore. One band, about two feet wide, is exposed on the trail to the main exposure. The second, on which a crosscut tunnel was being run, has a width of three feet, then a horse of dike was run through, with ore again on the other side. The face of the tunnel was still in ore, several feet beyond the dike. Across the gulch, near a little canyon, a couple more small bands of ore were exposed. The ore, which could not be traced for any great distance up the mountain (and below its outcrops the slopes are wash covered), seems to be confined to the neighbourhood of the dikes. It consists of pyrrhotite, chalcopyrite, often interbanded with the pyrrhotite, a little zinc-blende, with, in places, a considerable amount of calcite gangue. Most of the gangue is, however, silicified rock (jasperoid) and biotite-schist. On the north side of the canyon some pyroxene-like mineral is also developed in the gangue.

see also 1917 Mem 161

The ore is said to run low in gold but to carry some silver ; the main value is in the copper, which, however, is variable.

The work done was insufficient to enable an opinion to be formed as to the percentage of copper the ore was likely to carry and the amount of ore that might be developed. The deposit is interesting, being a unique type in the Lardeau, where practically all the known lodes are either auriferous or silver-led quartz deposits, in which chalcopyrite is inconspicuous and tetrahedrite is the only abundant copper-bearing mineral. The Copper Cliff ore, on the other hand, is more like some of the ores in the southern part of West Kootenay, such as the Rossland camp. This resemblance consists not only in the association and dominance of pyrrhotite and chalcopyrite, but in the biotitization and silicification of the associated country rock.

The main difference between this and the other Lardeau deposits, outside the ores, is the number of granite-porphyry dikes occurring here and the metamorphism of the sedimentary rocks adjacent to them. There is a strong probability of a genetic relationship between those dikes and the ore deposits.

The rocks of the Duncan river to Hall creek are phyllites, hornblende and mica schists and gneisses, with a few limestone and quartzite bands.

The rocks up Hall creek are somewhat similar but less metamorphosed. A heavy band of quartzite several hundred feet thick constricts the creek into a canyon. Above this to the 'lime dike,' near the head of Hall creek, the rocks are graphitic phyllites, with occasional bands of limestone and green chloritic schists. Small quartz veins cut these rocks in an intricate way and silicify them in the neighbourhood of the veins.

The Bannockburn claim on the south side of Hall creek, just below the 'lime dike,' was once worked, but has been neglected the last few years. The work consists of numerous open cuts along a vein exposed on a rock bench, and a tunnel run in to crosscut this vein from below. The vein can be traced for several hundred feet and seems to occupy the contact between a rusty, thinly fissile schist (west wall) and a limestone band (east wall). It varies greatly in width from a mere streak to, at one point, several feet of solid ore. The ore consists of galena, zinc blende and chalcopyrite, weathered on the surface to rusty oxides and carbonates. The tunnel has been driven in ninety feet to a silicified and slightly mineralized band of rock which has been followed about one hundred feet, without encountering any ore. It is doubtful if this tunnel has been driven far enough, as a crosscut, to catch the vein, and there is as yet no proof that the vein is only superficial.

In this part of the country where the rocks are so badly folded and the veins show a tendency to be bedded (*i.e.*, conform to the bedding planes of the rock) it is very risky undertaking expensive work to crosscut them at depth, without first having followed them down, and thus accurately determined their position. On account of its topographical character most of the work so far done in this part of the country consists of crosscut tunnels that have rarely encountered the veins. So that although there are some good surface showings, it is in most cases still uncertain whether they extend downwards, and if they do, whether the values hold.

Some work was being done on the Wagner claim, mostly in the nature of preparations for serious exploration. This prospect was described in the Summary Report for 1904. The tunnel is now said to be in 100 feet with a forty-foot crosscut. From the tunnel a winze sixty-five feet deep has been sunk and from the winze a

MIN-EN LABORATORIES LTD.
705 WEST 15TH STREET
NORTH VANCOUVER, B.C.
Phone: 980-5814

Certificate of Assay

TO: Canadian Superior Explorations, Attn: D. Rae
2201-1177 W. Hastings St., PROJECT No. DATE Oct. 29/76.
Vancouver, B.C. File No. 2983

SAMPLE No.	Cu %	Pb %	Zn %	Ag oz/ton	Au oz/ton
CC1+00W 1+44S (Copper Cliff Coordinates)	.175	.14	2.70	.37	.019
CC1+30W 3S	4.650	.23	5.90	1.78	.016
SLSHOW (Sugar Lake Showing)	.680	.06	.11	.42	.024
BCSHOW (Boulder Creek Showing)	.063	.07	.08	.16	.011
Cr. Upper ADIT (CC Cliff Creek Adit)	5.350	.09	1.86	1.35	.018

MIN-EN Laboratories Ltd.

CERTIFIED BY

PROPERTY EXAMINATION

NAME: COPPER KING.

LOCATION: Cooper Creek, north side of main fork, 3.25 miles upstream from junction of south fork. Cooper Creek joins the Duncan River at a point 1/2 mile above the north end of Kootenay Lake. The showings are on 2 old Crown Grant claims, at elevation 5000'. NTS 82K/3E½

ACCESS: Helicopter from Nelson or Revelstoke. There are roads to elevation 6000' within 5 miles of the prospect on the north side of Cooper Creek, but a new route, about 9 miles long from Lardeau on the south side of Cooper Creek would be necessary to gain road access to the property.

OWNERSHIP: Otto Janout, and Otto Janout Jr., 310 - 1509 Martin, White Rock, B.C. Two reverted Crown Grants, Lots 8793, 8794.

EXAMINATION:

HISTORY: Two short adits and one or more trenches were put in about 1900 and 1910.

GEOLOGY & MINERALIZATION: The claims and surrounding area are underlain by volcanics volcaniclastics and argillites assigned to the Permian and/or Triassic Kaslo Group by the G.S.C.

The mineralized zone is shown underlain by an outlier of the Kuskanax Batholith on Open File Map 288, G.S.C. There are a few post-mineral dikes of granitic rock present, but the showings are wholly in Kaslo rocks. Kaslo lithology is probably dominantly volcanic to the west (down section?) and sedimentary to the east.

Copper occurs as chalcopyrite both disseminated with pyrrhotite sulphide bearing schist (meta tuff?) and with pyrrhotite, sphalerite in massive lenses conformable with the bedding. Sulphide schist contains at best a few hundred ppm Cu. The lenses are distributed over a 50' thick section of sulphide bearing meta tuff or meta sediments, and possibly overlying, meta andesite flows and breccias. The massive sulphide lenses, which strike about 160° and dip steeply west; are distributed in an echelon fashion over an exposed strike length of about 400'. To the north, the sulphide bearing horizon is well exposed. It narrows to 10' to 20' over a distance of 2000'. No massive sulphides occur. At the contact between andesite and bedded sulphide schist, just north of the northern most massive lens, is a 5' to 20' thick, 200' to 300' long lens of dacite breccia with fragments to 6". To the south the zone goes under cover in the Cooper Creek Valley for at least 2500'. A zone, east of andesite flows and breccias, including a (basal?) western 5' band of felsic tuff

and 100' of rusty, pyrrhotite bearing thin bedded sediments or tuffs was noted on the south side of Cooper Creek at elevation 5900', about 4000' at bearing 160° from the showings. These rocks, striking 015° and dipping 70° to 90° east, may be the favorable horizon. Only pyrrhotite was seen here.

At the showing area the largest lens of massive sulphide is about 100' long, and averages about 2' to 2.5' thick. In the upper crosscut, a post mineral dike cuts this lens and may have locally affected the thickness. Samples were taken as follows:

Upper Adit	% Cu	% Zn	Ag Oz/T	Au Oz/T
3.5' east of dike	2.12	0.42	0.51	0.01
5' west of dike	3.50	1.66	1.20	0.01

The lower crosscut, driven from a point just south of about 60' below the upper crosscut failed to intersect the same lens.

Other lenses of massive mineralization range in size from 6" x 30' to 1.5' x 100'. They appear to be of about the same grade as the sampled material.

The exposed mineralization is too limited in size to be attractive. The property potential lies down dip or beneath overburden to the south.

The deposit is quite obviously a volcanogenic massive sulphide. Further testing will require diamond drilling, possibly preceded by some geophysical surveys. The minimum cost for a reasonable test, including helicopter transport and fairly expensive site preparation, is estimated to be about $75,000.

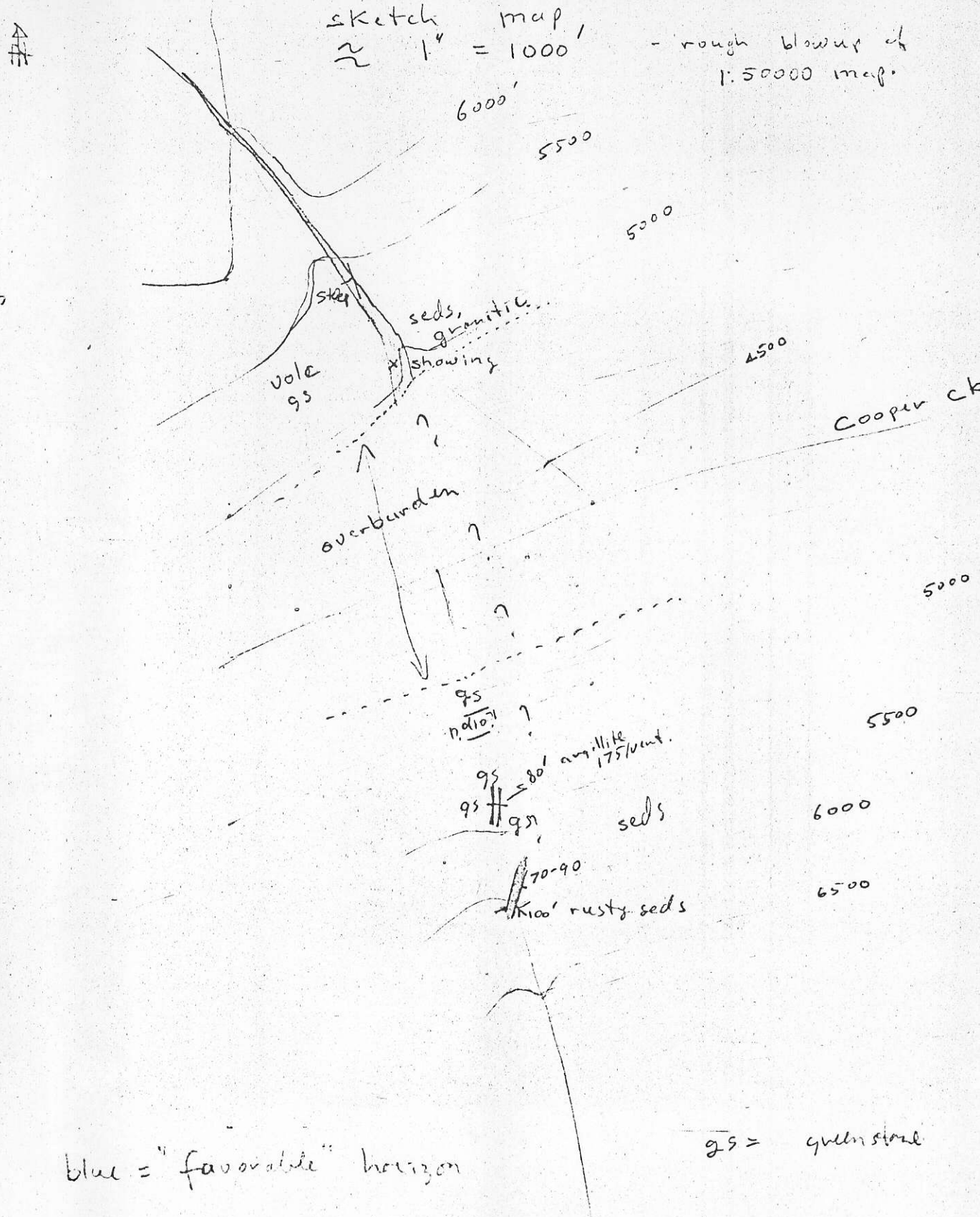
M.R. WOLFHARD

August 10,1976

BY MRL DATE Aug 6/76 SUBJECT Copper King
Cooper Creek
Landeau

CHKD. BY DATE

SHEET NO. OF
JOB NO. 82 K 3E 1/2



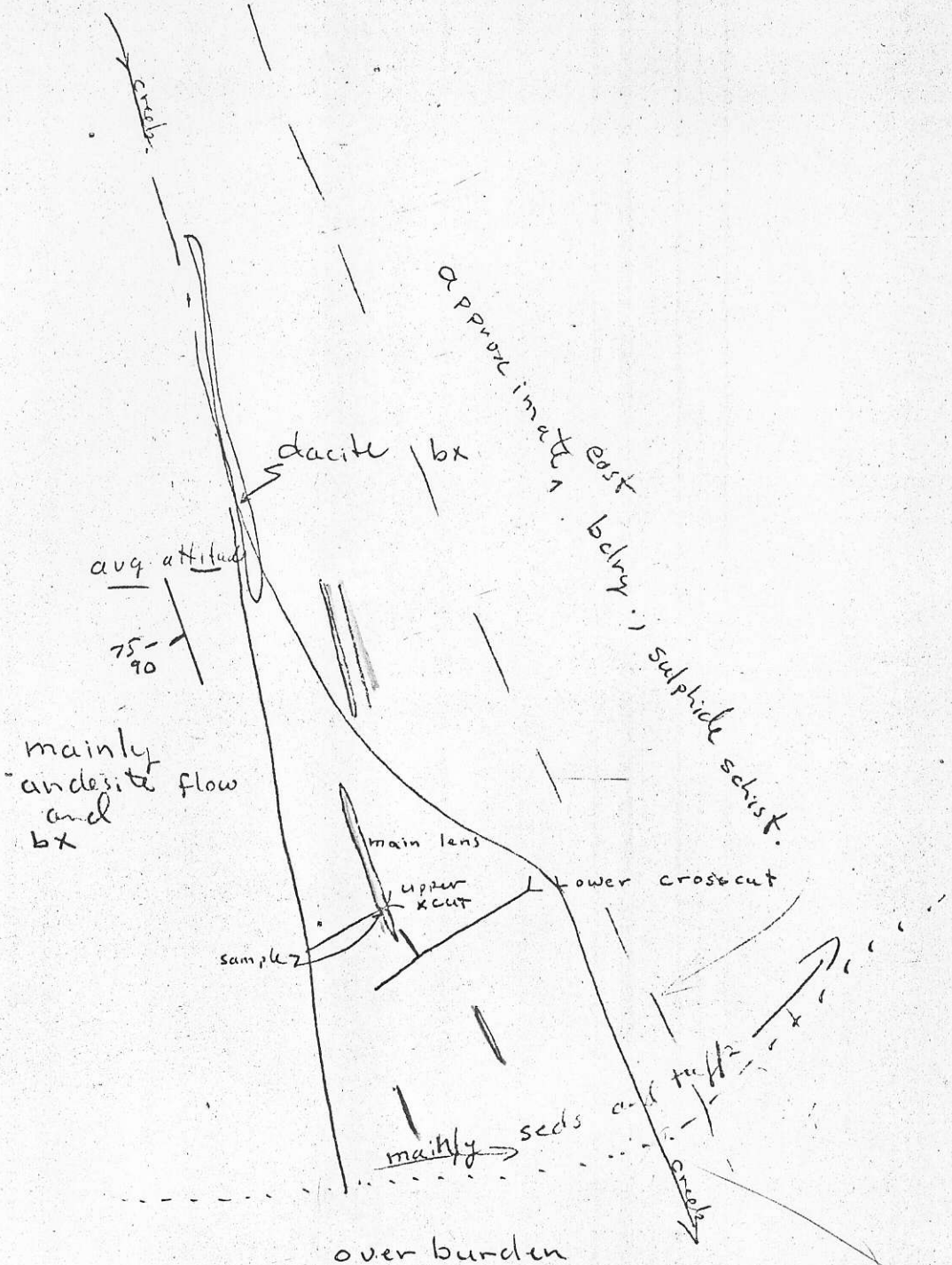
blue = "favorable" horizon

gs = greenstone

BY MRW DATE Aug 6/76 SUBJECT Copper King, Cooper Creek, Lardeau SHEET NO. ... OF ...
CHKD BY ... DATE ... JOB NO. 82-K-3 E 1/2

Sketch map

1" x 100'



yellow = massive sulph

□ old campsite


350
10
20
30
40
13
15

Copper King?


BC4387-04

LEGEND

LEUCO QUARTZ MONZONITE : mg, 10-25 % quartz, locally porphyritic plagioclase, 5 % mafics as biotite replaced pyroxene ? and mafic clots ; traces hematite , pyrite ; locally garnetiferous near contacts

FELSITE f-vfg dikes and sills similar in composition to leuco quartz monzonite

METASEDIMENTS interbedded grey to black argillite and quartzite

ANDESITE - TYPE I - f-mg andesite ; 40-60 % chlorite with 6"-2' interbeds pale green metadacite - metasiltstone ; minor Py

FELSIC SERIES - undifferentated - well bedded reddish black cherty argillite ; white to yellow green pyritic rhyolite, tuff ; possible thin rhyolite flows ; local occurence of rhyolite breccia (see maps) ; patchy massive sulfides Po-Py-Cp-Sphal. 6"-6' thick

ANDESITE - TYPE II - m-cg andesite ; 40-60 % chlorite ; 1-2 % disseminated Py ; no interbeds observed.

BEDDING

OUTCROP

GEOLOGICAL CONTACT

ASSUMED GEOLOGICAL CONTACT

CLIFF FACE (down direction on spiked side)

STREAM AND FLOW DIRECTION

MINERALIZATION

ADIT

CANADIAN SUPERIOR EXPLORATION LIMITED

COPPER CLIFF PROSPECT

GEOLOGY MAP

FIG. 2

DWG. D.Rae

N.T.S.

SCALE 1"=100'

inches 0 1 2 / 0 1 2 3 4 5 centimetres

BRITISH COLUMBIA GEOLOGICAL SURVEY

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

L 5 W

L 4 W

L 3 W

L 1 W

SNOW COVER

Steep Slope Heavily Treed

Rhyolite Breccia Pods up to 30' long

15' Falls

10' Falls

20' Falls

UPPER FP

Base Line

75°

80°

85°