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CINDY MINING  
REPORT ON GEOLOGY  
of  
PROPERTY NEAR  
CRANBROOK, B.C.

**CINDY MINES LTD. (N.P.L.)**

**REPORT ON GEOLOGY**

**OF**

**PROPERTY NEAR**

**CRANBROOK, BRITISH COLUMBIA**

**BY**

**A. C. A. HOWE & ASSOCIATES LTD.**



Expiry Date: October 20, 1966

**Vancouver, B. C.**

**May, 1966.**

**A. C. A. HOWE & ASSOCIATES LTD.**

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SUMMARY

Cindy Mines Ltd. (B.P.L.) holds a group of claims five miles northeast of Cranbrook, in the Fort Steele Mining Division of British Columbia.

Mineralization is in the form of stringers and disseminated grains of chalcopyrite within a diorite sill of the Purcell series of Precambrian age. The sill has intruded calcareous and argillaceous sediments of the Kitchener formation. Several northeasterly trending faults occur near the main showing.

The mineralized section of the sill has been traced for a distance of 1500 feet on surface. The sill probably has considerable strike length though its width could not be determined due to overburden. The possible existence of a replacement type copper deposit in the adjacent limestone should not be discounted.

It is recommended that a systematic exploration programme be implemented on the property. The estimated cost of this programme is \$26,500.00



Expiry Date October 20, 1966

INTRODUCTION

This report is based on information derived from examination of the property by S. Tan on April 10, 1966 and on government reports and maps covering the area of British Columbia.

PROPERTY

The property consists of the following claims:

<u>CLAIM NAME</u>	<u>NO. CLAIMS</u>	<u>RECORD NO.</u>
Happy Day	1	8047
Happy Day	2	8065
Happy Day	3	8066
Happy Day	4	8048
Happy Day	5	8181
Happy Day	6	8182
Happy Day	7	8231
Red Chief	1-2	8377 - 8378
Tom	1-75 inc.	8198-8285 inc.
Tom	78-85 inc.	8286-8293 inc.
	86-93 inc.	not yet available.

The total property now held consists of a contiguous group of 100 claims.

LOCATION AND ACCESS

Approximate co-ordinates: 115° 43' W, 49° 35' N.

The property is situated about five miles northeast of Cranbrook on the west side of the Rocky Mountain Trench. It can be reached by a gravel road that runs east from Highway 95, two and one half miles from Cranbrook.

TOPOGRAPHY

Elevations on the property range from 3000 feet to 3500 feet above sea level. A few small lakes are located 1000 feet to the northwest of the showing. The terrain is gently undulating, and sparsely forested, with grassland predominating. Several cattle ranches are present in the immediate area.



## GENERAL GEOLOGY

- References: (1) Rice, H.M.A., 1937: Cranbrook Map-area British Columbia, Geol. Surv. Canada, Mem. 207.
- (ii) Leach, G.B., 1960: Geology-Fernie (west half). Geol. Surv. Canada, Map 11, 1960.

The geology of the area is described in the above two publications. Rice's map, on a scale of 1 inch to 1 mile, gives greater detail than the one by Leach. Map 396A accompanying Rice's Memoir 207 shows the boundaries of the chief rock units in the vicinity of the property.

The property is located on the west side of the Rocky Mountain Trench. Sedimentary rocks ranging in age from Precambrian to Lower Cambrian underlie the major part of the area. Numerous dykes and sills of dioritic composition have intruded the sediments.

The oldest Precambrian sediments in the immediate area are the Creston formation consisting of grey and green argillite and siltstone, and grey, green, white and purple quartzite. This rock unit is overlain by the Kitchener formation which is made up of dolomitic argillite, quartzite and grey dolomite of which the dolomite rocks are weathered buff to brown. In addition, quartzite and grey limestone are also present. The Siyeh formation overlies the Kitchener. It is composed of varicoloured argillite, red weathering dolomite and argillaceous dolomite, dolomite, argillite, siltstone, quartzite, and grey weathering limestone.

The Siyeh in turn is overlain by the Lower Cambrian Cranbrook Formation, consisting of quartzite, grit, conglomerate and sandstone.

Overlying the Cranbrook is the Eger Formation of Cambrian age, composed mainly of argillaceous sediments with minor limestone, siltstone and sandstone.

The Precambrian dykes and sills in the area are collectively referred to as the Purcell series and are divided into (i) Purcell Intrusives, dominated by diorite with other rock types that range in composition from gabbro to granite, (ii) Purcell Extrusives, consisting of andesitic lavas. In general, the Purcell sills and dykes strike north easterly.

### STRUCTURAL GEOLOGY

Structurally, the Rocky Mountain trench in the vicinity of the property is very complex. It is characterized by an abundance of uni-directional faults, the majority of which strike parallel to the Trench. In addition, the sedimentary rocks are extensively folded.

The largest fault in the Cranbrook map area is the Molfie fault. It is a northeasterly striking reverse fault that dips steeply to the northwest and is believed to be Precambrian in age. This fault is located about four and one half miles southwest of the property. A major fault or series of faults parallel to the Rocky Mountain Trench, lies along Joseph Creek about two miles west of the property. This fault system cuts the Molfie fault. The northern part of the property is traversed by a northeasterly fault and also to the south of the property are a series of northeasterly striking faults (along Highway No.3). These faults are probably related to and form part of, the Molfie fault system. Diorite dykes and sills generally strike parallel to the northeasterly faults and have probably entered along some of these major tectonic breaks. It is likely that

copper mineralization and the diorite intrusives are controlled by these northeasterly fault systems.

### ECONOMIC GEOLOGY

The main showing on the property consists of "disseminated copper" in what appears to be a diorite sill of the Purcell series. Three shallow trenches were sunk to test the showing.

The diorite sill strikes northerly and was traced along strike for a distance of 1500 feet. To the east a 40 foot wide skarn zone separates it from the dolomites and limestones of the Kitchener formation and to the west it is in contact with quartzite and skarn. Overburden in the area prevented an accurate determination of the sill's width. The diorite is porphyritic locally and has been partly altered to sericite, clay minerals and chlorite.

The copper mineralization occurs both in disseminated form and also as a stockwork of closely spaced quartz veinlets and stringers carrying sulphides. Discrete grains of sulphide mineralization have pitted the host rock and quartz stringers imparting a "salt-and-pepper" appearance as shown in Plates 1 and 2.

Chalcopyrite and bornite account for most of the mineralization with little or no pyrite present. This deficiency of pyrite may have been a contributing factor in the apparent absence of any supergene enrichment. Minor cobalt-staining was also observed but is probably only a residual product of weathering in the adjoining dolomite.

This copper deposit is of hydrothermal origin resulting from the intrusion of the diorite. Small fractures in the diorite probably developed on cooling and subsequent rock alteration increased the rock permeability. The fractures were later filled by quartz and





sulphides, and grains of sulphides replaced silicates in the inter-fracture areas. Four samples taken by the writer in the main showing assayed as follows:

<u>Sample No.</u>	<u>Copper %</u>	<u>Remarks</u>
7224	0.58	Mineralization in diorite
7225	0.20	Dump sample near trench
7226	0.75	Mineralization, mainly in quartz stringers.
7227	0.30	Chip sample across trench (9.0 feet)

#### CONCLUSIONS AND RECOMMENDATIONS

The property is easily accessible by a good gravel road, and is only about five miles from the town of Cranbrook.

Copper mineralization is present in the form of Chalcopyrite contained in quartz and stringers and also disseminated throughout a diorite sill that has intruded calcareous and argillaceous sediments. The sill persists for considerable length along strike, and mineralization in it has been traced for a length of 1500 feet. Although the adjoining sediments near the main showing are not mineralized, there is a possibility that along other sections of the sill sulphide replacement of the adjacent rocks may have taken place, especially where limestones are present.

Several northeasterly trending faults are present in the vicinity of the showing and probably bear some relationship to the mineralization.

If copper sulphide mineralization along other sections of the sill is as impressive and persistent as that of the main showing,

there is a possibility that a considerable tonnage of a disseminated copper deposit may exist on the property. There is also a possibility that replacement sulphide deposits might be found in the limestone adjacent to the sill. If sufficient ore grade tonnage is present, this deposit would be suitable for an open pit type operation.

It is recommended that a systematic exploration programme be implemented, consisting of the following:

1. **Geological mapping:** to determine the extent of the diorite sill and copper mineralization in relation to the adjoining rocks and structural geology.
2. **Reconnaissance geochemical soil survey:** Soil cover is sufficiently thick to warrant such a survey.
3. **Induced Polarization Survey over anomalous geochemical areas:** the nature of the copper deposit (i.e. disseminated) is such that this geophysical exploration method is most suitable.

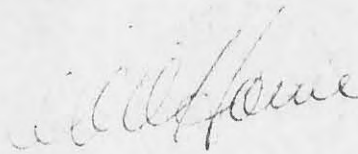
Estimated cost of the Programme is:

1. Line cutting at 400' intervals and geological mapping . . . . .	\$13,500.00
2. Reconnaissance geochemical soil survey . . . . .	5,000.00
3. Induced Polarization Survey (estimated 20 miles @ \$300 per line mile) . . . . .	6,000.00
4. Contingency . . . . .	2,000.00
	<hr/>
<b>Total Estimated Cost . . . . .</b>	<b>\$26,500.00</b>
	<hr/>



Further work consisting of diamond drilling would depend on results of the above programme.

Respectfully submitted,  
A.C.A. HOWE & ASSOCIATES LTD.



A.C.A. Howe, P. Eng.



S.S. Yan, B.Sc.

CERTIFICATE

I, A.C.A. Howe, of the City of Toronto, in the county of York, Province of Ontario, hereby certify that:

1. I am a Mining Engineer with offices at 826 - 159 Bay Street, Toronto, Ontario, and 540 Burrard Street, Vancouver, B.C.
2. I am a graduate of London University, England, B.Sc. in 1949.
3. I am a member of the Association of Professional Engineers of British Columbia, and of the Association of Professional Engineers of Ontario.
4. I have no interest, direct or indirect, in either the property or securities of Cindy Mining; nor do I expect to receive any such interest.
5. This report is based upon an examination of the property made by S.S. Tan during a visit to the area on April 10th, 1966 and on a report made by him to me. S.S. Tan is employed by A.C.A. Howe & Associates Ltd and his work is well known to me.

DATED at Toronto, Ontario this 6th day of May 1966.

  
A.C.A. Howe, P. Eng. MAY 23 1966

Plate 1:

Granodiorite with  
Chalcopyrite (c) stringers  
and specks, and  
malachite (a) stain.



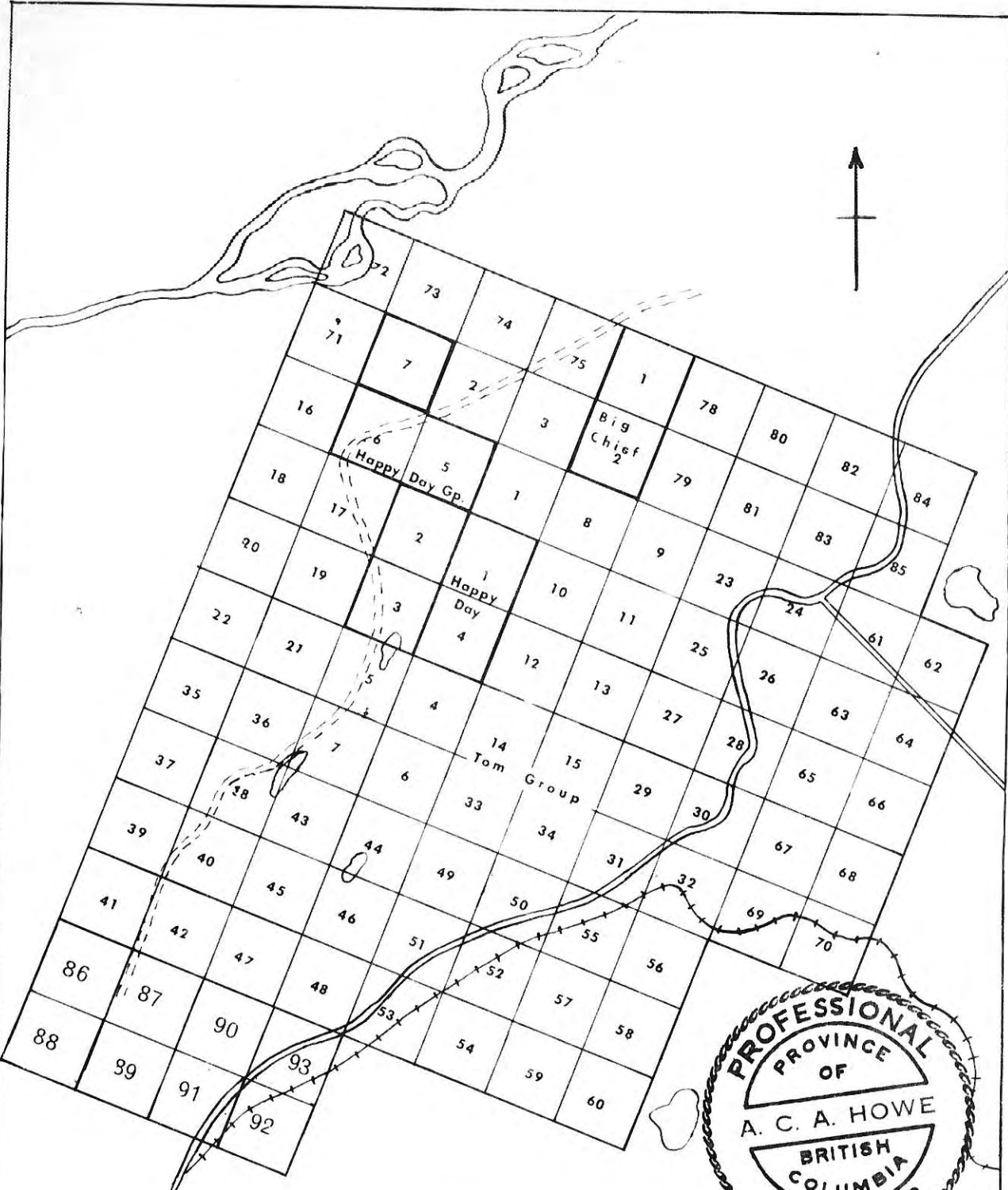
Plate 2:

Quartz in granodiorite,  
containing grains of  
chalcopyrite (c) and  
bornite (b).

Plate 3:

Trench at vein showing.  
Note omnidirectional  
quartz stringers (q)  
in granodiorite.





Claims map

Expiry Date October 20, 1966

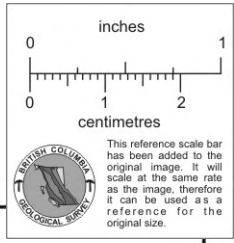
# CINDY MINES LTD.

KOOTENAY DISTRICT  
BRITISH COLUMBIA

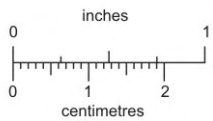
SCALE 1 in = 3000 ft

Prepared by :-  
**A C A HOWE and ASSOCIATES LTD**  
Vancouver B C

April 9 66



BM



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.

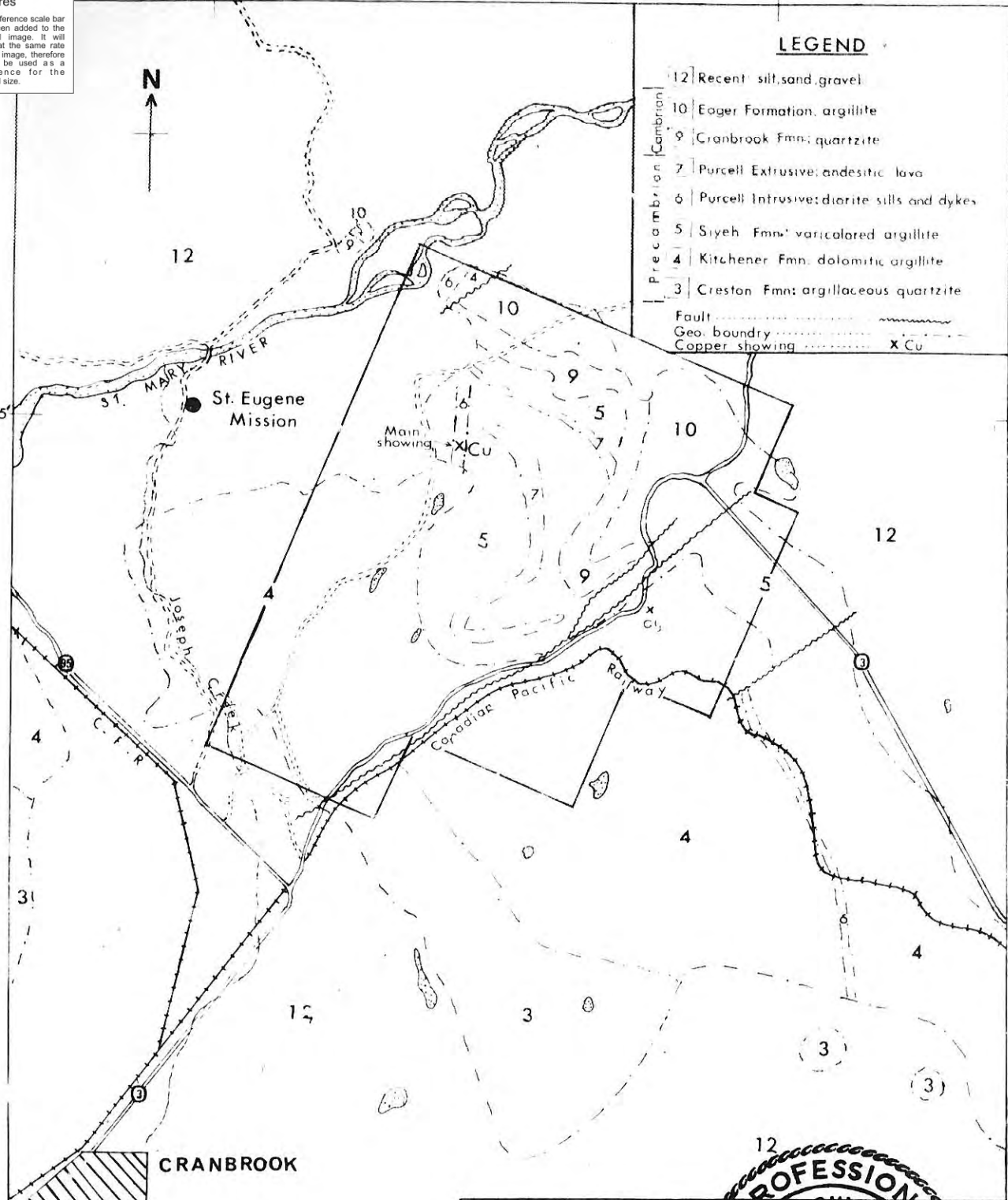


115°40'

115°45'

**LEGEND**

- 12 Recent silt, sand, gravel
  - 10 Eger Formation, argillite
  - 9 Cranbrook Fmn; quartzite
  - 7 Purcell Extrusive; andesitic lava
  - 6 Purcell Intrusive; diorite sills and dykes
  - 5 Siyeh Fmn; varicolored argillite
  - 4 Kitchener Fmn; dolomitic argillite
  - 3 Creston Fmn; argillaceous quartzite
- Fault .....  
 Geo. boundry .....  
 Copper showing ..... X Cu



CRANBROOK

49°30'

115°45'

Geology after G.S.C. map 396 A revised by S.Tan

Prepared by:-

**A.C.A.HOWE & ASSOCIATES LTD,**  
 Vancouver, B.C.

April 1966.

S.S.Tan

Claims location & geology map

**CINDY MINES LTD**

KOOTENAY  
 BRITISH



SCALE 1 in = 1 mi  
 Expiry Date October 20, 1966

Miles