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Bacon & Crowhurst

SUMMARY REPORT & RECOMMENDATIONS ON CINDERELLA MINING GROUP FOR NIPPON MINING COMPANY LTD.

1

INTRODUCTION

At the request of Mr. S. Noma, Manager; and Mr. N. Hakari, Chief Geologist, of the Vancouver office of Nippon Mining Company Ltd., the firm of Chapman, Wood & Griswold Ltd. has reviewed all available data on exploration to January 27, 1966 on the Cinderella group of mining claims near Merritt, British Columbia.

Since much of the exploration work performed prior to the interest of Nippon in these properties was based on a sequence of recommendations made by us for Peel Resources Ltd., it is advisable to summarize the principal work and related source data chronologically..

August, 1964 — C.W.& G.Ltd. report of examination. Comparison with Craigmont geologic environment indicated need for broad scale geologic mapping, ground magnetometer survey, and geochemical survey. No drill target was defined.

December, 1964 — C.W.& G.Ltd. progress report on program recommended to Peel. Lithologic environment considered favourable for contact-replacement type copper deposits with or without associated magnetite-specularite, and galena-sphalerite. Some low order copper soil anomalies thought to be indicative of surface

or near-surface mineralization. Magnetics correlated with formations, but not with observed mineralization. Further recommendations were made for surface trenching, and drilling of 4 geological test holes. Peel completed trenching and started DDH No. 1, but abandoned it at about 144 feet due to unsatisfactory drilling conditions.

May, 1965 — C.W.& G. Ltd. letter report recommended Induced Polarization Survey as an aid to definition of sub-surface drill targets. McPhar Geophysics Ltd. of Toronto was engaged to implement this work.

June, 1965 — McPhar report on reconnaissance I.P. survey suggested further detailed I.P. to further evaluate several anomalies. This work was conducted in late June and early July.

July, 1965 — McPhar report on detailed I.P. indicated confirmation of several moderate magnitude anomalies several of which would require drill tests to determine the source.

August, 1965 — C.W.& G. Ltd. report on I.P. survey recommended testing several I.P. anomalies by drilling. Peel started drilling DDH No.3 to test broad weak I.P. anomaly on grid line 12 S, 25-33 W. Nippon concluded participation agreement with Peel and assumed direction of exploration thereupon.

August, 1965 to January 31, 1966 — Nippon completed 8 preliminary diamond drill holes

totalling 5396.2 feet.

Surface geology was re-mapped in considerable detail, and vertical geologic cross sections were prepared through each drilled zone. Split core samples from several weakly mineralized sections were assayed for gold, silver, copper, lead and zinc.

Drilling was suspended at the end of January to permit thorough evaluation of all results.

II

CONCLUSIONS & RECOMMENDATIONS

A. The principal area of interest on the Cinderella group of mineral claims is, in our opinion, the contact aureole surrounding a diorite intrusion lying approximately in the center of the established exploration survey grid (see C.W. & G. Ltd. Drawings Nos. 374,375,376, and Nippon Mining Company Ltd. modifications thereof).

B. Within this contact zone there have been observed a number of geologic criteria which we consider favourable for the occurrence at depth of pyrometasomatic copper deposits.

C. There are also a number of generally accepted criteria of this type of ore deposit which have not been observed. They are regarded as either not being present in the environment or at best not revealed by the work to date.

D. The results of a staged program of geologic mapping, geochemical survey, ground magnetic survey, induced polarization survey, and preliminary diamond drilling have thus far been somewhat disappointing. Both surface and subsurface exploration have indicated only discontinuous narrow zones of copper-iron and lead-zinc mineralization.

E. Nevertheless the possibility remains that, at depth between the limits of the explored zones and the diorite intrusive margin, an economically significant deposit could be present.

F. A minimum target to be sought is estimated to be the equivalent of 3,000,000 tons grading 2.7 percent copper. Such a deposit could be

contained in a body having dimension equivalent of 800 ft. length by 600 ft. depth by 75 ft. width.

Economic controls applied to defining this hypothetical mimimum target are:

1.	Operating life	9 years
2.	Milling rate	1000 tons/day = 330,000 tons/year
3.	Copper sales price (concentrates)	32¢/lb. Canadian
4.	Hydrometallurgical recovery of copper from ore milled	90 percent
5.	Total operating cost per short dry ton of ore milled.	$9.00
6.	Capital Expenditure	$2,000,000
7.	Mimimum profit per ton required to meet present value formula for 10 percent compound interest on unrepaid capital	$3.00

G. Certain additional exploration is advisable to further test the potential of the principal area of interest. Our recommendations for such supplemental work are as follows:

1. Drill two geological test holes through the bordering andesitic Nicola formation toward the inferred margin of the central mass of diorite.

   Suggested locations are:

   Collar at station 6.8 N; 1.25 W; drill S 25° E at minus 60 degrees for a total length of approximately 800 feet.

   Collar on Line 8 S, station 9 E; drill S 70° W at minus 50 degrees for a total length of approximately 800 feet.

2. Concurrently with drilling of the above two holes, conduct a detailed induced polarization survey. This work would consist of extending some of the previously surveyed I.P. lines plus taking new measurements on intermediate lines. Estimated required coverage is 5.4 line miles at 400 foot electrode interval and 4 separations; and at 200 foot electrode interval and 4 separations.

The purpose of this work would be to attempt to better define possible buried sulfide zones.

Proposed locations for the two geological holes, together with a layout of recommended I.P. coverage are shown on appended copy of Areal Geologic Map dated September, 1965, which was prepared by Mr. Hakari of Nippon Mining Company, Ltd.

H. Total estimated cost of the recommended stage of exploration is $25,000 distributed as follows:

Drilling	1600 feet	$16,000
I.P.	5.4 line miles @ $600	3,240
I.P. contingency for weather, etc.		1,000
Overall contingency		4,760
		$25,000

I. Completion of the above described work will provide considerable additional critical information which can be utilized as a basis for decisions on further exploration.

Respectfully submitted,

CHAPMAN, WOOD & GRISWOLD LTD.

John A. Wood

John A. Wood,
Vice-President

February 28, 1966

III

GEOLOGY

The recently completed exploration work has provided a considerable amount of geologic information which clarifies some of the environmental criteria. A number of complex features, however, remain obscure, and it is not possible to define precisely any target zones to which we could assign a high probability for the occurrence of major orebodies.

In our opinion there are certain criteria which we would consider favourable for the existence at depth of a contact-replacement type of deposit. There are also several depositional controls considered important at Craigmont which are not clearly in evidence at Cinderella.

A brief discussion of the plus and minus factors which we consider pertinent is presented.

Contact-Replacement Deposits

The area in which such a deposit might occur lies generally in the central portion of the survey grid, and the dominant feature is a boss-like intrusion of medium to fine grained diorite which is believed to be related to the Guichon Batholith. This diorite mass is exposed over a roughly circular area some 1000 to 1200 feet in diameter. The host rocks intruded by the diorite comprise a layered series of andesitic and limy tuffs and greywackes belonging to the Nicola formation of the Jurassic system. The Nicola rocks are characteristically highly altered and are classed as meta-volcanics. Around the margins of the intrusion there is an irregular aureole of contact metamorphism which is easily

identified by the presence of epidote skarn and zones of chloritic alteration. There is a gentle warping of Nicola members immediately surrounding the intrusive. Otherwise these formations strike nearly north south and dip rather steeply to the east. Interlayered between the greywacke and andesite units are occasional thin members of limestone and limy tuffs. Chalcopyrite, bornite, magnetite, specularite, galena and sphalerite mineralization occurs at scattered locations in close association with some of these limy horizons, but no continuity of this mineralization has thus far been established which could be considered indicative of major mineralization.

At least 3 stages of metallic mineral deposition are indicated:

1. Chalcopyrite-bornite-pyrite in quartz veins and veinlets in limestone. These may pre-date the diorite intrusion or be related to its early stages of emplacement. Vein widths are narrow.

2. Chalcopyrite-magnetite-specularite as irregular masses and fillings along walls of limestone members and bordering some skarn zones. Discontinuity is pronounced.

   Chalcopyrite-pyrite in thin parallel seams in epidote skarn. Mineralized stringers seldom exceed 1/2" in width.

   These assemblages are probably contemporaneous and followed emplacement of the diorite.

3. Galena-sphalerite in narrow banded zones following limestone walls and in quartz veinlets within highly fractured zones bordering skarn zones. Known occurrences are confined to the western and northern margins of the intrusive.

The criteria of ore deposition are rated as follows:

FAVOURABLE:

A. Age of diorite intrusion (Jura-Cretaceous)

B. Diorite apparently is a knob-like expression of the underlying mass of the Guichon Batholith.

C. The stratigraphic units of the Nicola host rocks, being principally andesitic with interlayered limestone and limy tuffs, are considered good host rocks for replacement by copper and iron-rich mineralizers.

D. Fracturing is fairly intense, and is well developed in both north-south and east-west directions. There is photo-geologic evidence that the major fracture sets are deep seated, and that the central area was strongly fractured prior to the intrusion and also as a result of it. Thus the zone peripheral to the intrusive could have provided good accessibility for mineralizers.

E. Feldspar enrichment is indicated by the presence of more than one stage of introduced potash spar in some of the Nicola rock units adjacent to the intrusive.

UNFAVOURABLE OR UNKNOWN:

A. The limestone units as mapped are relatively thin and apparently of limited lateral extent. Since they would constitute the best host for replacement type ores, a deficiency of limestone would be considered as a negative factor. Whether more abundant limestone could be anticipated at depth cannot be surmised on the basis of existing knowledge.

B. Trapping Conditions.

The best structural traps in a Craigmont type environment are

believed to be folds, particularly drag folds. While there is gentle warping along the west margin of the intrusive no well developed folds have been observed.

There are several zones bordering the intrusive which are suggestive of small embayments, and these could be regarded as favourable structures.

As a whole the trapping conditions appear moderately good to poor.

IV

GEOCHEMISTRY

The copper geochemical anomalies are of rather low order, but could be significant if they represent leakage haloes from a buried source.

It is not possible to conclude definitely whether they represent transported anomalies from some of the small surface showings, or residual anomalies caused by a buried source.

V

GEOPHYSICS

A. Magnetics

Magnetic features appear to be related to formational characteristics rather than mineralization.

Anomalies as such are of low order and limited extent.

It is inferred that no major body of magnetite exists within the area of interest.

Since copper could occur with specularite and without magnetite, or without either, the rather weak magnetic pattern does not entirely preclude the existence of a significant buried copper deposit; but it does appreciably reduce the odds in favour thereof.

B. Induced Polarization

It is our opinion that Induced Polarization-Resisivity surveys constitute the best known geophysical method for indicating buried deposits of iron, copper and leas sulfides.

Occasionally some of the anomalism encountered may be caused by sources other than metallic sulfides, but this is the exception rather than the rule.

In evaluating the results of the I.P. surveys conducted on the Cinderella property in 1965, a few comments are in order:

Line 12 S

Broad weak anomaly from 22W - 32W, explored by drill hole H-1.

The anomalism is considered to be due to a combination of "membrane" I.P. effect from broadly distributed earthy hematite filling zones of intense fracturing, together with a slight metallic conduction contributed by minor disseminated pyrite and very sparse grains of bornite.

Line 11.8 N

Moderate intensity anomaly centered at 2 W.

The anomalism is adequately explained by presence in DD Hole B-1 of wide bands of disseminated and fracture-fill pyrite. Concentrations varying from 2-8% sulfide were observed in core from about 80 - 450 feet.

Line 4 N

Possibly significant anomalies at depth below 0-4 W and 5 E - 8 E. Survey incomplete and zones untested.

Line 4 S

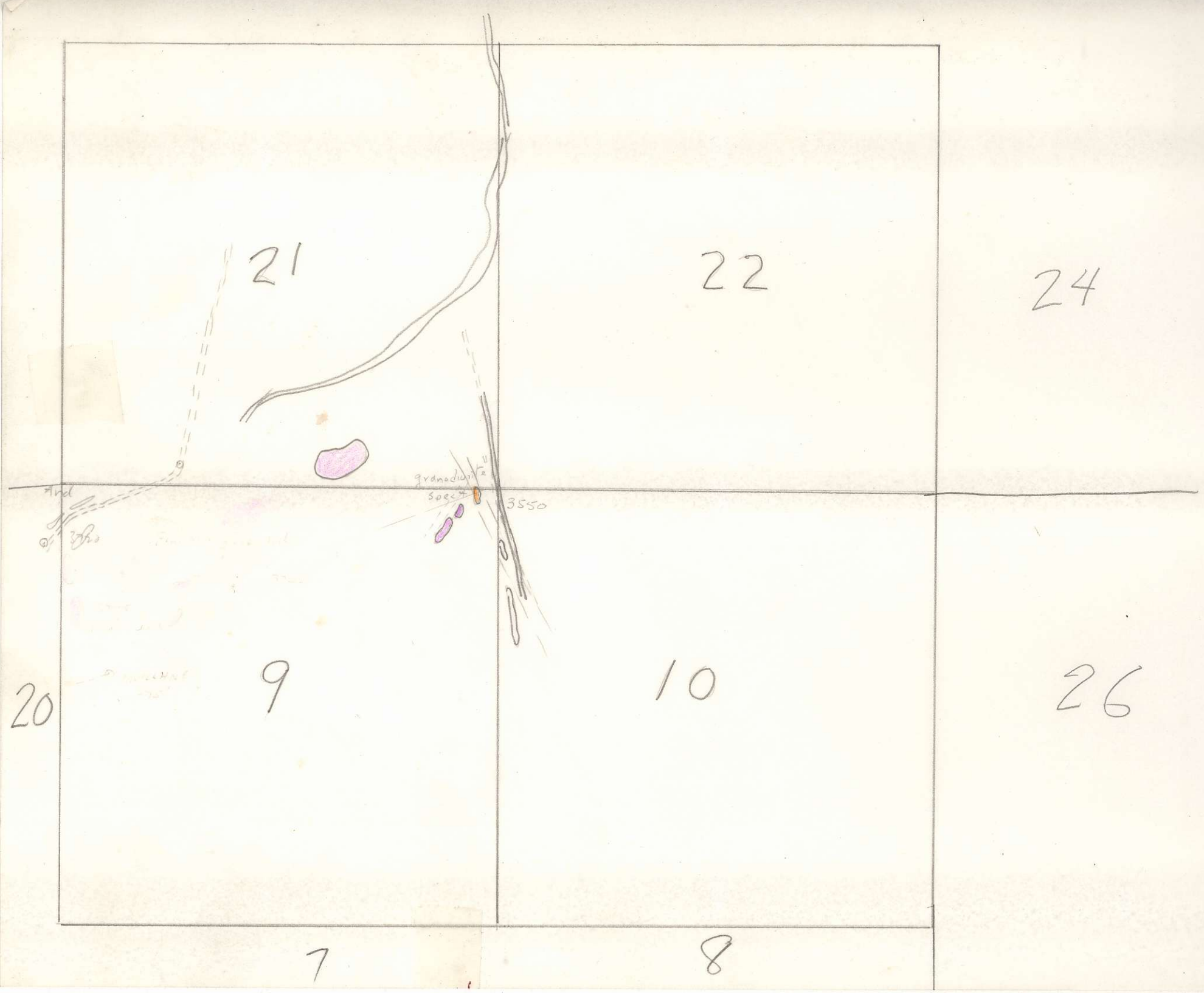
Possibly significant anomalies indicated on 4th separation below 8 W and 8 E. Survey incomplete and zones untested.

Additional detailed work to extend several existing lines and to survey intermediate lines at both 400 ft. and 200 ft. spreads are required to further evaluate the target area.

Suggested Detail I.P.

Line	Extent of Coverage		Approximate Footage
12 N			
	4W - 26E extension of	400'	3000'
	2E - 26E	200'	2400'
8N			
	16W - 30E intermediate line	400'	4600'
	16W - 30E	200'	4600'
4N	12W - 30E extension of	400'	4200'
	12W - 30E	200'	4200'
O	12W - 30E intermediate line	400'	4200'
		200'	4200'
4S	12W - 30E extension of	400'	4200'
		200'	4200'
8S	12W - 30E intermediate line	400'	4200'
	12W - 30E	200'	4200'
12S	16W - 26E extension of	400'	4200'
	16W - 26E	200'	4200'


To Nola
OVERBURDEN - 8'
D.H
-65°
Marble
And
Rhyolite - Spkld ph Spec!!
Med grd and
Open grassy meadow
FENCE
hem
hem cp
3750
Med grd and
20
19
9
And
grassy slope
Mal
Hem
9392-10'
9391-10'
Peak
3850
Mor3
D.H
spec8
3750
BASE LINE
0+66
3
3
Spec #6
hem & hug
DRILLHOLE
-63°
3620
And
340
I.P.?
TIN FOIL
18
17
7
3350
420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22
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granodiorite
3550
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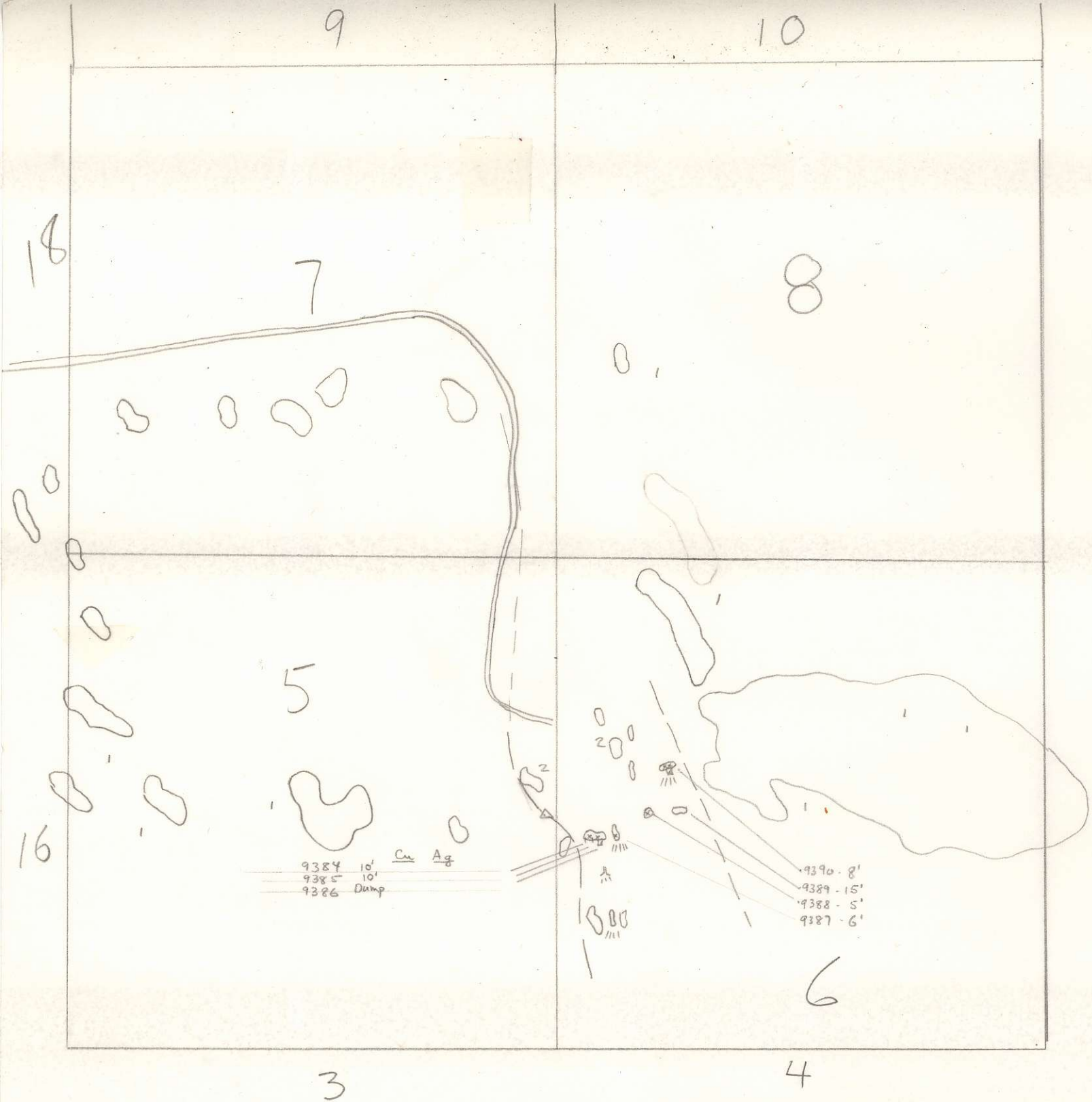
9
10
18
7
8
5
16
9384 10' Cu Ag
9385 10'
9386 Dump
9390 - 8'
9389 - 15'
9388 - 5'
9387 - 6'
6
3
4


cleaved line
3350
Flag
Tuffaceous andesite
Fine chert and wk epidote
DRILL HOLE -80'
CAR
9390-8'
9390-0.7'
9388-
9389-
9387-6.0'
cleaved line
3180'
9384
9385
9386
Spec
And
Porphyritic and Fragmental
purplish and med grd
ls, bedded
barren bedded ls.
dump