

GEOLOGICAL BRANCH
ASSESSMENT REPORT

85-621-13795



Province of
British Columbia

Ministry of
Energy, Mines and
Petroleum Resources

13,795

ASSESSMENT REPORT
TITLE PAGE AND SUMMARY

TYPE OF REPORT OR SURVEY(S)
GEOLOGICAL

TOTAL COST
\$ 3,464.70

AUTHOR(S) F.B. Whiting SIGNATURE(S) *F.B. Whiting*

DATE STATEMENT OF EXPLORATION AND DEVELOPMENT FILED July 8, 1985 YEAR OF WORK 1985
PROPERTY NAME(S) Copket #1-#8, David #1-#6, Copket Frac., Copket #2 & #3 Fracs.
(Grouped as Copket Group)

COMMODITIES PRESENT Copper, gold, silver

B.C. MINERAL INVENTORY NUMBER(S), IF KNOWN Not known

MINING DIVISION Greenwood NTS 82-E-10W

LATITUDE N. 49° 38' LONGITUDE W. 118° 49'

NAMES and NUMBERS of all mineral tenures in good standing (when work was done) that form the property (Examples: TAX 1-4, FIRE 2 (12 units); PHOENIX (Lot 1706); Mineral Lease M 123; Mining or Certified Mining Lease ML 12 (claims involved)):

Copket #1-#8 Rec.#4093-4098 (7) & 4128-4129 (9)
David #1-#6 Rec.# 4090-4092(7) & 4125-4127 (9)
Copket Frac.# 4089(7), Copket #2 Frac #4130(9), Copket #3 Frac # 4131(9).

OWNER(S)
(1) Francis B. Whiting (2) Orion Resources Ltd.
(as to Copket 1-6 & 3 Fracs.) (as to David #1 - #6.)

MAILING ADDRESS
P.O. Box 1239 # 200 - 675 West Hastings St.
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OPERATOR(S) (that is, Company paying for the work)
(1) Orion Resources Ltd. (2)

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200 - 675 West Hastings St.
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SUMMARY GEOLOGY (lithology, age, structure, alteration, mineralization, size, and attitude):
Mineralization of copper as bornite with gold and silver occurs in marble and volcanic rocks of the Anarchist Formation adjacent to Nelson Intrusive; some garnetite. Also secondary copper impregnation in Coryell dykes (malachite in fractures). Also pyrite/galena/chalcopyrite in Tertiary andesites along regional fault.

REFERENCES TO PREVIOUS WORK A.R. 2482 (Sand - Cup - Lassie M.Cs.)

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Fig. 2: Claim Map

Fig. 3: Regional Geology

Fig. 4: Topographic Map

Fig. 5: Geology Map with separate legend sheet.

Appendix: Assay Report.

A. SUMMARY

1.

A program of mapping and sampling was carried out in two stages, between June 14, 1984 and July 7, 1985. The work was aimed at testing for indications of gold-silver mineralization in altered Tertiary volcanics, and to search for copper-gold-silver mineralization in beds of the Mesozoic (?) Anarchist Formation. A new logging road had been built through the north part of the property in later 1984-early 1985, which exposed rock in many new areas. These new exposures were mapped.

Encouraging assays in gold, silver and copper were obtained from old workings adjoining the claim group, and an old adit, previously never seen, was exposed by the new road, and exhibits strong malachite staining. Further work is justified.

The work programs cost a total of \$ 3,464.70. This work was recorded and was sufficient to keep the claims, 17 in all, in good standing for two years.

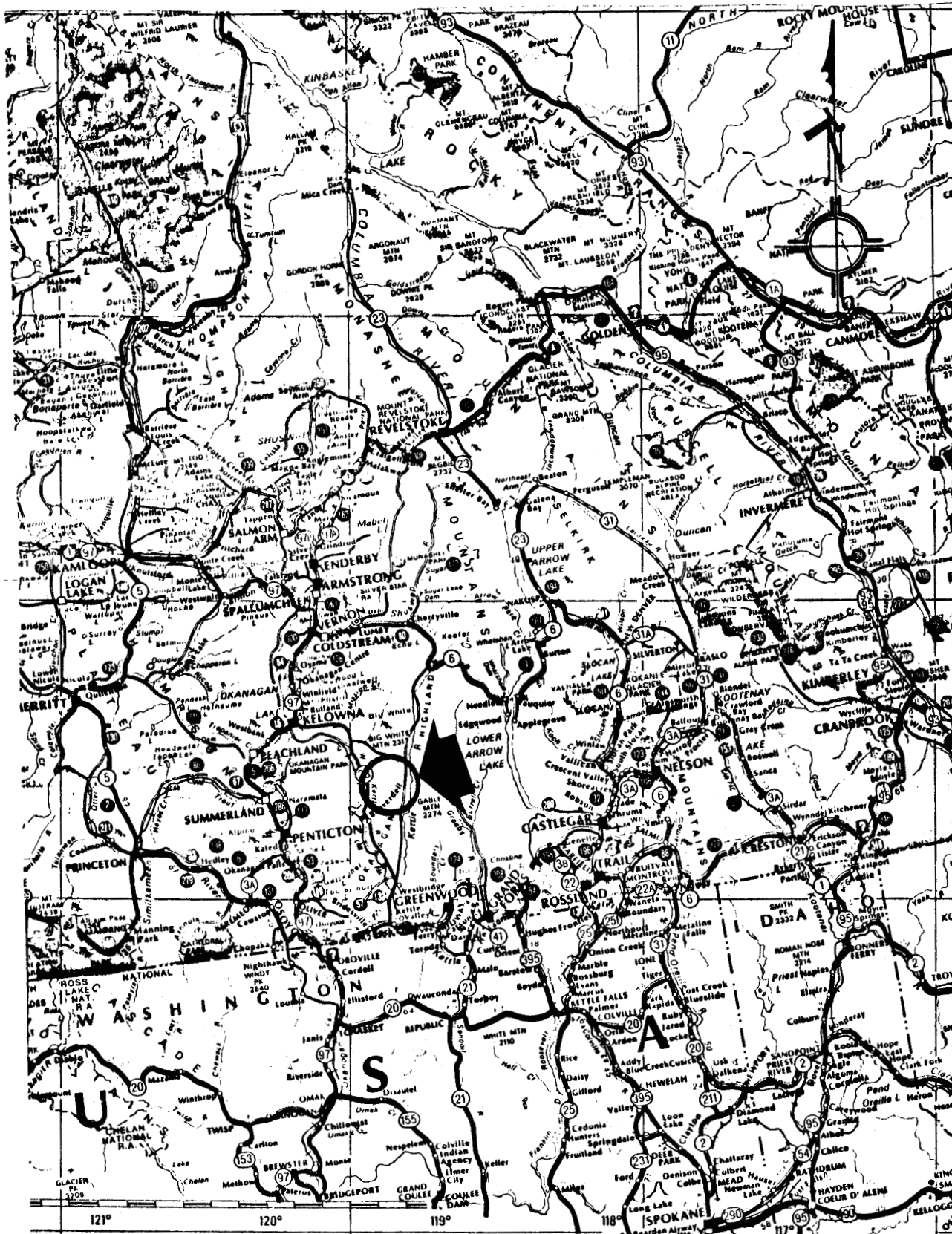


FIGURE 1.

LOCATION MAP.

B. GEOLOGIC ENVIRONMENT

The COPKET GROUP of 17 2-Post claims is situated on Copperkettle Creek in the Greenwood Mining Division of British Columbia. On this property valuable mineral deposits of either or both of two distinct types may occur:

- :- epithermal Tertiary gold/silver bodies in wide alteration zones along a regional fault.
- :- copper/gold/silver replacement bodies of Mesozoic (?) age in marble & garnetite.

Evidence for the existence of the first type is provided by an intersection in a 1970 drillhole that was intended to test for uranium in possible lake beds underlying an area of Phoenix Volcanics of Tertiary age (the type locality is at the Fuki - Donen deposit at Lassie Lake, 7 km to the southwest). This drillhole encountered sporadic mineralization of calcite veinlets, clay alteration, pyrite, chalcopyrite and, in one section, galena , from the bedrock surface down to a vertical depth of 60 metres. The site of this drillhole is immediately adjacent to a regional fault. It is believed that certain strong resemblances exist between this geologic setting and other late-Tertiary fault-related gold/silver deposits not far away : Ex. : the Wenatchee gold orebodies of Asamera-Breakwater, the Dusty Mac mine at Okanagan Falls, and the Au or Gold deposit at Venner Meadows. It is recommended that drilling be done along the regional fault to search for such gold or gold/silver mineralization.

Evidence for the second type of mineralization is afforded by open cuts and short winzes on the old Lottie F Crown Grant, only a few metres away from the boundary of certain claims

included in the COPKET GROUP, the DAVID #1 - #3 claims. The Lottie F workings expose heavy bornite mineralization in marble, associated with extensive brown garnetite skarn. Assays of this copper ore show high contents of gold and silver. A grab of dump ore taken in July 1984 assayed 0.163 oz. gold / ton, 2.23 oz. silver per ton, and 9.6 % copper. It is highly probable that the massive high-temperature metamorphism and associated copper-gold-silver mineralization extends into the immediately-adjacent COPKET GROUP.

C. CLAIMS, ACCESS & LOCATION

The claims included in the COPKET GROUP are:

Copket # 1 - # 8 : Record #s 4093(7)-4098(7) & 4128-29 (9)
Copket Fraction, & COPKET #2 & # 3 Fractions, #4089(7), 4130-31(9).
David # 1 - # 3, Record # 4090-91-92 (7), and David # 4 - # 6
4125-27 (9).

The total area covered by the group amounts to approximately 290 hectares (725 acres). The claims are situated near the junction of Sandrift Creek and Copperkettle Creek, west of the Kettle River, in the Greenwood Mining Division, at Lat. N 49° 38' , Long. W 118° 49 ' . Access is by Highway 33 north from Rock Creek to Westbridge, then due north along the Christian Valley road to Km. 52.3, thence northwest up a fair logging road which leads up over the ridge and then down to the confluence of Sandrift Creek and Copperkettle Cr. at Km 8. The road is passable by car. Travel time from Rock Creek is 1 hour.

Elevations on the claims range from 850 m (2800 ft) in the lower valley of Copperkettle Cr. to 1100 m (3600 ft) on the ridge at the southern extremity of Copket # 5 & # 6. Copperkettle Cr. has a good flow but can be waded in most places, with care. The hillsides are covered with light timber, of pine and spruce with some cedar in the valley bottoms. The climate is moderate, with dry summers and probably several feet of snow in winter.

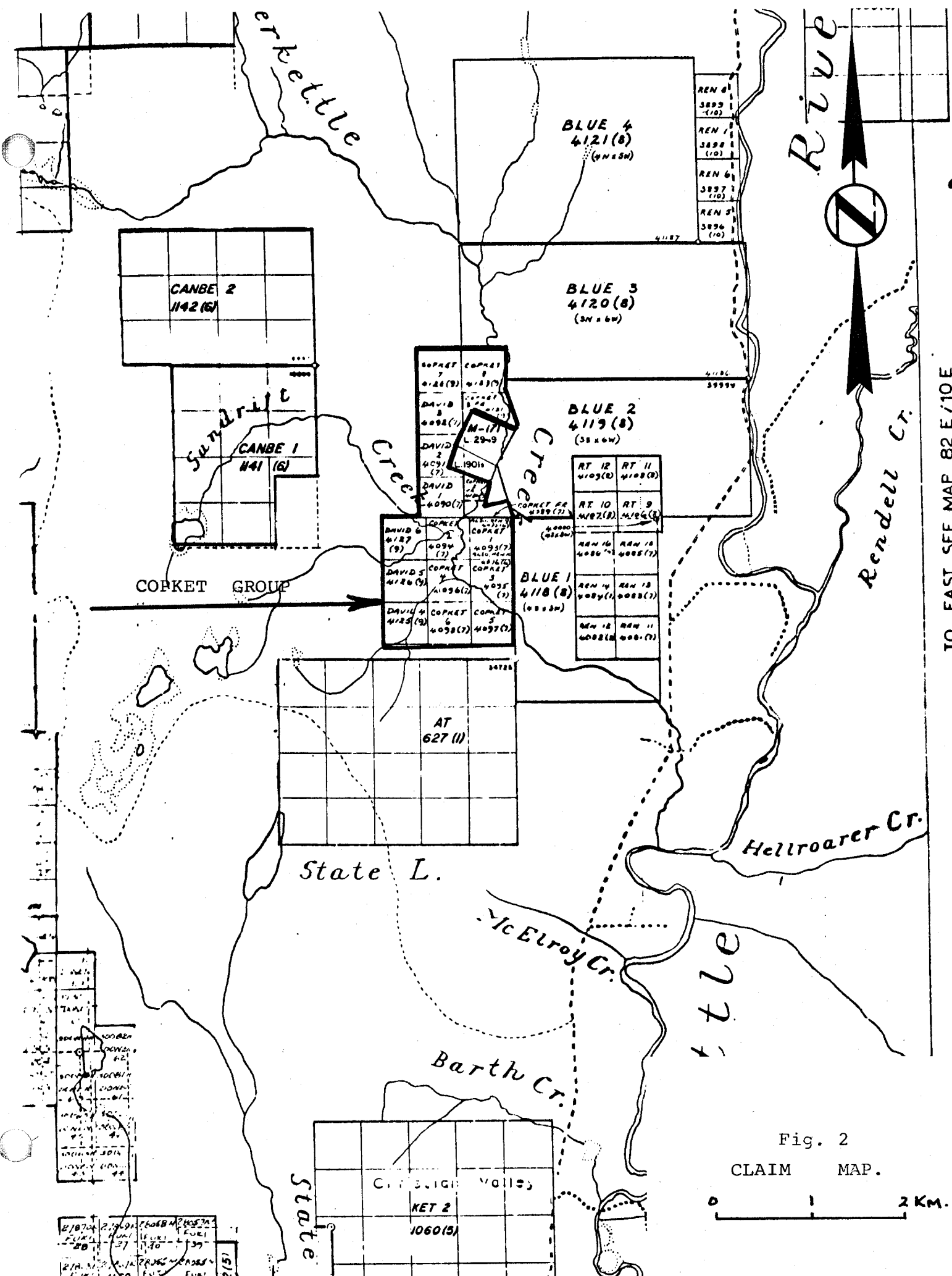


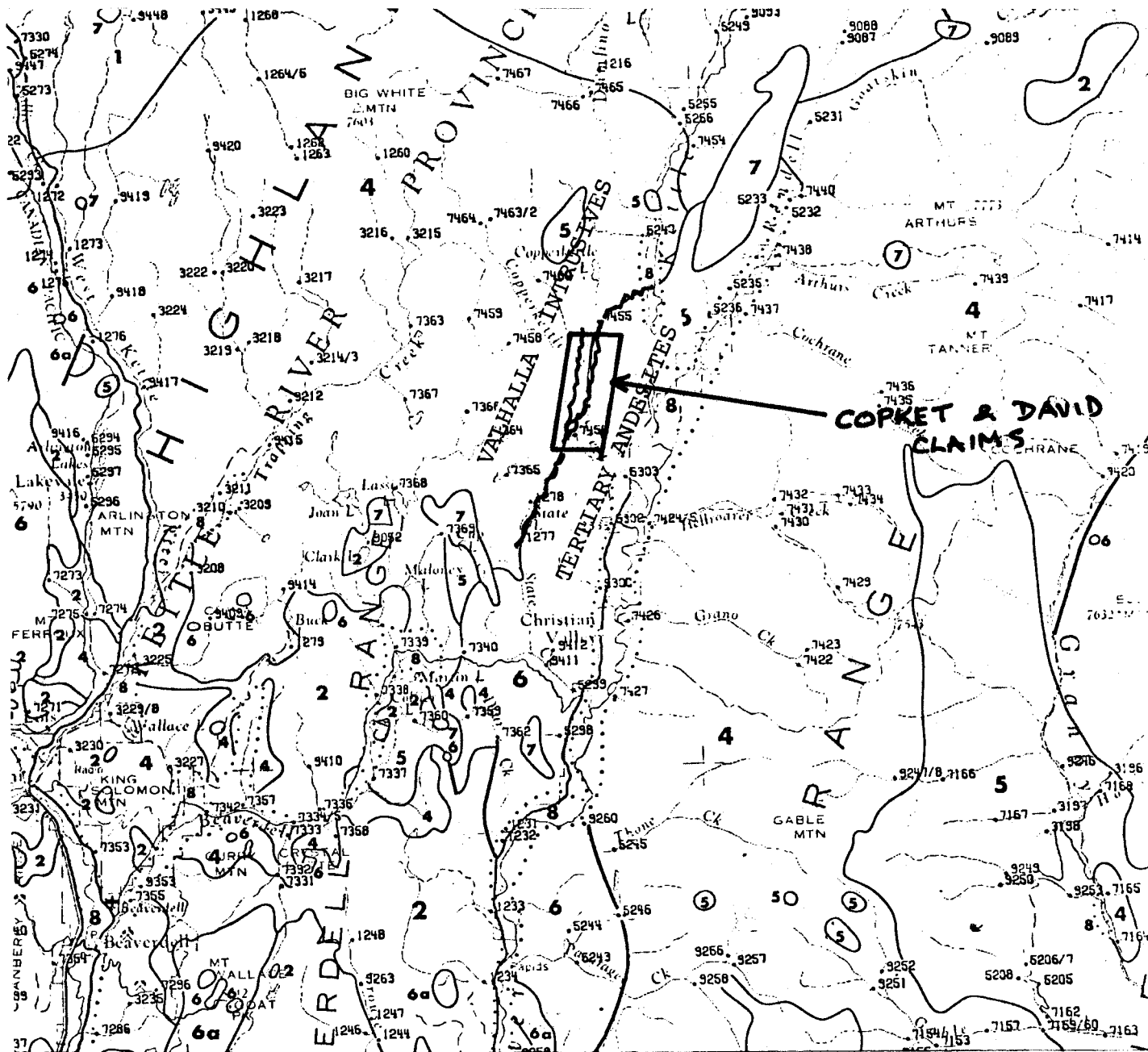
Fig. 2
CLAIM MAP.
0 1 2 Km.

TO EAST SEE MAP 82 E/10 E
LEGAL CORNER POST & TAG NUMBER 8-9-10

D. REGIONAL GEOLOGY

The regional geology is shown on the Kettle River East Half sheet, Map 6-1957, by H.W. Little, a portion of which is reproduced as Figure 3. A contact line is shown running NNE through the confluence of Sandrift Creek and Copperkettle Creek, with Map Unit 7, Lower Cretaceous (?) Valhalla Intrusions of granite and porphyritic granite on the west, and Map Unit 10, Palaeocene or Eocene Phoenix Volcanic Group of andesite, trachyte, basalt, and interbedded tuffs, shale and siltstone on the east. Just north of the confluence a small area of Map Unit 6, Nelson Intrusion, is shown; this unit has not been seen by the writer, but may be represented by a reference in the literature (BCMM A.R. 1913, p. K 160) to a " decomposed granodiorite " situated " north of the Lottie F ". From field observations of strong gouge-filled faults exposed on the east side of Copperkettle Cr. about 60 m NE of the Initial Post of Copket #1 & #2, and by study of air photos, it is interpreted that a major regional fault makes the above-mentioned contact for considerable distances to the NNE and SSW from the creek confluence.

Little's map does not show the small area of outcrops of marble and skarn that comprise the Lottie F showing. This area occurs on the top of a small knoll, and appears to be no larger at surface than, say, 100 by 200 metres. On the south end of this knoll, andesite is exposed : the andesite there most probably is un-eroded cap-rock of Tertiary age, which encircles a small window of the marble and garnetite that makes the Lottie F showing. It is to be expected that, underneath the capping Tertiary volcanics, the older rock formations that form the small surface window will occur over a much larger area.



SECTOR OF: G.S.C. Map 6-1957 by H.W. Little.
Kettle River, East Half.

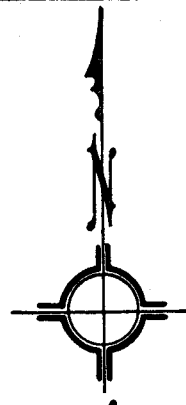


FIG. 3.

REGIONAL GEOLOGY



Andesites showing intense clay alteration and bleaching are seen in road cuts on the west side of the regional fault, SW of the confluence of Sandrift and Copperkettle Creeks, in the area shown on Little's map as all Valhalla Intrusions. This suggests that the regional fault mentioned is actually a composite feature, with parallel faults up to one kilometer apart, which have brought the older sediments up to surface in uplifted fault blocks, earlier in age than the rocks outside of the faulted band. This fits with the existence of marble and skarn at the Lottie F workings, which must be older sediments, metamorphosed.

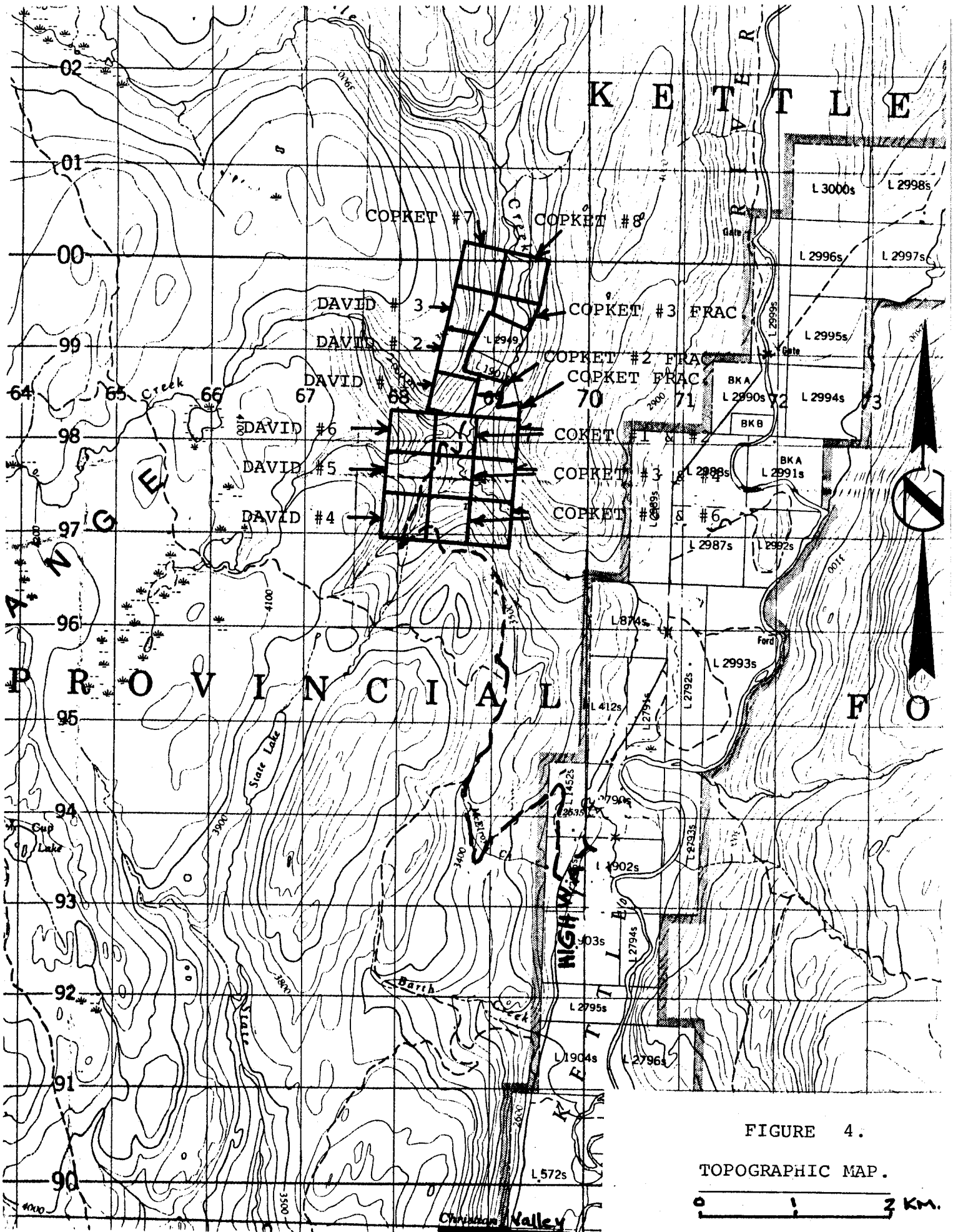


FIGURE 4.
TOPOGRAPHIC MAP.

E. LOCAL GEOLOGY

COPKET #1-#6 AREA:

On the Copket # 1 - # 6 M.C.s , few outcrops exist apart from those exposed in road cuts on the west side of the valley. The rocks there are andesites that are highly bleached and subjected to clay alteration, and cut by many near-vertical slips. The other firm data concerning the bedrock geology is that provided by Mitsui Mining Co.'s Drillhole A, which is situated a few metres east of the location line. This hole, 106 m long, vertical, entered bedrock at a depth of 6 m and then passed through light gray biotite-bearing andesite and andesitic tuff, welded tuff and brown to purplish tuff breccia. This rock belongs to the Phoenix Volcanic Group of Palaeocene or Eocene age, which were plateau-type flows and tuffs laid down over the eroded surface of the older basement rocks, and now occur as hilltop or fault-block remnants. In some places, pre-volcanism erosion and water transport of uranium ions into ponds or depressions formed uranium ore-bodies in the lake beds lying between the old basement rocks (often either Nelson Intrusions or Palaeozoic Anarchist Group) and the Early Tertiary volcanics.

The intriguing aspect of Drillhole A is that the log reports many calcite veinlets, abundant clay alteration and some sulphide mineralization : at 23 m - " slight mineralization of pyrite "; at 27 m - " chalcopryrite "; at 31 m - " pyrite impregnation "; at 50 m - " chalcopryrite impregnation "; at 60 m - " chalcopryrite - galena impregnation ". No assays were made.

Where sulphide mineralization occurs in Tertiary rocks it is obviously either of the same age as the host volcanics or is younger. In the Rock Creek - Greenwood - Jewel Lake - Grand Forks area there are numerous mineral showings that are of Tertiary age. The Dusty Mac gold mine is in a brecciated part of the Tertiary White Lake and Marama formations. At Venner Meadows, the Au or Gold M.C. has a gold vein in Phoenix andesites.

At the Wenatchee property of Asamera-Breakwater, the gold occurs in Eocene to Recent sediments and volcanics ranging from rhyolites to basalts. Also at Wenatchee, Silver Strike Resources has found high-grade gold across impressive widths (see reprint in Appendix). The nearby Day-Lovit Mine had production of 1,000,000 tons @ 0.41 oz. Au/t. All of these deposits testify to the effectiveness of the mineralizing processes that were active in Tertiary time in this region. Receptive host rocks along any major NNE or NNW fault that acted as a conduit for the gold-bearing solutions or gases may be impregnated with the precious metals in large volumes.

Any favorable rock units that show extensive alteration alongside a major fault, accompanied by pyritization, may carry significant gold and/or silver. The chances of having good gold or silver are much enhanced if other sulphides such as galena, sphalerite, chalcopyrite or tetrahedrite are also present. The existence of pyrite, chalcopyrite and galena in Drillhole A even in small amounts , which is a rare occurrence in Phoenix Group volcanics, is considered to be a strong indication that the fault had acted as a conduit, and hence that gold or silver ore-bodies may have been created somewhere along it.

Along such a feeder system the precious metals commonly are concentrated in certain short sections where the combination of pre-mineral tension fracturing with suitable rock units , and a local vent that tapped the hot exhalations coming up from the depths, resulted in bulk precipitation of the gold and silver. There may be ore close around Drillhole A, or the real ore zone or zones may lie some distance away along the fault. A combination of geophysics (E.M. and resistivity are suggested) , geochemistry, and drilling can be used to test this favorable locality.

DAVID - LOTTIE F AREA:

On the DAVID #1 - 6 and the Copket Fraction and Fractions 2 & 3 at the north end of the Copket Group, adjoining the Lottie F showings, an entirely different ore-making potential exists. Here, the target is gold-silver-copper in marble and skarn, obviously a high-temperature environment (scheelite has also been reported).

The key to finding ore here is the geological interpretation that the small area of marble and skarn on the knoll at the Lottie F is a "window" of older rocks, bordered on the east and west by major strands of the regional NNE fault, and on the south and possibly the north by caprock of the much younger Phoenix Group andesites. The significance of this is that while the surface outcrop area of the marble/skarn rocks is small, the sub-surface extent of these rocks can be enormously larger. Cross-sections are given showing this structural interpretation.

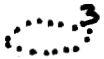
The marble that carries the massive bornite/gold/silver mineralization in the Lottie F workings may be the Brooklyn Limestone of the Greenwood camp, of Triassic age; at Greenwood and at Copper Mountain northwest of Greenwood, the Brooklyn member has been altered to garnetite skarn with copper and some gold/silver.

LEGEND FOR FIGURE 5.

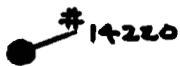
<u>Rock Unit.</u>	<u>Description</u>
1.	Anarchist Fm: dark gray Phyllite.
2.	" " : porphyritic andesite.
3.	Nelson Granite, in places sheared.
4.	Silicified equivalent of Unit 2.
5.	Medium-grained monzonite, age uncertain.
6.	Granite, age uncertain.
7.	Rhyolite, probably part of Unit 2, possibly younger.
8.	Tertiary Andesites.
9.	Valhalla Intrusions.



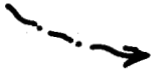
Roads.



Outcrop Areas



Sample Site with #.



Creeks.

F. WORK DONE

Work was done as follows:

June 14, 1984: geologic mapping of outcrops along road in David #4 & #5 and Copket #2 & #4, with collection of samples.

June 22-23, 27, 1985: mapping in claims Copket #7 & #8, Copket Fraction, Copket #2 Frac., Copket #3 Frac., with sampling.

July 6-7, 1985: preparation of report, drafting.

In total an area of 100 hect. was mapped. Geological study was extended northwest of the claim group and also to the northeast to determine what rocks outcropped there.

The work of June 22-23 & 27, 1985 was done with a three-person crew: a supervisor, one geologist, and one field assistant.

G. RESULTS OF WORK

The geological mapping defined the southern limit of the Nelson granite that lies mainly north of the claims, and mapped the andesite and breccia that lies south of the intrusive. A hitherto unknown adit was found in the Copket #3 Frac, which has disseminated copper mineralization (malachite). Several narrow acidic dykes of Coryell type were found crossing the granite and the andesites. In the southern portion of the claims, strong NNE faulting was seen in gently-dipping Tertiary andesites, accompanied by strong clay alteration and occasional rusty staining along cross faults. The general structure of the valley is that of a down-dropped fault block, bordered on the east by Tertiary lavas and on the west by Valhalla granites. The zones that are favorable for mineralization are: first, the contact-metamorphic belt around the Nelson granite, in the north part of the claims, where copper with gold and silver occurs in garnetite and marble of the Anarchist Formation; and second, the potential for gold-silver along the Tertiary faults in the south part.

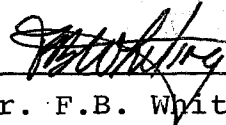
The sampling in the southern part of the claims found only weak traces of gold and silver in the altered Tertiary andesites along the faults. Sample # 14215 in black gouge in a fault carried less than 0.002 oz Au/t and less than 0.02 oz Ag/t. Sample # 14218 in altered andesite gave less than 0.002 oz Au/t and 0.02 oz Ag/t. Sample # 14221 in altered andesite also gave less than 0.002 oz Au/t, less than 0.02 oz Ag/t.

Malachite-bornite material from the main dump ran 0.163 oz Au/t, 2.23 oz Ag/t, 9.60 % Cu, 0.02 % WO_3 .: # 14224.
14220: green skarn: < 0.002 oz Au/t, < 0.02 oz Ag/t.
14216: garnetite: 0.002 oz Au, 0.07 oz Ag/t.
14217: red skarn: < 0.002 oz Au/t, 0.03 oz Ag/t.
50476: garnetite: < 0.002 oz Au/t, 0.05 oz Ag/t.
Sample locations are shown on Fig.5.

H. CONCLUSIONS

The presence of copper mineralization on the claims has been proved. Good values in copper, gold and silver occur in an extension of the same skarn belt on adjacent claims. Exploration in the Anarchist andesites and marble around the edge of the Nelson granite is justified, searching for more extensive deposits than those exposed by natural agencies. The overburden cover, though largely continuous is not thick, so a combination of geophysics and trenching could disclose worthwhile mineralization. Further testing of the altered andesites beside the major faults may find gold-silver concentrations.

Respectfully submitted,

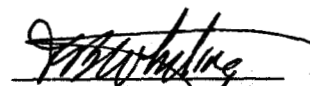


Dr. F.B. Whiting, P.Eng.

July 7, 1985.

I. ITEMIZED COST STATEMENT

<u>Item</u>	<u>Cost</u>
1. Personnel:	
F.B. Whiting: June 14, 1984, June 22, 23, 27 '85, & July 6, 7 1985 . 6 days @ \$ 275	\$ 1,650.00
C.P. Whiting, geologist: June 22, 23, 27, 28 1985 : 4 days @ \$ 100	\$ 400.00
Luis Gomes: field assistant: June 22, 23, 27, & 28, 1985: 4 days @ \$ 60	\$ 240.00
2. Travel Costs, motels, meals, groceries	
Motels 12 person-days	\$ 293.15
Meals, groceries 12 person-days	\$ 244.70
3. Vehicle rentals 8 days @ \$ 30 + gasoline	\$ 428.60
4. Supplies: Laths \$ 4.00, Flagging \$ 3.00	\$ 7.00
5. Assaying \$ 143.75 + \$ 42.00	\$ 185.75
6. Xeroxing, report binders, map prints	\$ 15.50
	<hr/>
TOTAL.....	\$ 3,464.70 =====


F.B. Whiting

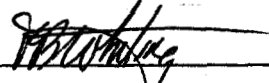
AUTHOR'S QUALIFICATIONS

13.

The undersigned, Francis B. Whiting, has the following qualifications:

- a) Graduate of Univ. of B.C., 1946, in Geological Engineering.
Graduate of McGill University, 1948, as M.Sc., in Geology.
Graduate of Mass. Institute of Technology, as Ph.D. in
Geology and Economics, 1951.
- b) Geological work in B.C. in 1945 for International Mining Corp.
Geological work in 1946 for Placer Development Co.
Work at Hedley B.C. for Hedley Mascot Gold Mines, 1947
& 1948.
3 Years as Mine Geologist in Missouri for St. Joseph Lead Co.
6 years as Chief Geologist at Mina Aguilar, Argentina.
7 Years as Exploration Manager in Argentina for Cia. Minera
Aguilar S.A. , 1960-68.
5 Years as Manager of Arrow Inter-America Corporation , Vanc-
ouver, B.C. 1968-73.
3 Years as Regional Manager for Western North America for
Brascan Resources Ltd., based in Vancouver B.C. 1973-76.
8 Years as Consulting Geologist, Vancouver, B.C.
- c) P.Eng., B.C. & Yukon.

Signed:



Dr. F.B. Whiting, P.Eng.



PORT: 424-1290

PROJECT: NONE GIVEN

PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Au OPT	Ag OPT	Cu PCT	MO3 PCT	NOTES
14213		0.013	0.11			
14214		0.027	0.21			
14215		<0.002	<0.02	—		COPKET. Black gorge above highway turn E. of one
14216		0.002	0.07		0.02	— LOTTIE F garnetite from lower road.
14217		<0.002	0.03			— " " red rock " " " "
14218		<0.002	0.02	—		COPKET. just road cut by road section.
14219		<0.002	<0.02	Champion		
14220		<0.002	<0.02	—		LOTTIE F - COPKET green alt.
14221		<0.002	<0.02	—		" " middle road 7.9 Km.
14222		0.002	<0.02	Althea		
14223		<0.002	<0.02	Creston		
14224		0.163	2.23	9.60	0.02	— LOTTIE F main dump.
14225		<0.002	<0.02			
50476		<0.002	0.05		0.01	— LOTTIE F garnetite - road
50477		<0.002	<0.02	<0.01		— COPKET SOUTH - Green rock from road at Km 6

R. R. Clegg