GEOCHEMICAL REPORT ON THE SPIN CLAIMS
BOTANIE MOUNTAIN AREA
KAMLOOPS MINING DIVISION
BRITISH COLUMBIA

C. P. Lin
H. K. Conn

92I/5E

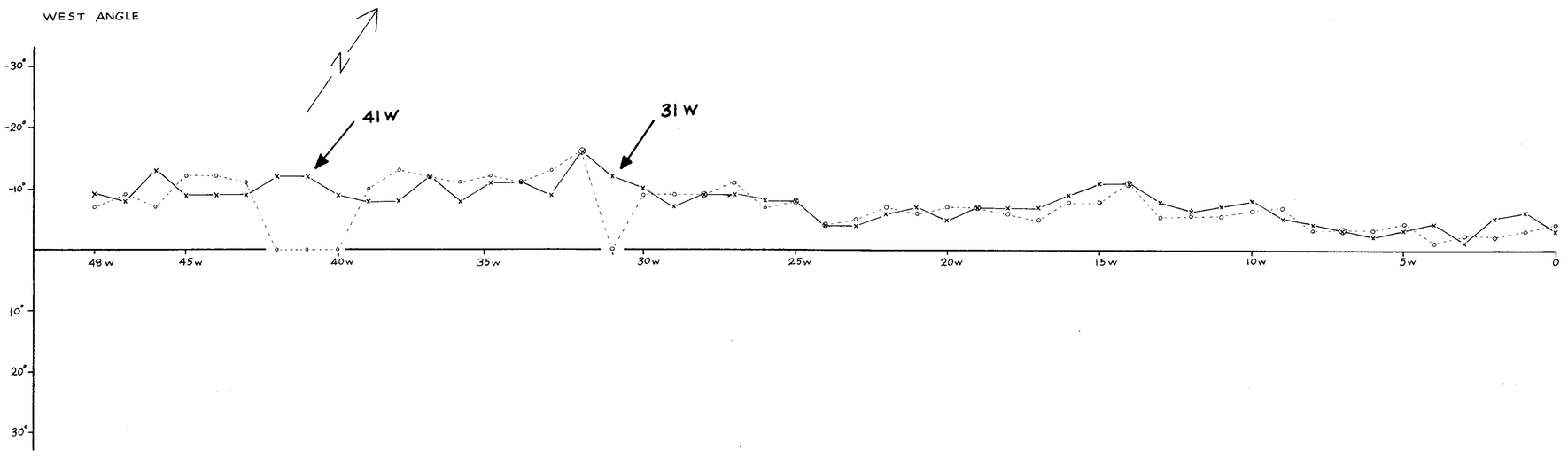
August 1972

BROADSIDE METHOD

LINE READ : ℄

TRANS. POS. : L 3+00 N

DATE : SEPT 23/24, 1971

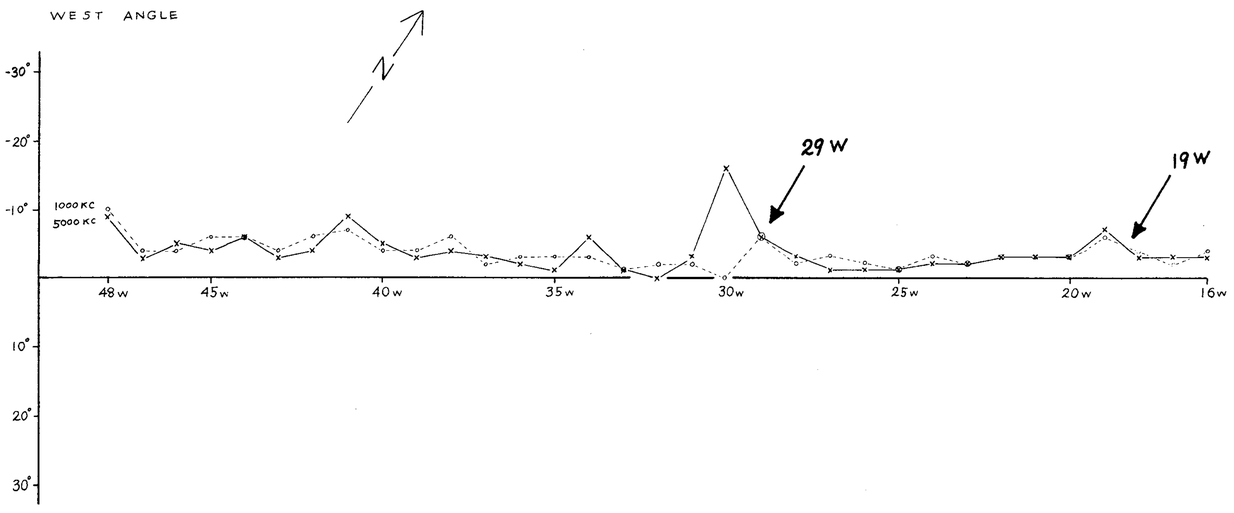


IN LINE METHOD

LINE READ: ℄

TRANS. POS. : 200' E

DATE : SEPT. 24, 1971

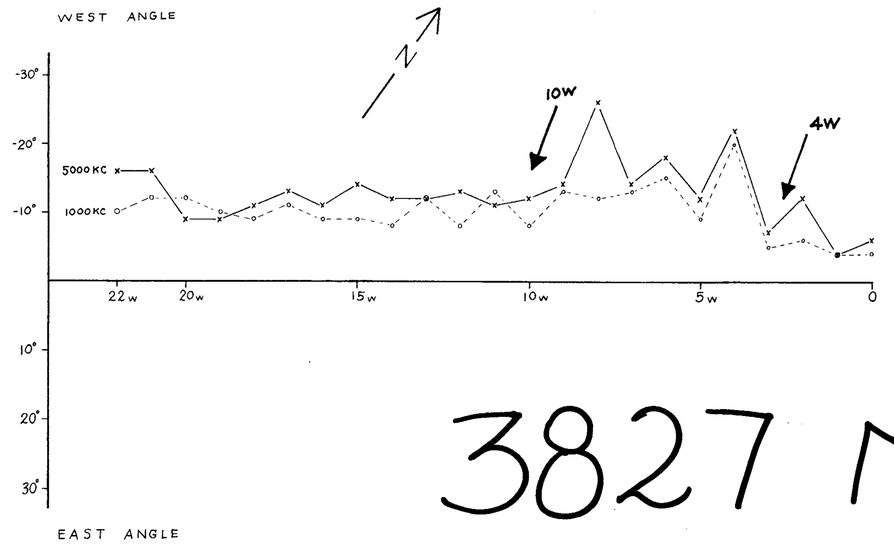


BROADSIDE METHOD

LINE READ : 3+00S

TRANS. POS. : ℄

DATE : SEPT. 23, 1971



Anomalies are marked by bold arrows.

CANADIAN JOHNS - MANVILLE CO. LTD
KAMLOOPS, B. C.

BOTANIE MTN. AREA
PROJ. 405
SPIN CLAIMS

REM SURVEY RESULTS

OPERATORS: J. BINNIE, A. GUSSEN
INSTRUMENT: McPHAR UNIT

DRAWN BY: CPL | SCALE: 1" = 200' | SEPT. 1971

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3827 MAP #8

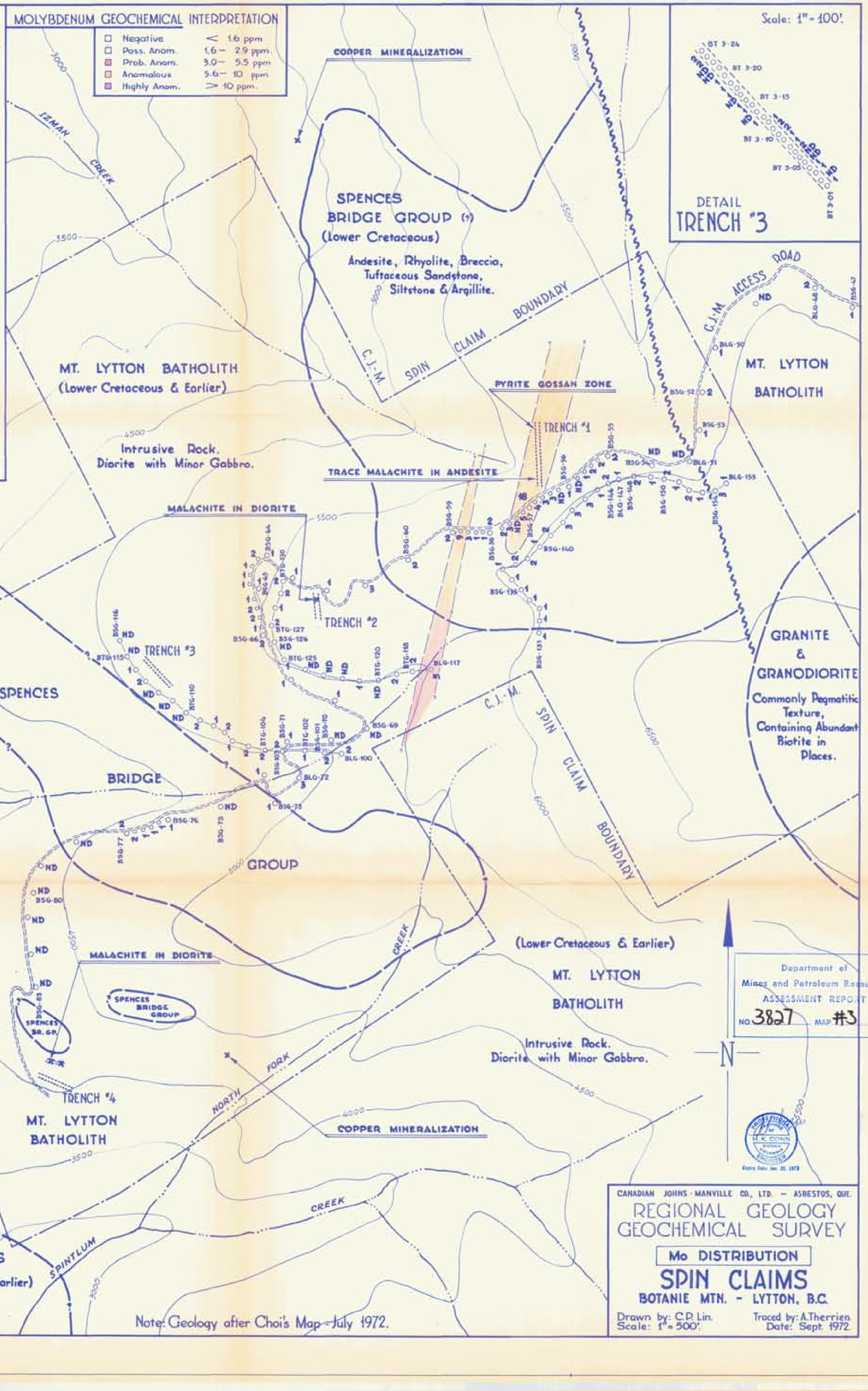
3827 M-8

DETAIL
TRENCH #1

Scale: 1" = 100'

MOLYBDENUM GEOCHEMICAL INTERPRETATION

Negative	< 1.6 ppm
Poss. Anom.	1.6 – 2.9 ppm.
Prob. Anom.	3.0 – 5.5 ppm
Anomalous	5.6 – 10 ppm
Highly Anom.	> 10 ppm.



DETAIL
TRENCH #3

Scale: 1" = 100'

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3827 MAP #3

N

CANADIAN JOHNS-MANVILLE CO., LTD. – ASBESTOS, QUE.

REGIONAL GEOLOGY GEOCHEMICAL SURVEY

Mo DISTRIBUTION

SPIN CLAIMS

BOTANIE MTN. - LYTTON, B.C.

Drawn by: C.P. Lin. Traced by: A.Therrien
Scale: 1" = 500' Date: Sept. 1972

Note: Geology after Choi's Map - July 1972.

CANADIAN JOHNS-MANVILLE CO., LTD. — ASBESTOS, QUE.

DETAIL SURVEYS - MAP A

GEOLOGY – Cu DISTRIBUTION

SPIN CLAIMS

BOTANIE MTN. - LYTTON, B.C.

Surveyed by: C.I.Choi. Interpretation by: C.P.Lin.
Scale: 1"=200' Date: Sept. 1972.

H. K. CORIN — REGISTERED

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3827 MAP #4

SPENCES BRIDGE GROUP

MT. LYTTON BATHOLITH

C.J.M. ACCESS ROAD

SPIN 1

SPIN 2

SPIN 3

SPIN 4

SPIN 5

SPIN 6

TRENCH #5

TRENCH #4

Malachite in Diorite

Malachite Stains are Present.

Malachite & Fine Disseminated Sulphides in Diorite Boulder.

Blue Diorite Dyke

LOST

see: DETAIL GEOLOGY.

COPPER MINERALIZATION

Fine Disseminated Sulphides: Chalcopyrite, Bornite, Tetrahedrite (?), are Contained in Bands (6"-12" wide), Spacing 10'-20' in Diorite.

GEOCHEMICAL INTERPRETATION

Negative	< 82 ppm.
Poss. Anom.	82 – 260 ppm.
Prob. Anom.	261 – 825 ppm.
Anomalous	826 – 2617 ppm.
Highly Anom.	> 2617 ppm.

Note: Rock Type Legend, see: Map B.

N

3827 M-4

SPIN #5

SPIN #6

SPIN #3

SPIN #4

COPPER GEOCHEMICAL INTERPRETATION

Negative	<	82 ppm
Poss. Anom.	82 –	260 ppm
Prob. Anom.	261 –	825 ppm
Anomalous	826 –	2617 ppm
Highly Anom.	>	2617 ppm

ROCK DESCRIPTION

DIORITE: Coastal Intrusion Batholith of Lower Cretaceous Age. Dark Green, Medium-Grained, Massive. Mafic Minerals: 50-70%. Mineral Contents: Hornblende, Chlorite (after Biotite), Plagioclase & some Quartz. (Choi's Gabbroic Rock).

ANDESITE: Dyke Rock. Dark Green, Aphanitic. (Choi's Greenstone).

RHYOLITE: Dyke Rock. Light Grey, Siliceous, in some Place with Quartz Phenocrysts.

DIABASE: Dyke Rock. Dark Green. Diabasic Texture.

AMPHIBOLITE (?): Lens or Band (6") in Dyke Rock. Foliated, Dark Green, Fine-Grained, Almost Aphanitic.

ORSERVED COPPER MINERALIZATION

* Float, Malachite & Fine Disseminated Copper Sulphide in Diorite Boulder. Bornite, Chalcopyrite & Tetrahedrite (?).

CANADIAN JOHNS-MANVILLE CO., LTD. — ASBESTOS, QUE.

DETAIL GEOLOGY

WITH COPPER GEOCHEMICAL LAB RESULTS

SPIN CLAIMS #4&#6

BOTANIE MTN. - LYTTON, B.C.

Surveyed by: C.P.Lin. Traced by: A.Therrien.
Scale: 1"=100'. Date: Sept.1972.

N

MT. LYTTON BATHOLITH

SPENCES BRIDGE GROUP

MT. LYTTON BATHOLITH

IZMAN CREEK

ROCK TYPES:

- 1 Diorite (Hornblende or Feldspar). Massive. Gabbroic Texture in Places. Mafic Minerals: 60-75%. Quartz: 5-10%. Plagioclase: 6-12%.
- 2a Altered Greenstone (Mainly Andesite & Rhyolite). Greyish-Green. Aphanitic or Fine-Grained. Generally Rusty & Altered Near Contact.
- 2b Schist. Quartz-Mica Schist, Hornblende Schist, & Chlorite Schist.
- 2c Breccia. Poor Sorting. Cementing with Angular Gravels. Consists of Mainly Diorite.

Massive Greyish-Green Diorite. Medium-Grained. Iron Oxide on Fractures.

Massive Feldspar Diorite.

Fir & Minor Pine Trees

Fir & Shrubs

Rusty Andesite. Altered & Weathered. Limonitic Staining on Surfaces. Contains Minor Fine-Grained Pyrite.

Hornblende Diorite. Gabbroic Texture. Weak Carbon on the Joints & Fractures.

Feldspar Diorite. Massive. Phenocrysts of Feldspar.

Talus. Diorite Boulders.

Fir & Shrubs

Feldspar Diorite. Partly Carbonated. Iron Oxide on Fractures. Disseminated Minor Pyrite.

Andesite & Diorite Boulders

Diorite Boulders

Talus

Douglas Fir & Minor Cedars.

Massive Hornblende Diorite With Disseminated Pyrite along the Joints & Fractures.

Covered by Diorite & Andesite Float.

Massive Quartz Rhyolite.

COPPER MINERALIZATION

Malachite Staining Associated with Carbon (2" x 4" wide) → Most of Calcite Crystals along the E-W Fractures within Diorite.

Fresh Hornblende Diorite Slightly Epidotized on Faces of Joints and Carbon on the Joints. Rusty. Dark Brown.

Rusty Feldspar Diorite. Carbon on the Faces of Fractures. Reddish-Brown Yellow Alteration.

Highly Altered Andesite. Slightly Silicified.

Talus - Diorite with Minor Andesite & Schist.

Qtz. Mica Schist & Breccia. Slightly Foliated. Epidotized. Fine-Grained.

Talus - Diorite

Massive & Weathered Medium-Grained Diorite.

Qtz.-Mica Schist & Hornblende Schist with Strong Rusty on Surface.

Siliceous & Foliated Andesite.

Highly Weathered & Siliceous Andesite. Iron Oxide on Surfaces. Minor Disseminated Pyrite.

Light Green, Coarse-Grained Diorite. Massive. Epidotized & Iron Staining on Surfaces & along the Fractures.

Siliceous Andesite. Aphanitic. Mixed of Greyish-Brown & Dark-Brown.

Siliceous & Massive Hornblende Diorite.

Highly Weathered & Rusty Andesite. Containg Disseminated Pyrite (minor). Limonitic Reddish-Brown Staining.

Weathered Diorite

Feldspar Diorite. Goldgric Texture. Slightly Carbonated on Fractures & Joints.

Altered Qtz-Mica Schist

Massive Hornblende Diorite. Reddish-Brown Yellow Alteration. Contains Minor Pyrite.

Massive Greyish-Green Hornblende Diorite.

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3827 MAP #C

CANADIAN JOHNS-MANVILLE CO., LTD. — ASBESTOS, QUE.

DETAIL SURVEYS - MAP B

GEOLOGY — Cu DISTRIBUTION

SPIN CLAIMS

BOTANIE MTN. - LYTTON, B.C.

Surveyed by: C.I. Choi. Interpretation by: C.P. Lin.
Scale: 1" = 200'. Date: Sept. 1972.

Note: Geochemical Interpretation Legend, see: Map A.

CANADIAN JOHNS-MANVILLE CO., LTD. — ASBESTOS, QUÉ.

DETAIL SURVEYS - MAP A

REM SURVEY LOCATION PLAN

SPIN CLAIMS

BOTANIE MTN. - LYTTON, B.C.

Surveyed by: J. BINNIE Interpretation by: C.P. Lin.
Scale: 1"=200' Date: Sept. 1972.

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3827 MAP #7

SPENCES BRIDGE GROUP

MT. LYTTON BATHOLITH

C.J.M. ACCESS ROAD

SPIN 1

SPIN 2

SPIN 3

SPIN 4

SPIN 5

SPIN 6

L 3+00N

L 3+00S

TRENCH #5

TRENCH #4

Malachite in Diorite.

Malachite Stains are Present.

Malachite & Fine Disseminated Sulphides in Diorite Boulder.

See: DETAIL GEOLOGY.

COPPER MINERALIZATION

Fine Disseminated Sulphides: Chalcopyrite, Bornite, Tetrahedrite (?), are Contained in Bands (¼"-12" wide), Spacing 10'-20' in Diorite.

▼ EM ANOMALY

GEOCHEMICAL INTERPRETATION

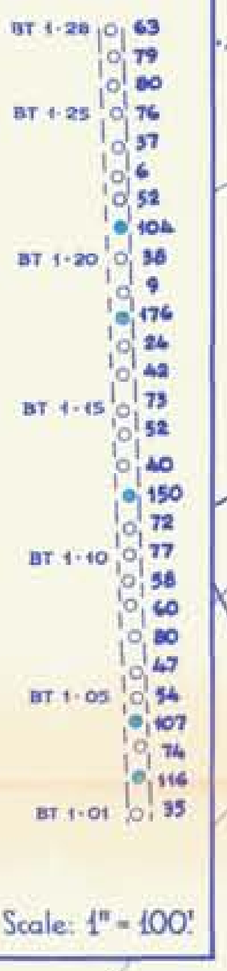
☐ Negative	< 82 ppm.
☐ Poss. Anom.	82 – 260 ppm.
☐ Prob. Anom.	261 – 825 ppm.
☐ Anomalous	826 – 2617 ppm.
☐ Highly Anom.	> 2617 ppm.

Note: Rock Type Legend, see: Map B.

N

3827 M-7

DETAIL
TRENCH #1



Scale: 1" = 100'

Scale: 1" = 100'

DETAIL
TRENCH #3

COPPER MINERALIZATION

SPENCES BRIDGE GROUP
(Lower Cretaceous)

Andesite, Rhyolite, Breccia,
Tuffaceous Sandstone,
Siltstone &
Argillite.

see: DETAIL MAP B.

C.J.M. SPIN CLAIM BOUNDARY

PYRITE GOSSAN ZONE

TRENCH #1

MT. LYTTON BATHOLITH

TRACE MALACHITE IN ANDESITE

MALACHITE IN DIORITE

TRENCH #2

TRENCH #3

SPENCES BRIDGE GROUP

MT. LYTTON BATHOLITH

GRANITE & GRANODIORITE

Commonly Pegmatitic Texture, Containing Abundant Biotite in Places.

C.J.M. ACCESS ROAD

MALACHITE IN DIORITE

TRENCH #4

NORTH FORK SPINTLUM CREEK

COPPER MINERALIZATION

SCHIST & GNEISS

(Triassic or Earlier)

see: DETAIL MAP A.

MT. LYTTON BATHOLITH
(Lower Cretaceous & Earlier)

Intrusive Rock.

Diorite with Minor Gabbro.

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3827 MAP #2

N

see: Map A for:
GEOCHEMICAL INTERPRETATION LEGEND

CANADIAN JOHNS-MANVILLE CO., LTD. – ASBESTOS, QUE.

REGIONAL GEOLOGY GEOCHEMICAL SURVEY

Cu DISTRIBUTION

SPIN CLAIMS

BOTANIE MTN. – LYTTON, B.C.

Drawn by: C.P. Lin.
Scale: 1" = 500'

Traced by: A. Therrien
Date: Sept. 1972

Note: Geology after Choi's Map - July 1972.

3827 M-2

GEOCHEMICAL REPORT ON THE SPIN CLAIMS

BOTANIE MOUNTAIN AREA

KAMLOOPS MINING DIVISION, BRITISH COLUMBIA

FOR

CANADIAN JOHNS-MANVILLE COMPANY, LIMITED

EXPLORATION DEPARTMENT

P.O. BOX 1500

ASBESTOS, QUEBEC

COVERING : SPIN CLAIMS #1-30

LOCATED : (1) 50°23'N, 121°40'W

(2) N.T.S. MAP 92I/SW

(3) SPINTLUM CREEK AREA, 10 MILES NORTH OF LYTTON, KAMLOOPS MINING DIVISION, BRITISH COLUMBIA

C.J-M PROJECT NO: 405

WORK DATE : September 1-October 31, 1971
July 13-18, 1972

REPORT DATE : AUGUST 1972

C.P. LIN, M.A. (Author

H.K. CONN, P.ENG.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF MAPS: (Cont'd)

REM SURVEY DATA:

INTRODUCTION:

Geochemical surveys and geological mapping were carried out on the Spin claims by the personnel of Canadian Johns-Manville Company, Limited during two periods: September 1 to October 31, 1971 and July 13 to 18, 1972. In this report, the results of the geochemical surveys are discussed against their geological background. Results of an REM survey are presented.

The work history of the Spin claims is briefly recounted as follows:

History:

Back in June 1969, a reconnaissance investigation first brought attention to the geochemical copper anomaly in the Spintlum Creek area.

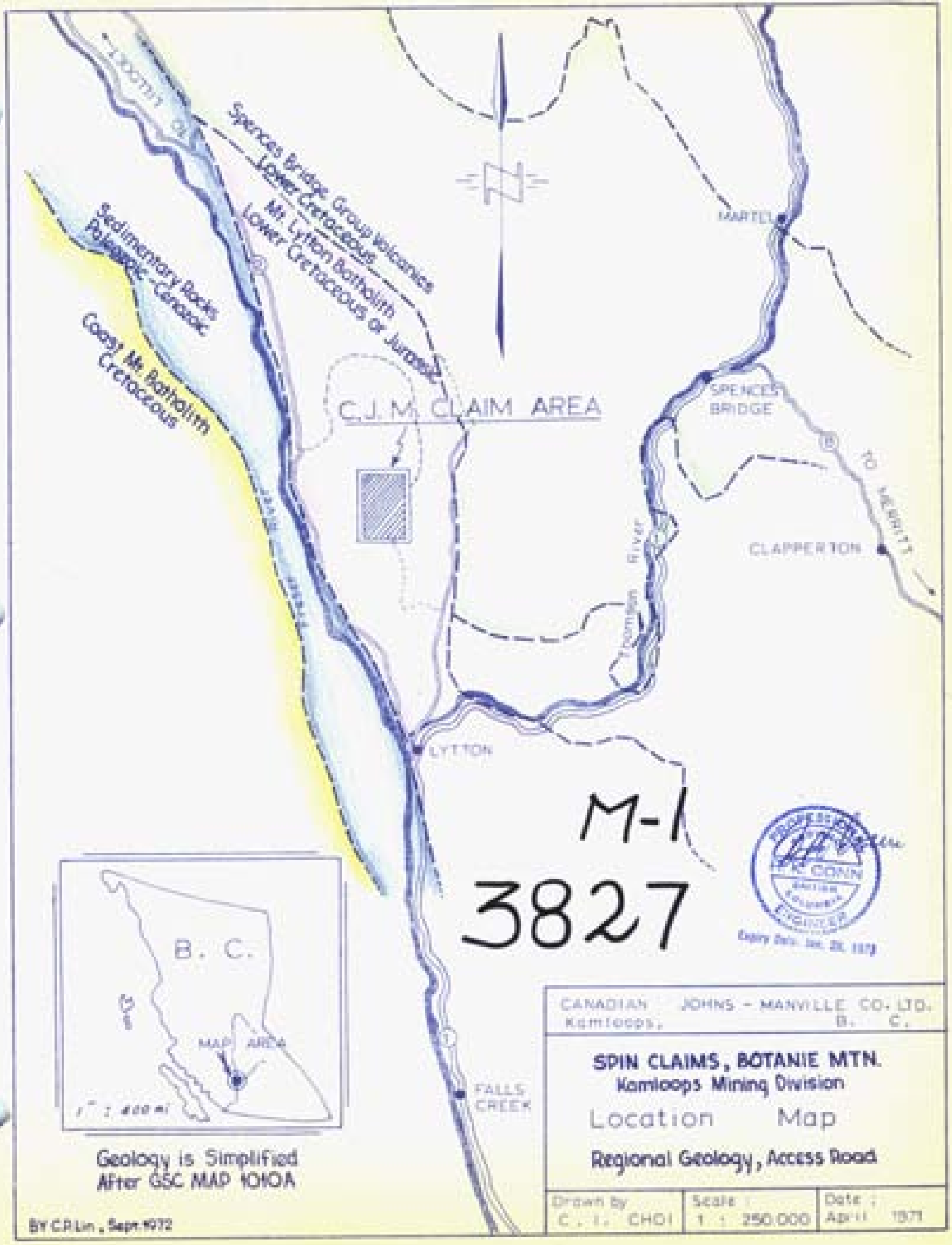
In 1970, a follow-up geochemical survey in the area showed encouraging results. Copper values ran as high as 1,750 ppm (BA-162). These results initiated major exploration work in the following years.

During the period September 1 to October 31, 1971 geochemical and geological surveys (Detailed Survey A) were launched following the staking of the Spin claims. One highly anomalous sample showed 7,750 ppm -Cu (BA-243). Brief, accompanying geophysical surveys, were carried out.

As the necessity of an access road arose, the late part of 1971 saw the road construction and the trenching of five showing zones. Meanwhile, geochemical samples were collected along the road cut and trenches #1 and #3.

In July 1972 a detailed sampling program was carried out in a second copper anomaly (Detailed Survey B), following the discovery of a malachite showing.

The work on the property to date has indicated strong geochemical copper anomalies and some chalcopyrite showings.


Spences Bridge Group volcanics
Lower Cretaceous
Mt. Lytton Batholith
Lower Cretaceous or Jurassic
Sedimentary Rocks
Paleozoic - Cenozoic
Coast Mt. Batholith
Cretaceous
C.J.M. CLAIM AREA
MARTEL
SPENCES BRIDGE
TO MERRITT
CLAPPERTON
LYTTON
FALLS CREEK
B. C.
MAP AREA
Geology is Simplified
After GSC MAP 10-1-0A
M-1
3827
CANADIAN JOHNS - MANVILLE CO. LTD.
Kamloops, B. C.
SPIN CLAIMS, BOTANIE MTN.
Kamloops Mining Division
Location Map
Regional Geology, Access Road
Drawn by C. I. CHOI
Scale 1 : 250,000
Date April 1971
By C.P.Lin, Sept. 1972

General: (Cont'd)

It has suggested certain geological controls over the copper mineralization.

Location and Access: (See Location Map - 1":250,000')

The Spin claims are located approximately ten miles north of Lytton, B.C. on the eastern slope of the Fraser River valley. Lytton is on the junction of the Thompson and Fraser rivers, 165 miles northeast of Vancouver.

Access to the property is by Highway #12. A forestry road branches off eastwards along Izman Creek and leads to the C.J-M road. It heads south through the property and reaches the southwestern corner of the claim block.

Physiography and Vegetation:

The claim area is situated in the Fraser River valley. Relief, moderate to steep, is approximately 3,000 feet.

Elevation rises from 3,500 feet in the west to 6,500 feet along the eastern claim boundary.

The area drains westward into the Fraser River. The upper part of creeks in the survey area is generally characterized by numerous cliffs and talus slopes.

The major vegetation of Botanie Mountain area is represented by firs and pines. Medium sized firs and pines prevail in most of the claim area, while alder and grass occur in some places.

Geology: (See map Spin Claims, Cu Distribution, 1":500')

The claim block is underlain mainly by two types of rocks. These are the diorite of Mountain Lytton Batholith and the volcanic complex of Spences Bridge Group. The age of the intrusive rock is believed to be Lower Cretaceous or Jurassic.

Geology: (Cont'd)

It is overlain by the lava of Spences Bridge Group, Lower Cretaceous in age.

The diorite is dark green, medium-grained and characterized by abundant hornblende. Minor gabbro and quartz diorite may occur as variations.

The local volcanic rocks of the Spences Bridge Group are breccia, greyish green andesite and light grey rhyolite. The matrix of the breccia varies from compact siliceous rhyolite to foliated, slightly porous andesite. The cemented fragments vary in commositions from diorite to andesite and rhyolite. The texture of the andesite and the rhyolite ranges from purely aphanitic to porphyritic, containing quartz or plagioclase phenocrysts. Boulders of vesiscular basalt are present in the area.

The wide variety of volcanic rock types found in a relatively local area is rather unusual. It seems to suggest a multiple extrusion origin of the local Spences Bridge Group rocks.

A gross view of the regional geology beyond the claim area is briefly reviewed as follows (see Location Map 1":250,000'):

The Mount Lytton batholith was a phase of the Mesozoic Coast Mountain intrusion and is probably contemporaneous with the Guichon Creek batholith (S. Duffel and K.C. McTaggart). The Mount Lytton batholith occurs in a belt east to and almost bordering the Fraser River. Locally, in the section north of Lytton, it forms an elongated lens, four to six miles wide, 18 miles long. In a gross, regional sense, the Snin claims are located in the batholith zone, although relatively small volcanic "patches" stud the area. Their sizes vary from limited zones (200 by 500 feet) to substantial bodies (3,000 by 5,000 feet).

Geology: (Cont;d)

The major belt of Spences Bridge Group, however, occurs further east of the Mount Lytton batholith, approximately two miles from the eastern claim boundary.

Mineralization:

Copper mineralization has been the main interest in the claim area to date. It seems to favor the "mixed zones" (after Choi's terminology). They occur within the diorite yet almost contiguous to the volcanics. In the "mixed zones", the host rock diorite is cut by numerous andesite and rhyolite dykes, their compositions apparently related to the bordering Spences Bridge Group volcanics.

The reader is advised to refer to the 1" = 500' scale map "Spin Claims, Cu Distribution". Typical "mixed zones" are the strong Cu anomalies in detail Map A and B areas. Moderate anomaly in Trench #3 area occurs along the periphery of the volcanics and resembles the typical "mixed zones" (Trench #3 area is yet to be thoroughly examined by a geologist).

In addition to the characteristics of dyke abundance in the "mixed zones", it is brought to the attention again that the Spin claims are located off the major belt of Spences Bridge Group lava flow. These two features seem to suggest a genetic hypothesis that the local "spotty" occurrences of volcanics in the claim area may represent a volcanic rift zone marginal to the major, continuous lava cover. The rift zone would be characterized by strings of lava fountains along erruptive fissures, not dissimilar to the spotty occurrences of the local volcanic rocks. And the country rock, in this case the diorite, would naturally be ruptured, probably to be filled by dyke intrusion and to facilitate late stage mineral enrichment (also see Discussion, Detailed Survey A).

Two major types of copper mineralizations are described as follows:

Mineralization: (Cont'd)

(1) In altered diorite:

Fine particles of chalcopyrite, bornite and tetrahedrite (?) are disseminated in altered bands of diorite close to joint faces. The altered bands are marked by heavy brown rusty stain, shear-like fine fractures, and a "bleached", pale color of the otherwise dark green diorite. In the showing area of Stations BA-241 to 245, the altered bands are six inches to one foot wide and the neighboring bands are spaced 10 to 20 feet. Malachite and azurite stains are common. Such copper mineralization occurs close to andesitic dykes and appear to imply genetic affinity between the two. But, definite field features are yet to be observed to offer conclusive answers.

(2) In quartz veins:

Chalcopyrite marked by malachite stain occurs in thick quartz veins (3" thick) with pyrite. Neighboring quartz veins, five to ten feet apart, may be barren (Trench #3).

GEOCHEMICAL SURVEY:

In the geochemical survey 290 samples were collected. These include reconnaissance and detailed samples along the C.J-M access road and detailed samples in the two anomalous areas (see maps-- Detailed Survey A & B).

Field Methods:

The geochemical samples in this area are largely composed of talus fines or C soils with occasional organic material. A few stream sediment samples were collected.

Reconnaissance samples were collected at 500 foot spacings along the road cut.

Field Methods:

Detailed samples were collected at 50 foot spacings basically along contours. Traverses were controlled by use of altimeter, compass and chain. Each station was marked on the ground by red ribbons.

Data recorded at sample sites include:

1. Color
2. Texture
3. Direction of drainage slope
4. Grain size of sample
5. Remarks concerning mineralization, rock types and limonitic stain

The geochemical survey data are presented in Appendix III.

Analytical Techniques:

All samples were analysed for Cu in the Vancouver laboratories of Bondar-Clegg & Company, Limited. Additional analysis for Mo was applied to reconnaissance samples.

The geochemical samples were dried at 40^{0}-50^{0}C in infra-red ovens and sieved to -80 mesh in Tyler sieves. An aliquot of -80 mesh fraction was digested in aqua regia to extract the metals. The metal contents were determined by atomic absorption. Their detection limits were one ppm.

Data Classification:

The analytical results of Cu were categorized statistically as negative, possibly anomalous, probably anomalous, anomalous, and highly anomalous. The mo results were largely negative (See Discussion, Statistical Studies). Therefore, the results are not thoroughly classified. Only a few narrow anomalous trends are marked (see Mo Distribution, 1" = 500').

The Cu results were computerized where ppm values were transformed to logarithm scales and frequency to probability scales

Data Classification: (Cont'd)

(See Statistical Studies, Cumulative Frequency Distribution of Cu). The median which approaches the geometric mean is taken as the background (?). The anomalous categories are determined by successive classes of probits. The first probit, P1, occurs at 84 percentile, the second probit, P2, occurs at 97.5 percentile. Each succeeding probit is increased by one factor, the geometric deviation S', where $S' = \frac{P1}{b} = \frac{P2}{P1} = \frac{P3}{P2}$, etc.

The statistical categories are illustrated as follows:

Negative	o - b
Possibly anomalous	(b+1) - P1
Probably anomalous	(p1+1) - P2
Anomalous	(P2+1) - P3
Highly anomalous	P3+

Attention is drawn to the "inflection" point which is considered as the "lower threshold" and in most cases signifies the base of the anomalous population.

The highest value is noted in terms of the probit scale.

Data Presentation:

Geochemical sample results are plotted at each station on Cu and Mo map sheets. Standard symbols of anomalous categories or surmounting color shades mark the stations.

Statistical analyses of results are presented on cumulative frequency distribution paper (see Discussion, Statistical Studies).

DISCUSSION:

The geochemical survey results are discussed in two aspects. In the section "Statistical Studies" the cumulative frequency distributions are analyzed. The following section "Ground Distribution" contains three sub-divisions pertaining to the three maps.

Statistical Study:

(1) Cu:

Please refer to the Cu cumulative frequency plot. In order to fit in the two-cycle paper, a parallel displacement was applied to the three-cycle distribution. A total of 509 sample results were treated and should form a sizeable population sufficient for meaningful analysis.

Due to the poor soil development in the claim area, the soil samples represent rather the C horizon and simulate the nature of talus fine samples. Because of their similarity in nature in the claim area, the soil and talus fine sample results were lumped in one population.

The background, taken at 50 percentile, is 82 ppm. Values below it are considered negative. Please note the slope changes slightly just beneath the background at 44 percentile or 70 ppm. This implies that the theoretical background value tends to represent a natural differentiation.

A distinct gap occurs at second probit = 825 ppm. This adds practical significance to the threshold value taken at the theoretical second probit.

Lower threshold 325 ppm represents a slight change of slope and approaches the first probit. The portion b-P1 may represent a mixed population in transition from a lower to an anomalous population.

The geometric deviation, S' = 3.17, is strong and signifies a strong contrast in Cu values. It is a favorable indication for mineralization tendency.

The highest value approaches the fourth probit. A remarkable anomaly.

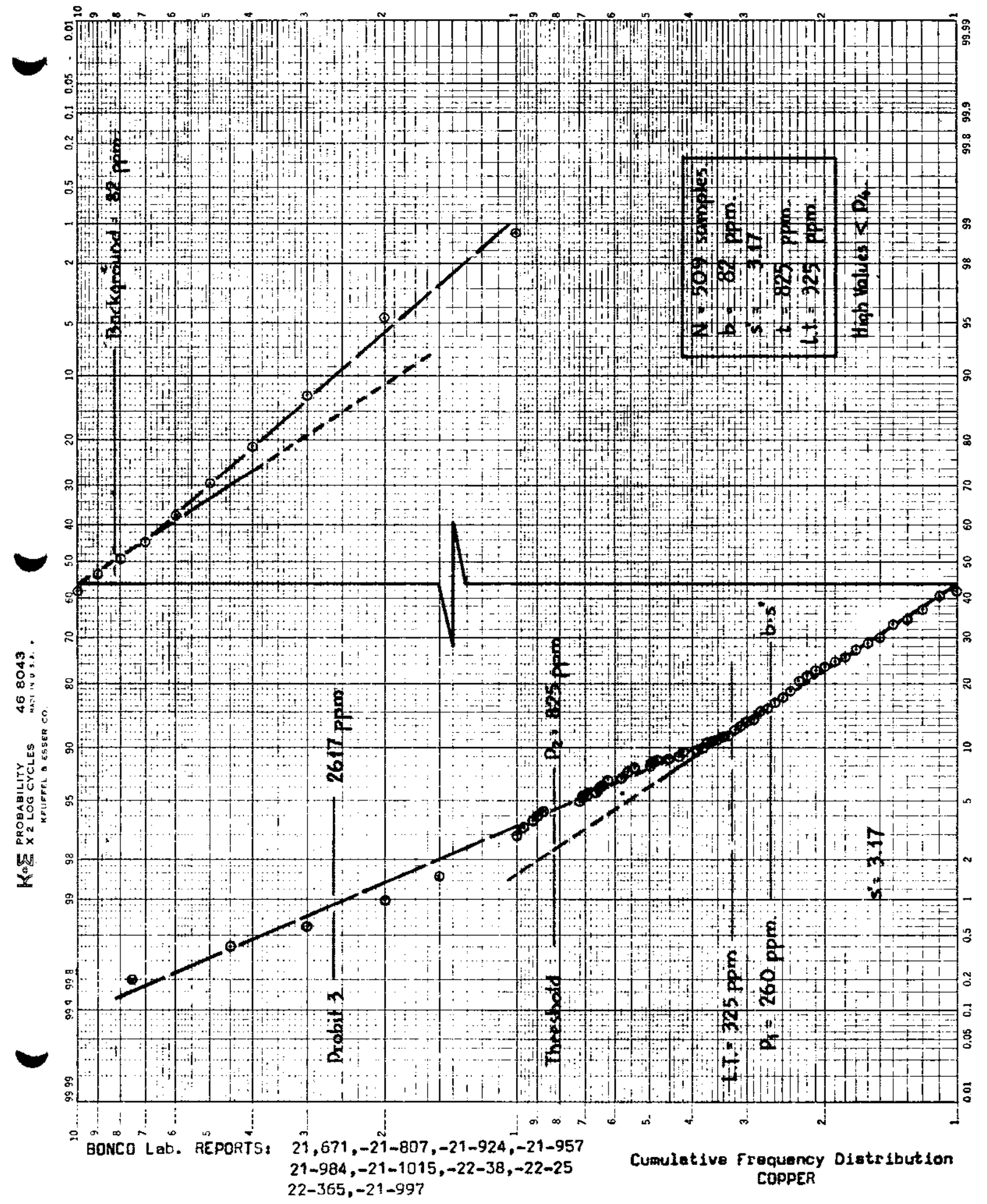
(2) Mo:

The mo results are largely insignificant and weak.

A. Therrien - September 8, 1972

SPIN CLAIMS, BOTANIE MOUNTAIN
LYTTON, B.C. - PROJECT 405

Soil & Talus Fine - 509 samples



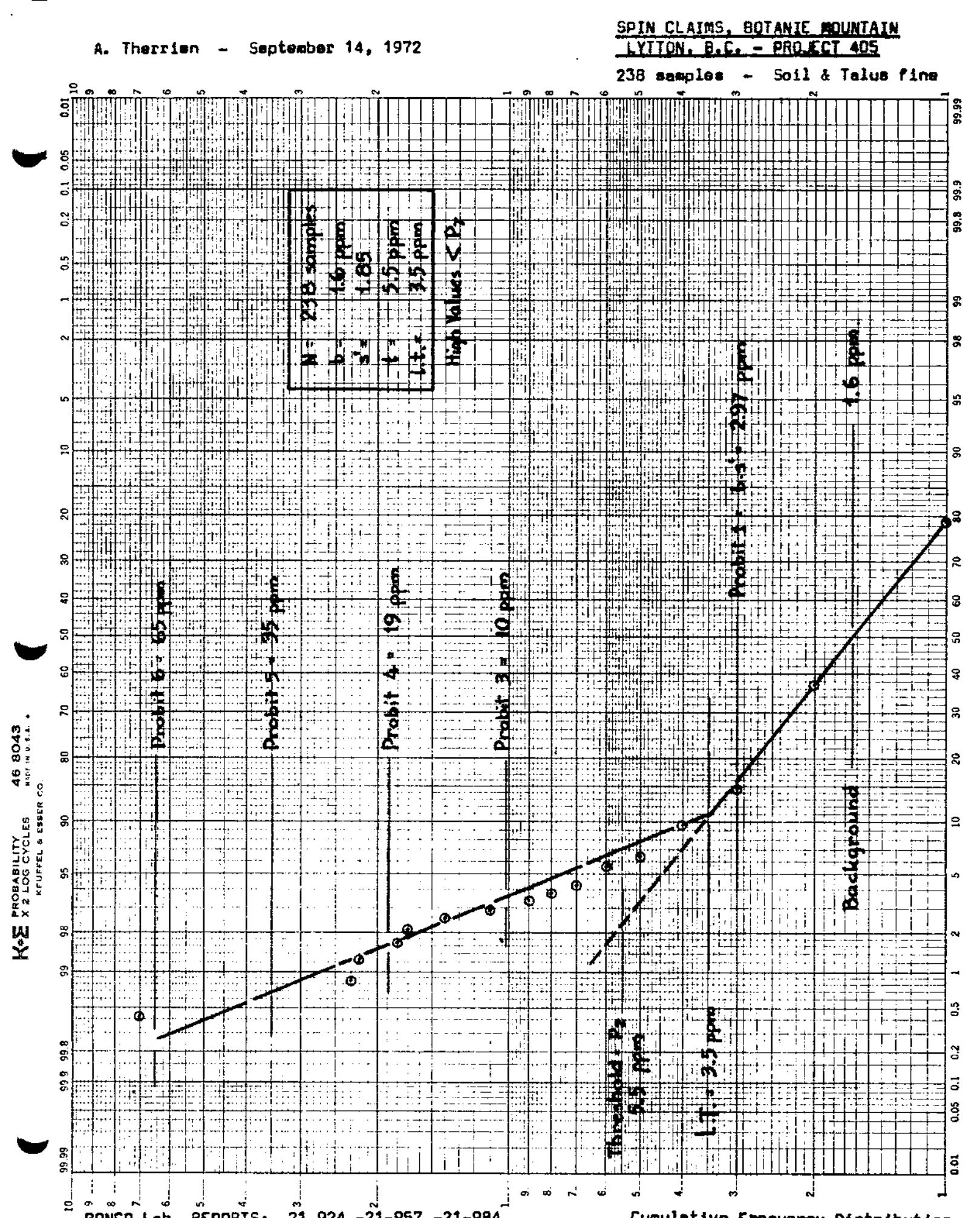
BONCO Lab. REPORTS: 21,671,-21-807,-21-924,-21-957
21-984,-21-1015,-22-38,-22-25
22-365,-21-997

Cumulative Frequency Distribution
COPPER

A. Therrien - September 14, 1972

SPIN CLAIMS, BOTANIE MOUNTAIN
LYTTON, B.C. - PROJECT 405

238 samples - Soil & Talus fine



BONCO Lab. REPORTS: 21-924,-21-957,-21-984, 21-997,-21-1015,-22-38, 22-25

Cumulative Frequency Distribution

MOLYBDENUM

(2) Mo: (Cont'd)

The background occurs below two ppm.

Two markedly different populations are present. One would naturally attribute the contrast to different rock types where the samples are collected. But, curiously, the Cu distribution does not show such contrast. After all, the Cu samples were collected from different types as well. The author is inclined to suggest that the Mo concentration is related to certain features other than rock types, probably late stage fissure filling or dyke injection that transgressed the rock contacts.

It is noteworthy that the lower threshold occurs at 89 percentile - 3.5 ppm; while the lower threshold of Cu distribution curiously coincides at 89 percentile as well.

The anomalous results are mostly from Trench #1 in andesite.

Ground Distribution:

Spin Claims Area:

Cu: (See Map "Cu Distribution, Spin Claims - 1" = 500')

The map shows the geology and the geochemical survey results.

Two strong copper anomalies are blocked out as "Detailed Surveys A and B". Their sample results are presented on 1" = 200' scale maps and will be discussed in the following sections. Please note their occurrences contiguous to the Spences Bridge Group volcanics.

Two weak anomalies are present. One covers trenches #2 and #3 and tends to emphasize the peripheral zone of the volcanics. A second one contains trench #1 and is marked by a pyrite gossan zone in the Spences Bridge Group volcanics. The strong Cu anomalies in detailed survey areas A and B both occur in the Mt. Lytton batholith.

Spin Claims Area:

Cu: (Cont'd)

Both are characterized by numerous dykes apparently related in composition to the Spences Bridge Group volcanics. Those areas were described as "mixed zones" by Choi and seem to represent a fractured portion in the batholith where the ascending parent magma of Spences Bridge Group volcanics intruded as dykes. The distribution of Cu anomalies and showings seem to suggest that the "mixed zones" are favorable for Cu mineralization (see also section "Mineralization").

Assuming that such observation is valid, the question naturally arises how the copper mineralization was introduced. As described in the previous section, Cu sulphides were found either in quartz veins or in association with joint faces in areas abounded by andesite, rhyolite dykes. However, the accompanying dyke rocks have seldom been found mineralized. Exceptions exist but are rather rare. The inference is that the Cu mineralization occurred independently from the dyke intrusion, given possible overlapping.

Mo: (See Map "Mo Distribution, Spin Claims" - 1" = 500')

The claim area is largely negative. Anomalous values occur in trench #1 area along narrow trends that appear to be Mo-enriched dykes or veins.

It is certainly unusual that such confined Mo anomalies should occur in Spences Bridge Group volcanics.

Detailed Survey A: (See "Detailed Survey Map A - 1" = 200')

This precipitous area harbors the strongest geochemical anomaly of the Botanie Mountain property. It initiated the Spin claims staking, geochemical survey, and road construction.

Detailed Survey A: (Cont'd)

The geochemical Cu distribution shows surmounting anomalies in the diorite, widely open to the south. The culminating values coincide with the showing at stations BA 242-245.

It is recommended that further claim staking and geochemical sampling be extended to the south of the existing surveyed area.

Detailed chip sampling and mapping is recommended to evaluate the showing at stations BA 242-246 since trenching is impractical in this extremely rugged zone.

Geophysical surveys (REM) were undertaken in the fall 1971. Due to the precipitous conditions at the geochemical anomaly, the coverage was not complete. Such topographical limitation should be taken into account if future geophysical survey is considered.

The area was examined by the author in the fall of 1971 (also see map "Spin #4 & 6", 1" = 100'). A discussion, based on his personal field observations, follows.

The local geology consists of two rock units. The Mount Lytton Batholith here is dark green, commonly massive, medium-grained hornblende diorite. It is cut by numerous dykes of various compositions. -Among them greyish green andesite dykes are most common. Light grey rhyolite and dark green diabase dykes also occur. One minor variety is a dark green dyke rock that tends to occur along sheared surfaces. It has a schistose texture and a basaltic composition.

The Spences Bridge Group rocks are a volcanic complex, predominated by breccia with rhyolitic or andesitic fragments. Layers of andesite and rhyolite are present, their textures vary from aphanitic to porphyritic. Such complex rock assemblage is interpreted as results of multiple extrusions.

Detailed Survey A: (Cont'd)

Intermediate and acidic lavas extruded in different, possibly alternating episodes. A hypothesis of volcanic rift zone has been discussed in the previous section "Mineralization".

Under such hypothetical framework, the origin of the locally predominant breccia is speculated. As each flush of magma squeezed through the eruptive fissures, the previously solidified volcanic wallrock would be scraped away and fragments of various compositions representing wallrock of successive extrusions would be cemented in each new layer of breccia.

It is noteworthy that the anomalous copper values in the dyke-swarmed diorite contrast sharply against the weak copper values in the Spences Bridge Group volcanics. Evidently the diorite hosts the copper mineralization while the local Spences Bridge Group is barren.

At showing stations BA 241-245, andesite dykes seem to accompany the altered diorite bands which contain disseminated chalcopyrite and bornite.

It is observed that the basically massive diorite appear somewhat fractured where Cu mineralization and abundant dykes occur. Assuming that the fracturing, the dyke injection were related, two possible time relations are deliberated:

(1) The fracturing of the diorite took place prior to the subsequent dyke injection and facilitated the injection. But no apparent explanation can be applied to the cause of the fracturing. It "selectively" occurs in the peripheral zones of the volcanics.

(2) The fracturing was caused by the forceful injection of the dykes. They were shot out from the neighboring eruptive fissures. This assumption has not met disproving field evidence to date.

Again, assuming fracturing, injection, and mineralization were all inter-related, three possible sequences are considered as follows:

Detailed Survey A: (Cont'd)

(1) The Mineralization Occurred Before the Dyke Injection.

This would open the possibility of a buried ore zone in the batholith under the volcanic veneer. However, the coincidental occurrences of Cu mineralization along the margin of the volcanics are not satisfactorily explained.

(2) The Mineralization Occurred During Dyke Injection:

This would imply that the Spences Bridge Group magma was a carrier of Cu mineralization; or certain phase(s) of the Spences Bridge Group volcanic activity was a carrier of Cu mineralization. The malachite stain in trench #1 and the surrounding pyrite gossan zone, both in andesite, may support this hypothesis, although most volcanics in the area are barren. Still, in the claim area, no definite in situ Cu sulphides have been observed in the Spences Bridge Group rocks to date. Regionally speaking, the Spences Bridge Group volcanics have rarely been known to carry Cu mineralization.

(3) The Mineralization Occurred After the Dyke Injection:

The dyke injection would have made the intruded diorite favorable for late stage Cu mineralization. The significance of such time-relation is that the dyke-swarmed diorite would be a major control for Cu mineralization. In the author's opinion, the field features observed so far suggest that this time relation is the most acceptable working hypothesis to date.

It is therefore recommended that all peripheries of the Spences Bridge Group volcanics be thoroughly mapped and prospected with special attention drawn to the dyke-swarmed diorite.

Detailed Survey B: (See next page)

Detailed Survey B: (See "Detailed Survey - Map B, 1" = 200')

Moderate to strong Cu anomalies occur in the diorite contiguous to the Spences Bridge Group rocks. The northwest - southeast trend of the culminating anomaly seems to follow one local joint system, approximately parallel to the Izman Creek branch. Its course might have developed along the same joint system as well.

The anomaly opens to the southeast into the Spences Bridge Group volcanics.

It is recommended that further geochemical sampling be extended east of the surveyed area. The periphery of the Spences Bridge Group is to be mapped and prospected.

Claim staking is recommended to cover the possible northwest extension of the Cu anomaly (stations BG 77-79).

CONCLUSIONS:

The local hornblende diorite of Mount Lytton Batholith has been found to host copper mineralization.

The mineralized zones in diorite are dyke-swarmed and contiguous to "spotty" volcanic occurrences of younger Spences Bridge Group. The periphery of the volcanics seems to be favorable for copper mineralization.

A working hypothesis of volcanic rift zone is discussed (Discussion - Detailed Survey A).

A narrow and weak geochemical Mo anomaly is present in the Spences Bridge Group andesite.

RECOMMENDATIONS:

Items of future work are recommended as follows:

RECOMMENDATIONS: (Cont'd)

The peripheries of the Spences Bridge Group volcanics are to be mapped and prospected with emphasis on the dyke-swarmed zones of Mount Lytton Batholith diorite.

Further staking, geochemical sampling, and detailed chip sampling are to be carried out in the existing Cu anomalies (see Discussion, Detailed Surveys A and B).

Geophysical surveys may be undertaken in the anomalies, allowing special consideration of the precipitous terrain.

BIBLIOGRAPHY:

Duffell, S., and McTaggart, K.C., 1951 - Ashcroft Map-Area, B.C. G.S.C. Memoir 262

Choi, C.I., 1971 - Geochemical Report on the B&B Claims, Botanie Mountain area, Kamloops M.D., B.C.

COST ANALYSIS

I LABOR COSTS:

A. Geochemical and Geological Surveys: (9-1-71 to 10-31-71)

C.I. Choi	(Geologist)	4 days @ $34/day	$ 136.00	
C.P. Lin	(Geologist)	18 days @ $45/day	810.00	
J. BInnie	(Sr. Ass't)	3 days @ $34/day	102.00	
A. Gussen	(Ass't)	12 days @ $25/day	300.00	
C. Robison	(Ass't)	4 days @ $24/day	96.00	
				$ 1,444.00

B. Geophysical (EM) Survey: (9-1-71 to 10-31-71)

J. Binnie	(Sr. Ass't)	5 days @ $34/day	$ 170.00	
A. Gussen	(Ass't)	5 days @ $25/day	125.00	
C. Robison	(Ass't)	5 days @ $24/day	120.00	
				$ 415.00

C. Geological & Geochemical Survey: (7-13-72 to 7-18-72)

C.I. Choi	(Geologist)	15 days @ $36/day	$ 540.00	
G. Davis	(Ass't)	15 days @ $25/day	375.00	
				$ 915.00

TOTAL LABOR COSTS $ 2,774.00

II ROOM AND BOARD:

Camp Costs	- 36 man days @ $ 7/man day	252.00	
Motel and Meals	- 50 man days @ $12/man day	600.00	
			$ 852.00

III ANALYTICAL COSTS:

290 Cu analysis	@ $1.00 per sample	290.00	
110 Mo analysis	@ $1.00 per sample	110.00	
290 sample preparations	@ 0.20 per sample	58.00	
			$ 458.00

IV TRANSPORTATION:

Helicopter rent	- 2 hours @ $160/hour	320.00	
4 x 4 3/4 ton truck	- 15 days @ 20/day	300.00	
			620.00

V REPORT PREPARATION:

C.P. Lin	(Geologist)	5 days @ $45/day	225.00	
C.I. Choi	(Geologist)	3 days @ $36/day	108.00	
A. Therrien	(Draftsman)	10 days @ $40/day	400.00	
D. Williamson	(")	3 days @ $17/day	51.00	
Secretarial			25.00	
				809.00

TOTAL COSTS $ 5,513.00

STATEMENT OF QUALIFICATIONS

I, Chong-Pin Lin of the town of Asbestos in the Province of Quebec, hereby certify that:

1. I am a mining exploration geologist with four years of experience.

2. I am a graduate of the following universities:

National Taiwan University (Republic of China)	B.A. (Geology)	1965
Bowling Green State University (Ohio, U.S.A.)	M.A. (Geology)	1969

3. I am employed by Canadian Johns-Manville Company, Limited, P.O. Box 1500, Asbestos, Quebec, as a geologist. My permanent address is in Asbestos.

4. I am an affiliate member of the Association of Exploration Geochemists, a member of the Canadian Institute of Mining & Metallurgy, and a Fellow of the Geological Association of Canada.

5. I made the geological observations in the Detailed Survey A area and the access road showings.

6. I compiled and interpreted the technical data.

September 1972

Chong-Pin Lin, M.A., Geologist
Canadian Johns-Manville Co., Ltd.

STATEMENT OF QUALIFICATIONS

I, Herbert Keith Conn, of the town of Asbestos, do hereby declare that:

1. I am a mining geological engineer employed as Exploration Manager for Canadian Johns-Manville Company Limited, P.O. Box 1500, Asbestos, Quebec.

2. I have practised in the geological profession for twenty-two years and specialized in economic geology and exploration procedures for the past twenty-one years.

3. I am a graduate of the University of Toronto, Toronto, Ontario, with a degree of B.A.Sc. (Mining Geology), 1948.

4. I am a member of the following professional associations:

   (a) Corporation of Engineers of Quebec

   (b) Non-resident member of the Association of Professional Engineers of the Province of British Columbia

   (c) Fellow of the Geological Association of Canada

   (d) Fellow of the Society of Economic Geologists

   (e) Member of the Canadian Institute of Mining and Metallurgy

   (f) Member of the American Institute of Mining Engineers

5. This report is based on published and unpublished information.

September 1972

H.K. Conn, P. Eng.
Exploration Manager
Canadian Johns-Manville Co., Limited

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
H. K. CONN
Expiry Date: Jan. 28, 1973

GEOCHEMICAL SURVEY DATA

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. I. Chi. & C. Robison

AREA: Botanie Mtn. Area (Anomaly III)

DATE: August 26 / 1971

PROJECT: 405

LOCATION REF.: 3750 ft. Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-215	50'W of BA-214	↓ 30°	Mountainous hill 3800' contour	Talus	B 4"	Grey	silt pebbles	minor needles	
BA-216	90'W of BA-215	↓	"	Soil	B 6"	Reddish brown	"	minor needles	
BA-217	50'W of BA-216	↓ 30	"	"	B 5"	"	"	some needles	
BA-218	50'W of BA-217	↓	"	"	B 4"	Dark Brown	silt fine sand & pebbles		
BA-219	50'W of BA-218	↓ 25°	"	"	B 5	"	"	minor needles	
BA-220	50'W of BA-219	↓	"	"	B 5"	"	"		
BA-221	50'W of BA-220	↓	"	"	B 4	"	silt fine sand		
BA-222	60'W of BA-221	↓	"	Talus	B 6"	"	"		

AMB 6069

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. I. Choi & C. Robison

AREA: Botanie Mtn. Area. (Anomaly II)

DATE: August 26, 1971

PROJECT: 405

LOCATION REF.: @ 3750' Contour.

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-200	3750' Contour 500' W of Creek	↓	Mountainous hill	Talus	B. 6"	Yellowish brown	s.ll f. Sand		
BA-201	50'W of BA 200	↓ Cliff	Bottom of Cliff	"	B. 4"	dark brown	s.ll f. sand some pebbles	minus rocks	
BA-202	50'W of BA-201	↓ Cliff	"	"	B 3"	Dark grey	s.ll f. sand pebbles some gravel	Bedrock showing on outcrop	
BA-203	50'W of BA-202	↓ Cliff	"	Soil	B 6	Grayish brown	s.ll f. sand pebbles	Chlorite schist bedrock with Qtz. gravel - Talus	
BA-204	50'W of BA-203	↓	Mountainous hill	Talus	B 4	reddish brown buff	"		
BA-205	50'W of BA-204	↓ Cliff	Bottom of Cliff	"	B 4	"	s.ll f. Sand		
BA-206	40'W of BA-205	↓ Cliff	"	"	B 4	reddish brown	s.ll pebbles minor rock		
BA-207	50'W of BA-206	↓	Mountainous hill	"	B 5	Dark brown	s.ll pebbles some Organic		
BA-208	50'W of BA-207	↓	"	"	B 5	Yellowish brown	s.ll pebbles		
BA-209	50'W of BA-208	↓	"	"	B 5"	Grayish brown	s.ll pebbles		
BA-210	50'W of BA-209	↓ 80'	"	"	B 6"	dark brown	s.ll f. Sand		
BA-211	50'W of BA-210	↓	"	"	B 4"	"	"		
BA-212	50'W of BA-211	↓ 40'	"	Soil	B 5"	Grey	s.ll f. sand pebbles		
BA-213	50'W of BA-212	↓ 40'	"	Talus	B 5"	Brown	s.ll pebbles		
BA-214	50'W of BA-213	↓	"	"	"	dark brown	"		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Choi & C. Robinson

AREA: Bolivia Mtn. Area (Anomaly III)

DATE: August 27 1971

PROJECT: 405

LOCATION REF.: 4000' contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA -223	4000' contour	↓	Mountainous Ridge	Soil	B 4"	Dark brown	Slt fine sand some pebbles		
BA -224	50'E of BA-223	↓ 30°	"	"	B 5"	"	"		
BA -225	50'E of BA-224	↓ 30°	Mountain hill	"	B 6"	"	"		
BA -226	75'E of BA-225	↓	"	Talus	B 4"	Pale Grey	Slt fine sand & pebbles		
BA -227	60'E of BA-226	↓	"	Talus	B 5"	Grey	"	minor rocks	
BA -228	50'E of BA-227	↓ 25°	"	Soil	B 4"	Dark Grey	Medium & coarse sand		
BA -229	130'E of BA-228	↓ 30°	Valley of hill	Talus	B 6"	Grey to brown	Slt fine to Medium sand	4100' contour (about)	
BA -230	50'E of BA-229	↓	"	"	B 6"	"	"	Minor Organic	
BA -231	30'E of BA-230	↓ 40°	Mountain Valley Talus slope	"	B 4"	Grey	Slt Medium Sand		
BA -232	50'E of BA-231	↓ 40°	"	"	B 4"	Grey	" some pebbles		
BA -233	50'NE of BA-232	↓	Mountain hill	"	B 4"	Grey	Slt & fine sand		
BA -234	150'NE of BA-233	↓	"	"	B 4"	Grey	Slt fine sand	4050' contour	
BA -235	50'NE of BA-234	↓ 25°	"	"	B 4"	Brown	Slt fine sand		
BA -236	60'NE of BA-235	↓ 25°	"	Soil	B 4"	Brown	"		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Chin & C. Robinson

AREA: Babine Mtn. Area (Anomaly III)

DATE: August 28. 1971

PROJECT: 405

LOCATION REF.: 4250' Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-237	4250' Contour N10°W of BA-153	↓	Mountainous Talus slope	Talus	B 6"	Grayish brown	silt fine sand & pebbles	4250' elevation	
BA-238	50' E of BA-237	↓ 40°	Mountainous Valley	Soil	B 5"	Brown	silt fine Sand		
BA-239	50' E of BA-238	↓ "	"	Talus	B 5"	Yellowish brown	"		
BA-240	50' E of BA-239	↓ 30°	"	Talus	B 5"	Buff	silt fine sand & pebbles		
BA-241	50' W of BA-237	↓ 35°	Mountainous hill	Soil	B 5"	Yellowish brown	silt & pebbles		
BA-242	50' W of BA-241	↓	"	Talus	B 5"	Brown	silt medium Sand		
BA-243	50' SW of BA-242	↓ Cliff	Bottom of Cliff	"	B 4"	Dark grey	silt fine Sand & pebbles		
BA-244	50' SW of BA-243	"	"	"	B 6"	"	silt pebbles	minor organic material	
BA-245	50' SW of BA-244	↓ Cliff	"	"	B 5"	Grayish brown	silt & sand pebbles	* Malachite staining in outcrop minor needles	
BA-246	50' W of BA-245	↓	"	"	B 6"	Grey	silt & fine sand	* Malachite staining in outcrop	
BA-247	50' W of BA-246	↓	"	"	B 7"	Grey	silt pebbles	Elevation of 4150 ft.	
BA-248	50' W of BA-247	↓ Cliff	"	"	B 6"	Grayish brown	"		
BA-249	50' W of BA-248	↓ 20°	"	Soil	B 6"	Dark grey	"		
BA-250	50' W of BA-249	↓ 40°	Mountainous hill	Talus	B 5"	Dark grey	silt fine Sand & pebbles	Elevation of 4160 ft.	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Chi & C. Robison

AREA: Babine Mtns. Area

DATE: August 28, 1971

PROJECT: 405

LOCATION REF.: 42.50' Cedar.

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-251	50'W of BA-250	↓	Mountainous hill	Talus	B 6"	Dark grey	Silt fine sand	Thick moss	
BA-252	50'W of BA-251	↓	"	Talus	B 5"	Grey	Silt & fine sand		

ACB 9384

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Chi & C. Robison

AREA: Bolam's Mtn. Area (Anomaly III)

DATE: August 28 1971

PROJECT: 405

LOCATION REF.: 4750 ft. Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-253	N 20°W of BA-252	↓ NW	Moulinaux Ridge	Talus	B 6"	Dark brown	silt fine sand		
BA-254	50'W of BA-253	↓ 30°	Moulinaux Valley	"	B 4"	brown	"		
BA-255	50'W of BA-254	↓	" "	"	B 6"	Grey & brown	silt & pebbles		
BA-256	50'W of BA-255	↓	"	"	B 6"	Dark brown	silt & fine sand		
BA-257	100'W of BA-256	↓ 35°	"	"	B 8"	Grey	silt fine sand & pebbles		
BA-258	70'W of BA-257	↓	"	"	B 6"	Dark grey	"		
BA-259	50'W of BA-258	↓	Moulinaux ridge	Soil	B 3"	Grey	silt fine sand		
BA-260	50'W of BA-259	↓	"	Soil	B 4"	Dark grey	"		
BA-261	50'E of BA-253	↓ 20°	"	Soil	B 4"	Grey	"		
BA-262	50'E of BA-261	↓	Moulinaux hill	"	B 5"	Grey & brown	silt fine sand		
BA-263	50'E of BA-262	↓ 20°	"	Talus	B 4"	Brown	silt & pebbles		
BA-264	50'E of BA-263	↓ 32°	"	"	B 4"	Dark Grey	silt sand pebbles		
BA-265	40'E of BA-264	↓	"	"	B 5"	"	silt & gravels		
BA-266	50'E of BA-265	↓	"	Soil	B 6"	Grey & brown	silt fine sand		
BA-267	50'E of BA-266	↓ 26°	Moulinaux ridge	Talus	B 5"	Brown	silt & pebbles		

ASP 4787

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Chow & C. Robison

AREA: Eaglenest Mt. Area (Anomaly III)

DATE: August 28 1971

PROJECT: 405

LOCATION REF.: 4750 ft. Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-268	50'E of BA-267	30°	Mountainous ridge	Talus	B 6"	Brown	s.ll f. gravel & pebbles	sand	
BA-269	50'E of BA-268	35°	"	Talus	"	Brown	s.ll pebbles		
BA-270	80'E of BA-269		Mountainous hill	Talus	B 6"	Grey dark brown	s.ll f.-m. sand & some pebbles		
BA-271	50'E of BA-270		"	Soil	B 6"	Grey	s.ll & f.-m. Sand		
BA-272	50'E of 271		"	Soil	B 6"	Dark brown	"		
BA-273	50'E of 272		"	Talus	B 6"	Grey	s.ll f.-m. Sand & pebbles		
BA-274	80'E of 273		"	Soil	B 5"	Dark grey	s.ll sand & some pebbles		
BA-275	50'E of 274		plateau & ridge	Soil	B 6"	Dark brown	s.ll sand	mica needles	
BA-276	50'E of 275		"	"	B 6"	Dark grey	s.ll pebbles		
BA-277	50'E of 276		"	"	B 5"	Brown	s.ll f.-m. Sand		

FER 6282

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C Chr. & R. Robison

AREA: Cirque Mtn. Area (Assessment II)

DATE: August 29, 1971

PROJECT: 405

LOCATION REF.: 5000 ft. Contour.

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA -378	5000' elev. N 20° W of Base Line	↓	Plateau (Ridge) Grass Covering	Soil	B 4"	Yellowish brown	Silt, sand & silt.		
BA -379	50' W of 378	↓	"	"	B 5"	pink brown	"		
BA -380	50' W of 379	↓	"	"	B 6"	Yellowish brown	Silt fine to medium Sand		
BA -381	50' W of BA-380	↓	"	"	B 7"	Brown	Silt fine sand		
BA -382	50' W of BA-381	↓	"	"	B 7"	Dark grey	Silt fine sand	minor organic material small drainage	
BA -383	50' W of BA-382	↓	"	"	B 7"	Dark grey	Silt fine sand		
BA -384	50' W of BA-383	↓	"	"	B 6"	Dark grey brown	Silt, fine sand & some gravels		
BA -385	50' W of BA-384	↓	Moulton plateau	"	B 4"	Dark grey	Silt fine sand		
BA -386	50' W of BA-385	↓	"	Soil	B 5"	Dark brown	"		
BA -387	50' W of BA-386	↓	"	"	A 1"	Brown	Silt. Sand & some gravels		
BA -388	50' W of BA-387	↓	"	"	A 5"	Brown	Silt, fine sand & some pebbles		
BA -389	50' W of BA-388	↓	"	"	A 5"	"	"		
BA -390	50' W of BA-389	↓	"	"	A 6"	Reddish brown	Silt fine sand & minor pebbles		
BA -391	50' W of BA-390	↓	"	"	A 4"	Dark grey	" minor Pebbles		
BA -392	50' W of BA-391	↓	"	"	A 4"	Brown	Silt & fine Sand		

4FR 6/70

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Choi & C. Robison

AREA: Babine Mt. Area (Area IV)

DATE: August 29, 1971

PROJECT: 405

LOCATION REF.: 5600 ft. Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA -293	50'N of BA-292	↓	Mountainous hill	Soil	B 4"	Dark brown	silt fine sand & minor rock		
BA -294	50'N of BA-293	↓	"	Soil	B 5"	Yellowish brown	silt fine sand		
BA -295	50'N of BA-294	↓	"	"	B 4"	Dark brown	silt fine sand		
BA -296	50' NW of BA-295	↙	"	"	B 5"	Dark brown	" minor rocks		
BA -297	50'NW of BA-296	↓	"	"	B 5"	Brown	silt fine sand		
BA -298	50'NW of BA-297	↓	"	"	B 6"	"	"		
BA -299	50'NW of BA-298	↓	"	"	A 8"	Grayish brown	silt fine sand & minor rocks		
BA -300	50'NE of BA-299	←	"	"	A 5"	reddish brown	"		
BA -301	50'NE of BA-300	←	"	"	A 4"	Dark brown	"		
BA -302	50'NE of BA-301	←	"	"	A 6"	Grayish brown	silt fine sand some gravels		
BA -303	50' NE of BA-302	←	Mountainous valley	"	A 8"	Dark brown	silt fine sand medium sand		
BA -304	50'NE of BA-303	←	"	"	A 6"	Grayish brown	silt fine sand some gravels		
BA -305	50'NE of BA-304	←	"	"	A 5"	light brown	silt fine sand		
BA -306	50'NE of BA-305	←	"	"	B 10"	Dark brown	"		
BA -307	50'NE of BA-306	←	"	"	A 10"	"	silt fine sand & minor rocks		

BSB 4-1111

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Chi & C. Robison

AREA: Bolivia Mtn. Area (Anomaly III)

DATE: August 29 1971

PROJECT: 405

LOCATION REF.: 5000 ft contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
~~BA -307~~	~~50' NE of BA~~								
BA -308	50' NE of BA -307	←	Moderate hill	Soil	A 8"	Grayish brown	Silt fine sand & minor rocks		
BA -309	50' NE of BA -308	←	"	Soil	A 7"	Light brown	"		
BA -310	50' NE of BA -309	←	"	"	A 7"	Dark brown	Silt & fine sand		
BA -311	50' NE of BA -310	←	"	"	A 9"	Reddish brown	"		
BA -312	50' NE of BA -311	←	"	"	A 2"	Dark brown	"		
BA -313	50' NE of BA -312	←	"	"	A 10"	Reddish brown	"		
BA -314	50' NE of BA -313	←	"	"	A 8"	Light brown	Silt fine sand Some pebbles		
BA -315	50' NE of BA -314	←	"	"	A 10"	Dark brown	Silt fine sand & minor rocks		
BA -316	50' NE of BA -315	←	"	"	A 3"	Yellowish brown	Silt & medium sand		
BA -317	50' NE of BA 316	←	"	"	A 6"	Buff	Silt & fine sand		
BA -318	50 NE of BA -317	←	"	"	A 4"	Brown	Silt fine sand & Some pebbles		
BA -319	50' NE of BA -318	←	"	"	A 3"	Buff	Silt & fine sand		
BA -320	50' NE of BA -319	↙	"	"	A 4"	Dark brown	"		
BA -321	50' NE of BA -320	↙	"	"	A 3"	Dark brown	Silt fine sand & minor rock		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Choi & C. Robison

AREA: Baker Mtn. Area (Anomaly III)

DATE: August 30, 1971

PROJECT: 405

LOCATION REF.: 5000 ft. Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-322	50'NE BA of 321	↙	Mountainous Valley	Soil	A 3"	Dark brown	s.ll fine sand	minor rocks	
BA-323	50'NE BA of 322	↙	"	Soil	A 3"	Grey	s.ll fine sand	some pebbles	
BA-324	50'NE BA of 323	↙	"	"	A 4"	Dark brown	s.ll. fine sand	minor rocks	
BA-325	50'NE of BA-324	↙	"	"	A 7"	Greyish brown	s.ll fine sand		
BA-326	50'NE of BA-325	↙	"	"	A 3"	white Grey	s.ll. fine sand	some pebbles	
BA-327	50'NE of BA-326	↙	"	"	A 6"	Light grey	s.ll fine sand	minor rocks	
BA-328	50'NE of BA-327	↙	"	"	A 5"	Grey	s.ll fine sand		
BA-329	50'NE of BA-328	↙	"	"	A 4"	Grey & brown	s.ll. fine sand	& some pebbles	
BA-330	50'NE of BA-329	↙	"	"	A 6"	Grey	"	elevation of 5100 ft.	
BA-331	50'NE of BA-330	↙	"	"	A 4"	Greyish brown	s.ll fine sand	& minor rocks	
BA-332	50'NE of BA-331	↙	"	"	A 6"	"	s.ll fine sand	some pebbles	
BA-333	50'NE of BA-332	↙	"	"	A 8"	Dark brown	s.ll fine sand	rocks	
BA-334	50'NE of BA-333	↙	"	"	A 6"	Brown	s.ll. fine sand	minor rocks	
BA-335	50'NE of BA-334	↓	"	"	A 3"	Grey	s.ll fine sand	& some pebbles	
BA-336	50'N of BA-335	←	"	"	A 4"	Buff	s.ll fine sand		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Choi & C. Robison

AREA: Babine Mtn. Area (Anomaly III)

DATE: August 30, 1971

PROJECT: 405

LOCATION REF.: 5000 ft. Contour

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-337	50'N of BA-336	←	Mountainous Valley	Soil	A 4"	Dark brown	s.ll. & fine sand pellets		
BA-338	50'N of BA-337	←	"	Soil	A 8"	Brown	s.ll. fine sand & some rocks		
BA-339	50'N of BA-338	←	"	Soil	A 4"	Grayish brown	s.ll fine sand & some rock		
BA-340	50'NW of BA-339	←	"	Soil	A 6"	Dark grey	s.ll. f sn sand		
BA-341	50'NW of BA-340	←	Valley Creek	Stream Sample	6"	Grey brown	s.ll. clay, medium & coarse sand	Flow water & west on Creek	
BA-342	50'NW of BA-340	↓	Mountainous valley	Soil	6"	Brown	s.ll. & fine sand		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Choi & C. Robinson

AREA: Baker Mtn. Area (Anomaly II)

DATE: August 30 1971

PROJECT: 405

LOCATION REF.: 5250 ft. Coaker

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-345	5250 ft (E end of Baker Mtn.)	↘	Plateau (Grass opening)	Soil	A 6"	Dark brown	silt & fine sand		
BA-346	50'W of BA-345	↘	"	"	A 5"	"	silt, fine sand minor rocks		
BA-347	50'W of BA-346	↘	"	"	A 7"	Brown	silt, fine sand some pebbles		
BA-348	50'W of BA-347	↘	"	"	A 8"	Grey'h brown	" minor rocks		
BA-349	50'W of BA-348	↘	"	"	A 6"	Brown	"		
BA-350	50'NW of BA-349	↓	"	"	A 4"	Dark brown	"		
BA-351	50'NW of BA-350	↓	"	"	A 6"	Light brown	silt, fine sand some pebbles	Timber Line	
BA-352	50'N of BA-351	↓	"	"	A 6"	"	silt, fine sand minor rocks		
BA-353	50'N of BA-352	←	Mountain hill side	"	A 6"	Reddish brown	silt, fine sand minor pebbles		
BA-354	50'N of BA-353	←	"	"	A 4"	Dark brown	"		
BA-355	50'N of BA-354	←	"	"	A 7"	"	silt, fine sand minor rocks		
BA-356	50'N of BA-355	←	"	"	A 10"	Reddish brown	"		
BA-357	50N of BA-356	←	"	"	"	"	"		
BA-358	50'N of BA-357	←	"	"	B 7"	Grey'h brown	silt, fine sand some pebbles		
BA-359	50'N of BA-358	←	"	"	B 6"	Dark brown	silt, fine sand minor rocks		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. Choi & C. Robinson

AREA: Colonie Alta Area (Assembly III)

DATE: August 30 1971

PROJECT: Grid 5

LOCATION REF.: 50-50 ft. (colour)

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BA-360	50'N of BA-359	←	plateau	Soil	A 5"	Dark brown	Sil. fine sand minor rocks		
BA-361	50'N of BA-360	←	"	"	A 8"	Light brown	"		
BA-362	50'N of BA-361	←	"	"	A 5"	Dark brown	Sil. fine sand some pebbles		
BA-363	50'N of BA-362	↙	"	"	A 5"	"	Sil. fine sand minor rocks		
BA-364	50'N of BA-363	←	Moderately hilly	"	A 6"	Light brown	Sil. fine sand minor pebbles		
BA-365	50'N of BA-364	←	"	"	A 6"	Grey	Sil pebbles		
BA-366	50'N of BA-365	←	"	"	A 5"	Greyish brown	Sil. fine sand pebbles, minor rocks		
BA-367	50'NE of BA-366	↖	"	Soil	A 6"	"	"		
BA-368	50'NE of BA-367	↑	"	Talus	B 9"	Dark Brown	Sil fine sand minor rocks	Small Talus (Greenstone)	
BA-369	50'NE of BA-368	↑	"	Talus	B 6"	Reddish brown	Sil fine Sand	"	
BA-370	50'NE of BA-369	↑30°	"	Soil	B 6"	Greyish Brown	Sil Medium Sand minor rocks		
BA-371	50'NE of BA-370	↑30°	"	Soil	B 6"	Brown	Sil fine Sand some Coarse Sand		
BA-372	50'NE of BA-371	↑	"	Soil	B 5"	Reddish Brown	Sil fine Sand		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS

AREA: Botanie Mtn

DATE: 14 July 1972

PROJECT: 405

LOCATION REF.: Anomaly Gr.

SAMPLE NO. BG	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
001	4400' contour 0+00	↓	mountainous hill	talus	B' 12"	grey brown	coarse sand	bank of a dry stream (water runs beneath bed)	
002	" 0+50	↙	"	soil	B' 8"	"	"	rock covered slope	
003	" 1+00	↙	"	"	B' 8"	"	"	"	
004	1+50	↓	"	talus	B' 8"	dark brown	"	"	
005	2+00	↓	"	"	B' 6"	"	"	"	
006	2+50	↓	"	"	B' 8"	"	"	"	
007	3+00	↓	"	"	B² 10"	grey brown	"	"	
008	3+50	↓	"	"	B'A 14"	"	"	"	
009	4+00	↓	"	"	B'A 14"	"	"	"	
010	4+50	↓	"	"	B'A 16"	"	"	"	
011	5+00	↓	"	"	B' 6"	brown	"	"	
012	5+50	↓	"	"	B' 5"	grey brown	"	"	
013	6+00	↓	"	"	B' 5"	"	"	"	
014	6+50	↓	"	"	B' 4"	"	"	"	
015	7+00	↓	"	"	B' 4"	"	"	"	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS AREA: Botanie Mtn

DATE: 18 July 1972 PROJECT: 405 LOCATION REF.: Anomaly G.

SAMPLE NO. BG	LOCATION 4400' Contour	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
016	4300' 8+00	↓	mountainous hill	soil	B'8"	brown	coarse sand	rocky slope	
017	4340 9+00	↓	"	"	B'8"	"	"	"	
018	4350 9+50	↓	"	"	B'2"	red brown	"	from surface of outcrop small amt. of iron pyrite	
019	4350 10+00	↓	"	"	B'6"	light brown	"	rocky slope - 50' to East outcrop	
020	4360 10+50	↓	"	"	B'6"	dark brown	"	" "	
021	4380 11+00	↓	"	"	B'A 2"	"	"	surface of outcrop	
022	4380 11+50	↓	"	"	B'8"	"	"	rocky slope	
023	4390 12+00	↓	"	"	B'6"	"	"	"	
024	4400 13+00	↓	"	"	B'2"	light brown	"	from surface of outcrop	
025	4400' 13+50	↓	"	"	B'A 2"	dark brown	"	"	
026	4400 14+50	↓	"	"	B'4"	grey brown	"	rocky slope - 80' to East outcrop	
027	4400 15+00	↓	"	"	B'8"	"	"	" "	
028	4400 15+50	↓	"	"	B'8"	brown	"	grassy slope	
029	4400 16+00	↓	"	"	B'14"	grey brown	"	"	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS AREA: Botanie Mtn

DATE: 18 July 1972 PROJECT: 405 LOCATION REF.: Anomaly Cr.

SAMPLE NO. BG	LOCATION 4200' contour	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
030	12+50	↓	mountainous hill	soil	B²6"	grey brown	coarse sand	rocky slope - some vegetation					
031	13+00	↓	"	"	B'2"	dark brown	"	from surface of outcrop					
032	12+50	↓	"	"	B'4"	brown	"	rocky slope - 50' to East outcrop					
033	12+00	↓	"	"	B²6"	light brown	"	" "					
034	11+50	↓	"	"	B'3"	dark brown	"	surface of outcrop					
035	11+00	↓	"	"	B'2"	"	"	"					
036	10+50	↓	"	"	B'2"	"	"	"					
037	10+00	↓	"	"	B²12"	light brown	"	rocky slope - 80' to East outcrop					
038	9+50	↓	"	"	B'3"	dark brown	"	from surface of outcrop					
039	9+00	↓	"	"	B²8"	brown	"	rocky slope - some veg.					
040	8+50	↓	"	"	B'3"	dark brown	"	from surface of outcrop					
041	8+00	↓	"	"	B²8"	brown	"	rocky slope - some veg.					
042	7+00	↓	"	"	B'4"	dark brown	"	" "					
043	6+50	↓	"	"	B'2"	"	"	from surface of outcrop					
044	6+00	↓	"	"	B'3"	"	"	"					

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS AREA: Botanie Mtn.

DATE: 18 July 1972 PROJECT: 405 LOCATION REF.: Anomaly G.

SAMPLE NO. BG	LOCATION 4200' contour	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
045	3+00	↓	mountainous hill	soil	B' 3"	grey brown	coarse sand	surface of outcrop	
046	2+50	↓	"	"	B' 2"	brown	"	rocky slope	lost in transit

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS AREA: Botanie Mtn

DATE: 19 July 1972 PROJECT: 405 LOCATION REF.: Anomaly G

SAMPLE NO. BG	LOCATION 4000' contour	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
047	2+50	↓	mountainous hill	soil	B'2"	dark brown	coarse sand	from surface of outcrop	
048	3+50	↓	"	"	B'4"	grey brown	"	rocky slope	
049	4+50	↓	"	"	B'6"	dark brown	"	rocky slope - grass cover	
050	6+00	↓	"	"	B'4"	brown	"	" - "	
051	7+25	↓	"	"	B'3"	"	"	" - "	
052	8+25	↓	"	"	B'1"	"	"	from surface of outcrop	
053	9+25	↓	"	"	B²8"	grey brown	"	rocky slope	
054	11+50	↓	"	"	B²8"	"	"	rocky slope	
055	12+50	↓	"	"	B'6"	"	"	rocky slope - grass cover	
056	13+50	↓	"	"	B'6"	"	"	" "	
057	14+60	↓	"	"	B²8"	brown	"	" "	
058	15+60	↓	"	"	B'3"	dark brown	"	surface of outcrop	
059	16+85	↓	"	"	B'3"	"	"	rocky slope - from foot of pine tree	
060	20+00	↓	"	sand : soil	B'3"	yellow brown	"	"	
061	21+40	↓	"	sand : soil	B'3"	brown	"	"	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS AREA: Botanie Mtn.

DATE: 19 July 1972 PROJECT: 405 LOCATION REF.: Anomaly G

SAMPLE NO. BQ	LOCATION 4000' contour	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
062	22+60	↓	mountainous hill	soil	B'2"	brown	coarse sand	from surface of outcrop	
063	23+90	↓	"	"	B'6"	"	"	rocky slope - from foot of tree	
064	25+50	↓	"	"	B'3"	grey brown	"	" - "	
065	27+50	↓	"	"	B'2"	dark brown	"	" - "	
066	30+00	↓	"	"	B'12"	brown	"	" - "	
067	31+00	↓	"	"	B'4"	"	"	" - "	
068	32+50	↓	"	"	B'4"	"	"	" - "	
069	33+50	↓	"	"	B'3"	"	"	" - "	
070	34+50	↓	"	"	B'3"	light brown	"	from surface of outcrop	
071	36+50	↓	"	"	B'3"	grey brown	"	rocky sandy slope.	
072	37+50	↓	"	"	B'5"	"	"	"	
073	39+50	↓	"	"	B'6"	"	"	"	
074	40+00	↓	"	"	B'3"	"	"	rocky slope	

CANADIAN JOHNS[illegible]ANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G. DAVIS AREA: Botanie Mtn

DATE: 19 July 1972 PROJECT: 405 LOCATION REF.: Anomaly G

SAMPLE NO. BG	LOCATION 3100' contour	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
075	17+50	↓	Mountainous hill	soil	B' 10"	light brown	coarse sand	rocky slope - some vegetation	
076	13+50	↓	"	"	B'6"	yellow brown	"	" - "	
077	12+00	↓	"	"	B'6"	brown	"	" - "	
078	11+00	↓	"	"	B'8"	grey brown	"	grassy slope	
079	10+00	↓	"	"	B'8"	"	"	"	
080	9+00	↓	"	"	B'6"	grey	"	" - some rock	
081	8+00	↓	"	"	B'6"	"	"	" - "	
082	7+00	↓	"	"	B'6"	brown	"	" - "	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C. I. Choi AREA: Bolonie Mt.

DATE: July 8, 1972 PROJECT: 405 LOCATION REF.:

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
OT-025	4500' Contour Acrossly 6	↓	Mountainous hill	Soil	6"	Dark Brown	Silt, Coarse sand & fine chips	Near Mt. Skinny assoc. bed with calcite veins					
OT-26	180ft N of OT-25	↓	"	"	7"	"	"						
OA-01	5 mile Jct. Turn-off	↓	Mountainous	Rock chips	Bed Rock	dark brown Reddish brown	Rock chips	Diss. pyrite & dark near contact with dark.	Au	S. Ag			
OA-02	Trench #1 120' N.	↑	Trench slope	"	"	"	"	Diss. pyrite with the rock					
OA-03	Trench #1 +90' N.	↑	"	"	"	"	"	"					

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: J Binnie A Gussen; Bond B22-2 AREA: Botanie Mtn

DATE: Feb 1/72 PROJECT: 405 LOCATION REF.: Trench #3

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH Tree Base	COLOUR Species	SIZE TEXTURE No. of Pieces	REMARKS	ANALYTICAL RESULTS
003B	BT3 003				3"	Douglas Fir	3/8/15		
005B	BT3 005				24"	"	3/8/15		
008B	BT3 008				2"	"	3/8/15		
011B	BT3 011				5"	"	3/8/15		
015B	BT3 015				2"	"	3/8/15		
020B	BT3 020				2"	"	3/8/15		
022B	BT3 022				12"	"	3/8/15		
023	BT3 023				3"	"	3/8/15		
03B	BT' 03	J Kerr J Binnie			8"	Douglas Fir	3/8/15	Trench #1	
05B	BT' 05				12"	"	3/8/15		
09B	BT' 09				14"	"	3/8/15		
20B	BT' 20				6"	"	3/8/15		
20BP	BT' 20				6"	White bark Pine	3/8/15	6 needle clumps White bark pine	
28B	BT' 28				14"	Douglas Fir	3/8/15		
28BP	BT' 28				6"	White bark Pine	3/8/15	5 needle clump White bark pine	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: J Binnie B Rutherford AREA: Botanie Mtn

DATE: Feb. 5 / 72 PROJECT: 405 LOCATION REF.: Izman creek.

SAMPLE NO.	LOCATION Elev.	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON Type DEPTH Size	COLOUR	No. of pieces TEXTURE size	REMARKS	ANALYTICAL RESULTS
B001 B	2760	↓↓↙	Outwash.	Douglas Fir	5"		3/8 15"	Izman ck bottom	
B002 B	2760	↓↓↙		"	2"		3/8 15"	side creek flowing from west	
B003 B	3100	↓↓↙		"	2"		3/8 15"	Right side of Izman creek.	
SLB 001	2760	↓		Sand		Grey		Izman ck bottom	very difficult to obtain good stream samples due to ice conditions
SLB 002	2760	↓		Sand		Grey		side ck (dry)	
SLB 003	3100	↓		Sand		Brown		left bank Izman ck	
004 SLG	3200	↙		St/S/G		Grey		Izman ck	
SLG 006	4000	↙		St/G		Grey		small ck.	
SLG C1	4000	↙		St/S/G		Grey		Izman ck	Feb 6/72 J Gossen B Rutherford
C4 BSG	3200	↙	soil sample	St/S/G	B/10	Dark Brown		very organic	BONCO 22-33
BG C4B	3300	↓	Talus sample	Douglas Fir	2"	Light Grey	3/8 15"	Fir second slope	
BG C5	3500	↘	soil sample	Douglas Fir	B/1"	Light Grey		Talus creek	
BG 01B	4000	↙	Talus sample		3"		3/8 15"	outcrops	
BG C6	4000	↙	soil sample		B/3"			outcrops	
BG 07B	4000	↙	Talus sample	Douglas Fir	4"		3/8 15"		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A. Gussen / B. Rutherford AREA: Batonie Mtn.

DATE: Feb. 6/72 PROJECT: 405 LOCATION REF.: West Fork, Ismay Gr.

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
SLG 07	—	—	——	St/S/G	10" 2.	LG	M		
BG 08B	2900'	W	TALUS FILLED RAVINE o/c	Fir	2"			MUCH SNOW, SCATTERED TIMBER	
BG 09B	3500	N	TIMBER FILLED RAVINE	—	5"			— —	
BSG 09	—	—	——	St/H	AB 2	DB LB	F	MUCH ORGANIC	
BG 10B	3600	W	——	FiR	12"				
BSG 10	3600	W	——						

AFS 2787

CANADIAN JOHNS[illegible]ANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gussen B. Rutherford J Binnie

AREA: Batnie Mtn

DATE: Jan 17 / 72

PROJECT: 405

LOCATION REF.: Santoy Trench

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
38-01	North end of trench Elev 3300'	W.	Lateral Moraine	Sand	B/8"	G	Med	Heavily Timbered slope No Bedrock exposed.	
38-02	50 E	"	"	"	B/8"	B	"		
38-03	150 E	"	"	"	B/12"	G	"		
38-04	200 E	"	"	"	B/8"	LB	"		
38-05	250 E	"	"	"	B/14"	LB	"		
38-06	300 E	"	"	"	C/12"	LB	"	granite-Pilled diorite water course	medium sized fines
38-07	350 E	"	"	"	C/12"	LB	"		
38-09	400 E	"	"	"	B/14"	LB.	"		

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

O nwo 83 22-1

COLLECTOR: A Grasen B Rutherford J Binnie — Biogeochem

AREA: Botanie Mtn

DATE: Jan 17/72

PROJECT: 405

LOCATION REF.: Santana Trench

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	~~SOIL~~ TYPE Twig Size	HORIZON & ~~DEPTH~~ Tree Type	~~COLOUR~~ Tree Size	TEXTURE	REMARKS	ANALYTICAL RESULTS
								ground level	
38-01B	Northend of trench 3800' Elev	↙		1/4 to 1/2	Douglas Fir	2"		Timbered Slope. Water Course upper center of sampled contour	
38-02B	50' E	↙		"	"	3"			
38-03B	100'	↙		"	"	4"			
38-04B	150'			"	"	2"			
38-05B	200'			"	"	2"			
38-06B	250'			"	"	14"			
38-07B	300'			"	"	18-20"			
38-08B	350'			"	"	4"			
38-09B	400'			"	"	6"			

AGP 9343

CANADIAN JOHNS-MANVILLE Co. Ltd.

Dozer B22-1 + 22

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: G Gleeson B Rotherford AREA: Botanie Mtn

DATE: Jan 18 / 72 PROJECT: Porf 405 LOCATION REF: Santana Trench

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
36-01	Northend of Trench Elev 3600	↙	Lateral Moraine	S	B/6"	GB	M	Heavily Timbered Slope above 12 MAN Ck.	
36-02	50 E	↙		S	B/14"	B	M		
36-03	100 E	↙		S	B/14"	LB	M		
36-04	150 E	↙		S	C/6"	G/LB	M		
36-05	200 E	↙		S	B/14"	LB	M.		
36-06	250 E	↙		S	B/14	LB	M.		
			Biogeochem Samples						
				Twig Size	Type	Tree Size		ground level	
36-01B	Northend of Trench Elev 3600				Douglas Fir	16"		Twigs cut with extendable pruning shears.	
36-02B	50 E			1/4 - 1/2	"	16"			
36-03B	100 E			"	"	6"			
36-04B	150 E			"	"	6"			
36-05B	200 E			"	"	3"			
36-06B	250 E			"	"	4"			

AFR 5262

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLD & SNOWING

JC 21-101

COLLECTOR: A Gussen AREA: Babine Lake

DATE: Dec 12 1971 PROJECT: 405 LOCATION REF.: Lg How BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BSG 131	0	west ↙	small drs water course	St/S	B 6	LB	M	outcrop adjacent 200m 2 FT	
BSG 132	200	—	Scattered timber open Brush	—	B 6	B	—		
BSG 133	400	—	—	—	B 4	LB	—		
BSG 134	600	—	—	—	—	B	—		
BSG 135	800	—	—	—	—	LB	—		
BSG 136	1000	—	more timber jackpine side hill	—	—	RED Brown Dark Brown	—		
BSG 137	1200	—	—	—	—	Light Brown	—		
BSG 138	1400	—	—	—	—	Orange Brown	—		
BSG 139	1600	—	—	—	—	Red Brown	—	outcrop in area	
BSG 140	1800	—	—	—	—	Orange Brown	—		
BSG 141	2000	-	drainage area large spruce	—	B 8	OB	M/F	thickly wooded	
BSG 142	2200	-	timbered slope jackpine	—	B 6	—	—	outcrops	
BSG 143	2400	-	steep thickly wooded	—	B 4	—	—	spruce timber	
BSG 144	2600	—	—	—	B 6	LB	—		
BSG 145	2800	—	near crest of ridge	—	B 4	RB	—	thickly wooded	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

Pg 2

BC 21-10-12

COLLECTOR: A Gunn AREA: Butanic Mtn

DATE: Dec 12 1971 PROJECT: 405 LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BSG 146	3000	NORTH ↙	thickly wooded ridehill	St/s	B 6	LB	M	2 Ft ∮ Snow on ground	
BSG 147	3100	—	clay humus Small Spring	—	surface	Dark Brown Brown	M/F	—	
BSG 148	3400	—	heavily wooded ridehill	—	B 4	LD	M	—	
BSG 149	3600	—	—	—	—	—	—	—	
BSG 150	3800	—	—	—	—	—	—	—	
BSG 151	4000	—	—	—	B 6	LB	M		
BSG 152	4200	—	—	—	—	OB	—		
BSG 153	4400	—	—	—	—	—	—		
BSG 154	4600	—	—	—	—	LB	—		
BLG 155	4700	—	Small creek Bed thickly wooded	—	—	—	coarse	very coarse sample	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gussow & J Brown — Detail Sampling TRENCH #1 25 Ft INTERVALS — AREA: Botanie Mtn

DATE: Dec 14 1971 — PROJECT: 4605 — LOCATION REF.: Layton

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BT#1 01	200 FT North of sample pt. 356 57	WEST ↙	Wall of Trench	St/s/TF	C 2 FT	Light O/B	M	very rusty colourful rock pyrite	
02	400 N	—	open side hill rock	—	4 FT	—	—	—	
03	600	—	scattered timber	—	2 FT	—	—	—	
04	800	—	—	—	3 FT	Orange Brown	—	—	
05	1000	—	—	—	5 FT	Red Orange Brown	—	andesite dykes very rusty orange red colour	
06	1200	—	—	—	—	Light Grey Brown	—	soil like sample no bed rock exposed	bed rock
07	1400	—	—	—	3 FT	Orange red Brown	—	Bed rock exposed	
08	1600	—	—	—	5 FT	Bright Light Brown Orange	—	no bed rock exposed soil like sample	
09	1800	—	—	—	6 FT	Brown Orange	—	Bed rock	
10	2000	—	—	—	—	—	—	—	
11	2200	—	—	—	7 FT	Orange Brown	—	very rusty bed rock exposed	
12	2400	—	—	—	6 FT	Bright Orange Brown	—	—	
13	2600	—	—	—	7 FT	Light Orange	—	—	
14	2800	—	—	—	8 FT	Bright O/B	—	aplite with pyrite	
15	3000	—	—	—	10 FT	—	—	very rusty rock	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

Detail Sampling Trench #1
25 Ft INTERVALS

COLLECTOR: A Gussow & J Binnie
DATE: Dec 14 1971
AREA: Bonanza Min
PROJECT: 405
LOCATION REF: Lytton

BC 21-10

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BT#1 -01	200 FT NORTH OF BSL 57	WEST ↙	wall of Trench open	St/S/TF	C 2 FT	light orange Brown	M	very rusty colourful rock Pyrite	
02	225	—	side hill rock scattered timbered	—	4 FT	—	—	—	
03	250	—		—	2 FT	—	—	—	
04	275	—	—	—	3 FT	orange Brown	—	—	
05	300	—	—	—	5 FT	red orange Brown	—	andesite dykes very rusty	
06	325	—	—	—	—	light Grey Brown	—	rock like sample no bedrock exposed	
07	350	—	—	—	3 FT	Orange red Brown	—	bed rock exposed	
08	375	—	—	—	5 FT	light Brown	—	no bedrock exposed rock like sample	
09	400	—	—	—	6 FT	Brown Orange	—	bed rock	
10	425	—	—	—	—	—	—	—	
11	450	—	—	—	7 FT	—	—	very rusty bed rock exposed	
12	475	—	—	—	6 FT	Bright orange Brown	—	—	
13	500	—	—	—	7 FT	light orange	—	—	
14	525	—	—	—	8 FT	Bright orange Brown	—	aplite with pyrite	
15	550	—	—	—	10 FT	—	—	very rusty rock	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

BC 21-101

COLLECTOR: AG JB — Trench #1 Detail Sampling 25FT intervals — AREA: Bitania Mtn

DATE: Dec 14 1971 — PROJECT: 405 — LOCATION REF.: Gay Horn

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BT#1 16	575	WEST ↙	Trench wall face open	St/S/TE	C 7FT	OB	M	very rusty bedrock exposed	
17	600	–	scattered timber	–	6 FT	Bright OB	–	–	
18	625	–	–	–	7 FT	Light OB	–	–	
19	650	–	–	–	–	OB	–	very rusty bedrock exposed	
20	675	–	–	–	–	Bright OB	–	–	
21	700	–	–	–	6FT	Light OB	–	bedrock: pyrite	
22	725	–	–	–	4FT	Light Brown	–	–	
23	750	–	–	–	10FT	–	–		
24	775	–	–	–	8 FT	Brown	–		
25	800	–	–	–	12FT	–	–		
26	825	–	–	–	8 FT	–	–	talus soil	
27	850	–	–	–	6 FT	–	–	bedrock exposed	
28	875	–	–	–	–	–	–	–	

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

Cloudy & Cold

COLLECTOR: C Biddle

Botanie Trench #3
Detail Sampling 25 FT Intervals

AREA: Botanie Mtn

DATE: Dec 16 1971

PROJECT: 405

LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BT#3 01	0	South ↙	open sidehill scattered timber	St/C	B & C 14	B	C		
02	25		outcrop and cliffs	—	B & C 10	—	—		
03	50	—	—	—	C 16	—	—	rusty rock pyrite	
04	75	—	—	—	C 18	—	—	—	
05	100	—	—	—	C 14	—	—	rocky overburden	
06	125	—	—	—	C 20	—	—	Talus - soil mixed	
07	150	—	—	—	C 28	—	—	reddish rock	
08	175	—	—	—	C 30	Lt B	—	—	
09	200	—	—	—	C 22	—	—	—	
10	225	—	—	—	C 30	Red Brown	—	rocky overburden	
11	250	—	—	—	C 30	B	Med	rusty rock in overburden	
12	275	—	—	—	C 26	—	C	—	
13	300	—	—	—	C 25	Lt B	—	soil under Talus	
14	325	—	—	—	C 30	—	—	rocky overburden	
15	350	—	—	—	C 30	—	—	—	

CANADIAN JOHNS-MANVILLE Co. Ltd.

pg 2

BC 21-101 W

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: C Bennie

Batane Trench # 3
Detail Sampling

AREA: Batane Mtn

DATE: Dec 16 1971

PROJECT: 405

LOCATION REF.: Lytton BC.

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BT#3 16	375	SOUTH ↙	OPEN SIDEHILL SCATTERED	ST/G/TE	C 24	L+B	M	Soil between talus & bedrock	
17	400	/	TIMBER OUTCROPS ?	–	C 30	–	C	Rocky overburden	
18	425	/	CLIFFS –	–	C 32	–	–	sil under talus	
19	450	/	–	–	C 28	B	–	Between talus & Bedrock	
20	475	/	–	–	C 24	–	–	on bedrock	
21	500	/	–	–	C 14	–	–	talus sil bedrock	
22	525	/	–	–	C 20	–	M	–	
23	550	/	–	–	C 24	–	M	–	
24	575	/	–	–	C 20	Dark Brown	C	–	

CLOUDY & COLD

CANADIAN JOHNS-MANVILLE Co. Ltd.

BUNCO 21-997

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gussen — Detail Soil Sampling — AREA: Botanie Mtn

DATE: Dec 3 1971 — PROJECT: 405 — LOCATION REF.: Access Route

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS Cu				
BD 55+100	0	NORTH ↙	TIMBERED SLOPE NEAR CREST OF HILL	St/S	B 6	LB	M	Soil Line Sample					
BD 55+200	100 South	—	—	—	—	—	—	—					
BD 55+300	200	—	—	—	—	—	—	—					
BD 55+400	300	Crest	CREST OF HILL TIMBERED SMALL OUTCROPS	St/S/G	B 8	—	—	WEATHERED BEDROCK EXPOSED IN ROAD BED RUSTY ROCK					
BD 56+00	400	South ↘	SIDE HILL TIMBER BEDROCK EXPOSED	—	B 10	OB	—	—					
BD 56+100	500	—	—	—	—	LB	—						
BD 56+200	600	—	—	—	—	OB/R	—	RUSTY APLITE DYKE PYRITE					
BD 56+300	700	—	—	—	—	—	—	—					
BD 56+400	800	—	—	St/TF	—	LB	—	VERY ROCKY SOIL Talus Fines					
BD 57+00	900	—	—	St/S/TF	—	RB	—	BEDROCK EXPOSED IN Road Bed VERY RUSTY	90				
BD 57+100	1000	—	—	—	B 12	OB/LB	—	—	135				
BD 57+200	1100	—	—	—	B 8	OB/LB	—	NEAR AREA OF MALACHITE STAIN					
BD 57+300	1200	—	—	—	—	RB	—	Sample L-1					
BD 57+400	1300	—	—	—	—	LB/RB	—	VERY RUSTY ROCK					
BD 58+00	1400	—	—	—	—	LB/RD	—	—					

ACP 5548

CANADIAN JOHNS-MANVILLE Co. Ltd.

P32

GEOCHEMICAL SOIL SURVEY DATA

Cloudy & Cold

COLLECTOR: A Coussen — Detail Sampling — AREA: Botanie Mtn Access

DATE: Dec 3 1971 — PROJECT: 405 — LOCATION REF.: Lytton

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				Cu
BD 58+100	1500	SOUTH ↘	Steep side hill with likely timbered bedrock exposed	St/TF	B 20	OB	M	very Rusty bedrock exposed in road bed Eden like sample					
BD 58+200	1600	S ↘	—	St/S/TF	B 12	LB/OB	—	aplite dyke very colourful area of rock					
BD 58+300	1700	—	—	—	—	—	—	colourful rusty rock					123
BD 58+400	1800	—	—	—	B 18	OB	—	aplite Dyke Rusty area, Pyrite Bright orange rock					

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gusson — Detail Sampling — AREA: Access Route

DATE: Dec 4 1971 — PROJECT: 405 — LOCATION REF.: Botanie Mtn

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BD 64+100	100 SOUTH OF sample BSG 64	SOUTH ↘	Rolling side Hill Scattered Jack Pine	St/S/H	B 6	B	M	rock ridge & o/c nearby open grassy slope	64+50'S claim zone Talus Area
BD 64+200	200 S	—	—	—	—	B/OB	—	—	64+230 claim Line
BD 64+300	300 S	—	—	—	—	LB	—	—	
BD 64+400	400 S	—	—	—	B 12	—	—	rocky soil	
BD 65+00	500 S	—	—	St/S/TF	—	—	—	within 50 FT of malachite staining directly below trench	
BD 65+100	600 S	—	—	St/S/H	B 8	—	—		
BD 65+200	700 S	—	—	—	B 4	OB	—	open side hill Lodgepole & fir o/c exposed in roadcut	
BD 65+300	800 S	—	—	St/S/TF	B 3	LB	—	very rocky soil	
BD 65+400	900 S	—	—	St/S/H	B 8	LB	—	open side hill - Jackpine	
BD 76+00	100 South of BSG 76	NORTH ↘	Timbered slope thickly wooded Lodge fir	St/S/TF	B 14	RB	M	very rusty soil, o/c in ~~bedrock~~ road bed	
BD 76+200	200 S	—	—	—	—	LB	—	very rocky soil rusty area	
BD 76+300	300 S	—	—	—	—	LB	—	area of pyrite & malachite stain, rusty area	
BD 76+400	400 S	—	—	—	—	B	—	very rocky soil Lodge o/c rusty area	

CANADIAN JOHNS-MANVILLE Co. Ltd.

BONLO 21-997

GEOCHEMICAL SOIL SURVEY DATA

Cloudy & Cold

COLLECTOR: A Graves — Botanie Valley Access Road — AREA: Botanie Valley

DATE: Dec 4 1971 — PROJECT: 405 — LOCATION REF.: Lytton

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
												Cu	Mo
BSG 76	35500	West ↘	contiguous dense Balsam fabel	St/S/G	B 8	LB	M	near small underground creek tr o/c present				150	1
BSG 77	36000	North ↘	thickly timbered slope douglas fir	St/S/H	B 10	OB	—	diorite andesite dyke bedrock exposed in roadbed				120	2
BSG 78	36500	—	—	—	—	OB/LB	—	very rusty area diorite o/c rusty staining, pyrites in diorite				57	ND
BSG 79	37000	—	—	St/S/G	B 12	—	—	— andesite dykes				140	"
BSG 80	37500	—	timbered slope rather open	—	B 12	—	—	—				65	"
BSG 81	38000	—	open side hill douglas fir grass	St/S	B 6	LB	—	no bedrock exposed				37	"
BSG 82	38500	—	—	—	—	—	—	none o/c in roadbed Diorite & andesite				45	"
BSG 83	39000	—	dense timbered beach fir	—	—	—	—	scattered o/c				36	-

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

PARTLY SUNNY

COLLECTOR: A Gussen J Binnie

AREA: Lytton BONC 021-924

DATE: Oct 21/71

PROJECT: 405

LOCATION REF.: BOTANIE MNT ROAD CUT

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
									Cu	Mo			
BSG 00	0	↘	Road cut open area	SH/S/G	B 12	Br	Med	open sidehill scattered spruce clump					
BSG 01	50m	↘	—		—	R/B	—	—	49	1			
BSG 02	1000	↘	Forested slope		18	Br	—	Granite bedrock exposed in roadcut	74	2			
BSG 03	1500	↘	Damp Forested slope		6	G/Br	—	—					
BSG 04	2000	↘	open side hill		8	R/Br	—	—					
BSG 05	2500	↘	Timbered area		8	—	—	—					
BSG 06	3000	↘	Timbered slope		10	Br	—	—					
BSG 07	3500	↘	—		6	O/Br	—	Large spruce Damp ish					
BSG 08	4000	↘	—		6	—	—	—					
BSG 09	4500		Level timbered area		6	Br	—	Large spruce swamp area near					
BSG 10	5000		—		12	G	—						
BSG 11	5500		—		12	G	—	Large spruce					
BSG 12	6000		—		8	O/Br	—	—					
BSG 13	6500		—		6	D/Br	—	—					
BSG 14	7000		—		8	O/Br	—	Spruce Damp ish					

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

P29 2

COLLECTOR: A.G. & J.B.

AREA: Layton

DATE: Oct 21 71

PROJECT: 405

LOCATION REF.: Bethune Lk

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
									Cu	Mn			
BSG 15	7500	↙	Rolly Ground Top of Hill	S+/S/G	B 12	Br	Med	Heavily wooded Jackpine Spruce					
BSG 16	8000	↙	—	—	6	—	—	—					
BSG 17	8500		— Level Area	—	6	Br	—	—					
BSG 18	9000	↘	Small Hill Thickly wooded Jackpine	—	6	O/Br	—	—	18				
BSG 19	9500	↙	—	—	6	LB	—	Granite Bedrock Exposed in Road Cut	210	1 ± 2 mile			
BSG 20	10000		Level Area Heavily wooded	—	4	O/Br	Fine		20				
BSG 21	10500		—	—	4	Br	Med	Base of small ridges Heavily wooded Granite Bedrock					
BSG 22	11000		—	—	6	O/Br	—	Heavily wooded Area					
BSG 23	11500	↙	Side of Hill Timbered	—	4	—	—	Granite Bedrock					
BSG 24	12000	↙	—	—	4	—	Fine	—					
BSG 35	12500	↙	Basin Between Ridges Level	—	4	Br	Med	Heavily wooded					
BSG 26	13000	↙	—	—	6	O/Br	Fine Med	Granite Bedrock Exposed					
BSG 27	13500	↙	Top of Ridge Heavily Timbered	—	6	—	Mod	— —					
BSG 28	14000	↙	—	—	6	—	—	Scattered clumps of Jackpine					
BSG 29	14500	↙	—	—	6	Br	—	Sulphides in granitic O/C in road					

AEP 9243

CANADIAN JOHNS-MANVILLE Co. Ltd. Pg 3

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: RG JB AREA: Lytton Area

DATE: Oct 82 PROJECT: 405 LOCATION REF: Botanie Mt Road

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
BSG 30	15000	↙	Timbered Area Heavily wooded	5A/5/6	4	Br	M	Spruce & Jackpine Sulphides NOTED IN GRANITIC BEDROCK					
BSG 31	15500	↘	—	—	8	LB	-						
BSG 32	16000	↙	—	—	12	R/Br	-	GRANITE BOULDERS					
BSG 33	16500	↘	—	-	8	R/Br	-	HEAVILY TIMBERED					

ADP 5345

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gussow & J Binnie

AREA: Batrawie Mt access Road

DATE: Oct 26 1971

PROJECT: 405

LOCATION REF.:

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
									Cu	Mo			
BSG 34	17000	↘	Road Cut Open Scattered Jackpine	St/S/G	B 8	O/Br	M	Granite Bedrock Exposed					
BSG 35	17500	↘	Crest of small ridge Heavily wooded	—	—	—	—	—	20	1			
BSG 36	18000		Level Heavily wooded area	—	B 6	Br	—	Spruce very Thick	14	4			
BSG 37	18500		—	—	B 4	—	—	—	14	2			
BSG 38	19000	↘	Timbered slope Large Spruce	S/G	B 6	O/Br	—	—	13	1			
BSG 39	15500	↘	—	St/S/G	B 6	Br	—	Near small stream ravine spruce					
BSG 40	20000	↙	Timbered side hill Large Spruce	—	—	LBr	—	Rather open some granite Bedrock					
BSG 41	20500	↙	—	—	—	—	—	—					
BSG 42	21000	↙	—	—	—	—	—	—					
BSG 43	21500	↙↘	Crest of ridge Level area Jackpine Timber	—	—	Br	—						
BSG 44	22000	↘	Jackpine slope	—	B 10	Br	—	Bedrock Exposed	63	ND			
BSG 45	22500	↘	—	—	—	R/Br	—	—	146	1	4½		
BSG 46	23000	↘	—	—	—	Grey	—	—	69	ND			
BSG 47	23500	↘	—	—	—	Grey Brown	—	—					

ASP 8248

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gross & N Cook AREA: Botanie Mtn Access Road

DATE: Nov 3 1971 PROJECT: 405 LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
									Cu	Mo			
BLG 48	Stream subs(2)	SOUTH WARD	Small Spring + Stream Head	St/s/G	SURFACE	BR	M	Heavily wooded Hvy organic mater Large SPRUCE	65	2			
BLG 49	"	NORTH WARD	Small Stream	—	—	LBR	—	— —	28	ND			
BLG 50	"	NORTH WARD	Small Dry Stream Bed WATER ABOVE	—	—	DBR	—	SPRING RUNOFF STREAM ORGANIC MATTER	52	1			
BLG 51	"	NORTH WARD	Med. Size Stream	—	—	LBR	—	GRANITE O/C NEAR JACKPINE SLOPE	61	ND			

ADP 8362

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

BONCO 21-957

COLLECTOR: A Gussow & N Coish

AREA: Botanie Mt Access Road

DATE: Oct 10 1971

PROJECT: 405

LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
									Cu	Mo			
BSG 52	24000	↘	Heavily wooded Spruce	St/S/b	B 12	B	M	Near small stream					
BSG 53	24500	↘	—	—	—	LB	—	wooded slope					
BSG 54	25000	↘	—	—	—	—	—	—					
BSG 55	25500	↘	—	—	8	B	—	Near crest of Hill					
BSG 56	26000	↘	Crest of Hill Heavily wooded	—	—	Dark Red	—	Open scattered Timber o/c	69	1			
BSG 57	26500	↘	side Hill open	—	—	OB	—	outcrop exposed Pyrite mineralization	225	18			
BSG 58	27000	↘	—	—	—	LB	—	—	145	2			
~~BSG~~ 59	27500	↘	—	—	—	—	—	—	36	2			

ADP 8348

CANADIAN JOHNS-MANVILLE Co. Ltd.

BONC 21-957

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: A Gussow & N Cook

AREA: Botanie Access Road

DATE: Nov 13 1971

PROJECT: 405

LOCATION REF.: Lytton

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				
									Cu	Mo			
BSG 60	28000	↘	Road cut Heavily wooded	St/S/G	B 8	LB	M	very thickly wooded jackpine poplate in	68	2			
BSG 61	28500	↘	—	St/S	—	—	F	bed rock	67	3			
	Nov 17												
BSG 62	29000	↘	road cut gently rolling area	St/S/G	B 5	LB	M	scattered large jackpine wooded area	39	1			
BSG 63	29500	↘	—	—	—	B	—	mean area of large O/C open scattered jackpine	53	1			
BSG 64	30000	↘	Steeply rolling side hill	St/S	—	OB	—	— —	75	1			
BSG 65	30500	↘	—	St/S/G	—	—	—	— — mean area of moderate exposure	83	1			

AFP 8248

CANADIAN JOHNS-MANVILLE Co. Ltd.

BONCO 21-984

GEOCHEMICAL SOIL SURVEY DATA

Road access samples

COLLECTOR: Arnold Gruszen AREA: Botanie Mtn Access Route

DATE: Nov 21 1971 PROJECT: 405 LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BSG 66	31,000	West ↙	rolling hillside open grassy	St/S	B 6	B	F	scattered jackpine o/c nearby	
BSG 67	31500	—	—	St/S/G	—	LB	M	o/c directly above	
BSG 68	32000	South west ↙	large open hill side	—	B 5	B	—	scattered fir o/c above angle pt o/c in road bed	
BSG 69	32500	South ↙	edge of open hill side in wooded fir	—	B 6	RB	—	fir bedrock exposed in road bed	
BSG 70	33000	—	steep side hill edge of talus	—	C 12	DG	—	o/c above angle pt bedrock exposed in road cut	
BSG 71	33500	—	—	—	—	—	—	— small creek	
BLG 72		—	small stream in steep talus	St/S/C/H	4	BL/DG	M	talus filled ravine o/c creek bed scattered stumps fir	
BTG 73	34000	—	road cut bedrock exposed	St/TF	24	G	—	talus from near bedrock large talus slope	
BTG 74	34500	—	road cut in talus slide	—	—	RB	—	— —	
BTG 75	35000	NORTH ↘	road cut in heavily timbered slope	St/S/TF	B +2	—	M	heavily wooded large fir o/c above angle pt. bedrock in road bed	

ABP 8848

Partly Cl[illegible]y & cold

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: Arnold Gussen

5000' Contour

AREA: Botanie Valley

DATE: Nov 25 1971

PROJECT: 405

LOCATION REF.: Lytton B.C.

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS				Cu
BLG 100	0	WEST ↙	Small creek bottom talus filled	St/S/C/H	4	DB	M	small stream. alder filled. Road – sample taken NW downslope					195
BTG 101	200	SOUTH ↙	talus slide area	St/S/TF	12	LB	–	O/C above sample pt. near road bed					210
BSG 102	400		–	–	B 6	RB		very soil like large fir trees present					51
BTG 103	600		timbered area large fir	–	–	OB	M/C	rock O/C near cut bank					10
BTG 104	800		–	St/TF	5	–	–	–					30
BTG 105	1000		–	–	surface	–	–	talus slide O/C directly above sample pt.					210
BTG 106	1200		steep timbered sidehill talus & O/C	–	–	–	–	–					80
BTG 107	1400		–	–	–	–	–	pyrite noted in talus					148
BTG 108	1600		steep talus covered side hill	–	–	–	–	talus timber O/C malachite in talus					89
BTG 109	1800		steep talus & timbered slope	–	–	–	M/C	O/C near cut bank large fir					110
BTG 110	2000		–	–	–	B	M	talus & timbered slope					120
BTG 111	2200		–	–	–	B	–	soil like sample O/C nearby					78
BTG 112	2400		–	–	–	DB	–	–					146
BTG 113	2600		steep timbered talus slope O/C present	–	–	–	–	malachite float large number (15 or so) of 6"–12" wide quartz veins copper showing 100' N of sample pt					230
BTG 114	2800		further talus & O/C	St/S/TF	5	B	M	very soil like sample large quartz veins present, rusty with [illegible] malachite staining					18

ABP 8343

CANADIAN JOHNS-MANVILLE Co. Ltd.

GEOCHEMICAL SOIL SURVEY DATA

P32

COLLECTOR: A Gwatkin — 5000 contour — AREA: Botanie Mtn

DATE: Nov 25 1971 — PROJECT: 405 — LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BTG 115	3000	South ↙	timbered 10/c sidehill	St/TF	5	DB	M	talus slope scattered large fir	
BSG 116	3200	↙S	timbered area grass & soil	St/S/TF	B 5	LB	M	thickly wooded mixed fir scattered large fir	

ADP 5348

Claims Grid

CANADIAN JOHNS-MANVILLE Co. Ltd.

BONCO 21-9

GEOCHEMICAL SOIL SURVEY DATA

COLLECTOR: Arnold Gressen — 5500 Contour — AREA: Botanie Mtn

DATE: Oct 26 1971 — PROJECT: 405 — LOCATION REF.: Lytton BC

SAMPLE NO.	LOCATION	DRAINAGE SLOPE	PHYSIOGRAPHY	SOIL TYPE	HORIZON & DEPTH	COLOUR	TEXTURE	REMARKS	ANALYTICAL RESULTS
BLG 117	0	West	Small stream in Talus filled ravine					very sandy sample o/c nearby Timbered slope	
BTG 118	200	South ↙	Talus covered slope scattered ~~bedrock~~					Talus & Timbered slope	
BTG 119	400	—	—					— some o/c	
BTG 120	600	—	—					outcrop near by	
BTG 121	800	—	Timbered slope grass & Talus					—	
BTG 122	1000	—	—						
BTG 123	1200	—	—					very soil like sample	
BTG 124	1400	—	—					— — some organic matter	
BTG 125	1600	—	—					— —	
BSG 126	1800	—	grassy slope open					some small brush	
BSG 127	2000	—	—					— —	
BSG 128	2200	—	—					o/c above sample pt	
BSG 129	2400	—	—					scattered timber	
BTG 130	2600	—	Timbered grassy sidehill o/c					—	

ADP 5368

SUPPLEMENTAL ELECTROMAGNETIC SUPVEY REPORT

INTRODUCTION:

This electromagnetic survey report is supplemental to the geochemical report on the Spin claims, Botanie Mountain area, Kamloops Mining Division, British Columbia.

During the geochemical survey (September 1 to October 31, 1971) of the Spin claims, a brief electromagnetic survey was carried out in the Detail Map A area.

The methods used are described and the results are discussed.

FIELD METHODS:

The survey was performed by a McPhar unit. Both "In-line" and "Broadside" methods were used. For detailed descriptions, please refer to the attached copy "General Notes on Vertical Loop Electromagnetic Prospecting".

Three traverses, striking approximately N45 E were established. with 300 foot spacing. The baseline coincides with the local claim line and starts from the initial post of Spin claims #1 and #2. The stations, with 100 foot intervals were blazed and marked.

The operators were employees of Canadian Johns-Manville Company, Limited.

J. Binnie - Senior Assistant, experienced EM Operator
A. Gussen - Assistant
C. Robison - Assistant

DISCUSSION & CONCLUSIONS:

The results of three traverses are presented on 1" = 200 scale table (EM Survey Results). The locations of anomalies are listed as follows:

(A) Baseline - Broadside Method:

(A) Baseline - Broadside Method:

(i) 31W
(ii) 41W

(B). Baseline - In Line Method:

(i) 19W
(ii) 29W

(C) 3+00S:

(i) 4W
(ii) 10W

The distinct EM anomalies along the baseline at Stations 29W, and 41W occur in the northward extensions of strong Cu geochemical anomalies. They may represent possible conductors. The other weak EM anomalies may have been caused by topography.

Due to extremely rugged topography, the essential target of the intended survey (geochemical station BA 242-246) was not covered by the EM survey.

The EM survey was not complete in the original intention. Nevertheless, some of the the anomalies when viewed with the geochemical distribution, seem to suggest the presence of conductors.

McPHAR GEOPHYSICS

GENERAL NOTES ON VERTICAL-LOOP ELECTROMAGNETIC PROSPECTING

1. THEORY

The field lines about a magnetic dipole (e.g. bar magnet) follow the form of donut-shaped shells. Fig. 1 shows a cross-section of one such shell. All flux lines pass through the dipole axis at the centre and form approximate ellipses which have a length/width ratio of 1.3.

When a magnetic dipole oscillates, an electric field is generated which is orthogonal to the magnetic flux lines. Thus electric currents, commonly called "eddy currents", are induced in any sheet-like conductor which is penetrated by the alternating magnetic flux lines. The eddy currents form large circles in the conductor and in turn produce a secondary alternating magnetic field which opposes the primary inducing field.

If the conducting sheet is relatively large and thick, with high conductivity and magnetic permeability, the secondary electromagnetic field will be strong enough to appreciably distort the primary field. An instrument capable of measuring the spatial distortions in the field can thus be used to locate conductors. One possible coil configuration is shown in Fig. 2.

2. FIELD PROCEDURES

There are three common field procedures which are used in conventional vertical-loop prospecting.

DIPOLE FIELD

$$\vec{H} = \frac{NAI}{4\pi} e^{-iwt} \frac{(2x^2 - y^2 - z^2)\vec{i} + 3xy\vec{j} + 3xz\vec{k}}{(x^2 + y^2 + z^2)^{5/2}}$$

Equipotentials satisfy $x^2 = c(x^2 + y^2)^3$

Flux lines satisfy $x = \pm (ky^{4/3} - y^2)^{1/2}$ and $\frac{dx}{dy} = 0$ at $y = \pm \sqrt{2}x$

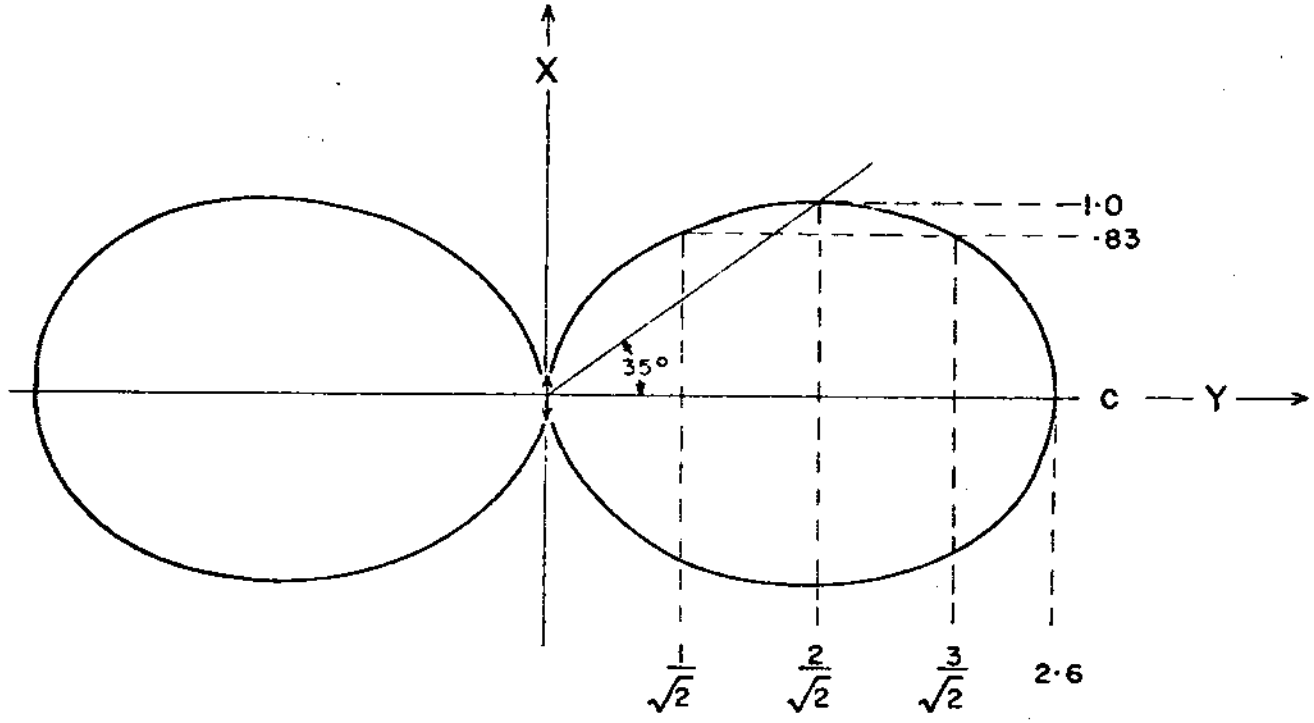


FIG.1

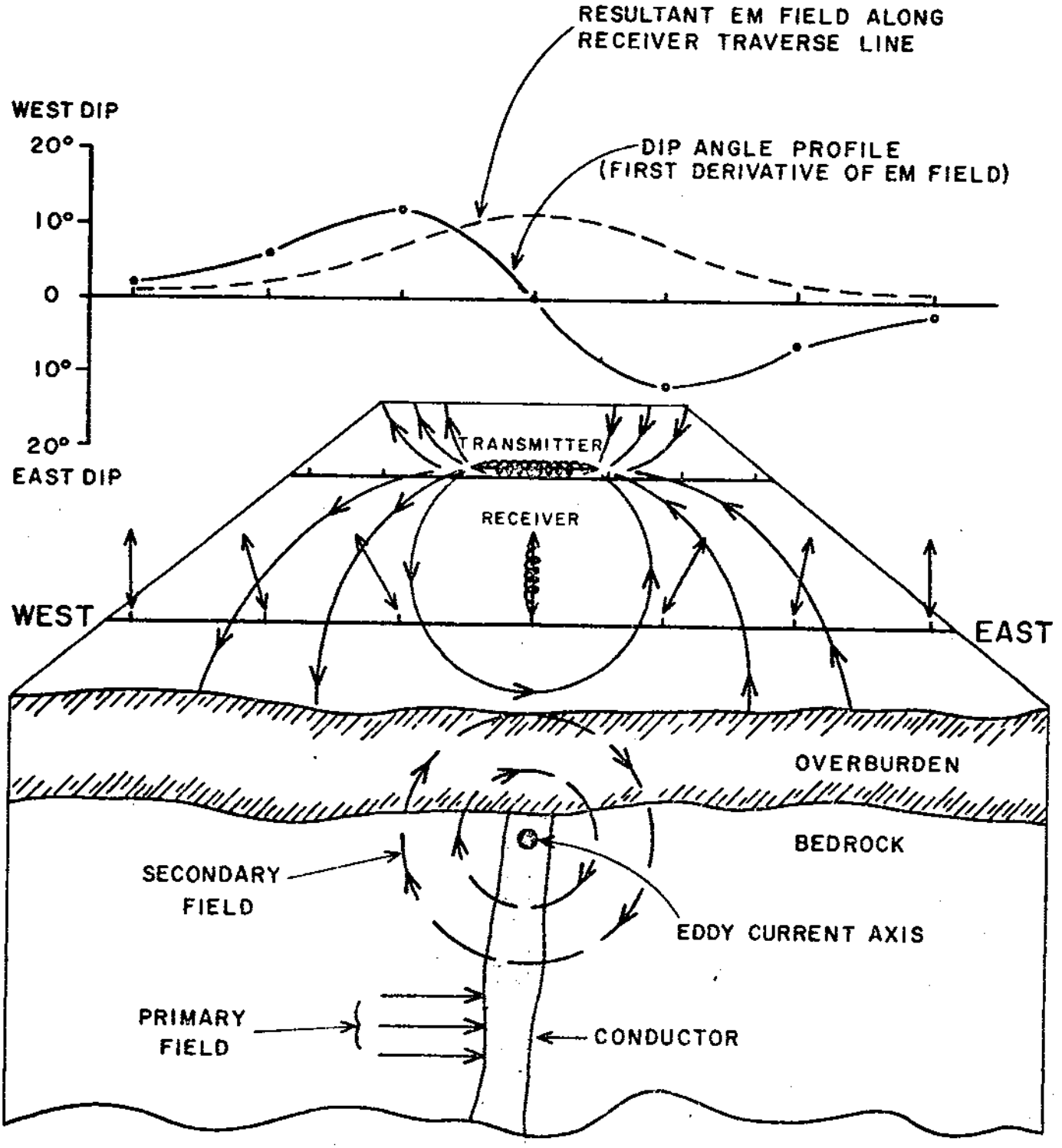
1) In-Line Method

This method is used for reconnaissance only, on lines which are widely-spaced or where there are no lines at all (as in the initial follow-up of airborne EM anomalies). The transmitter and receiver follow "in-line" along traverse lines which should be oriented at 45° to the suspected strike of the conductor. If the lines are exactly perpendicular, there will be little or no dip angle response over the zone.

Depending on relative position of the instruments, the direction of travel and the strike of the conductor, the in-line anomaly can be either positive or negative. As shown in Fig. 3, the peak response occurs when the transmitter is directly over the conductor, and in this case the dip angles are positive. If the conductor were at 135° to the strike instead of 45°, the profile would be negative, since the dip angles would all be to the north.

2) Broadside Method

This method is commonly used for reconnaissance on a well-cut grid. The transmitter and receiver move in co-ordination down adjacent parallel lines. The typical response over a conductor is shown in Fig. 3. Since all data sheets are drawn with west or south on the left, all bona fide anomalies (corresponding to "bumps" in the EM field) are indicated by "cross-overs" which go from positive on the left to negative on the right. A "reverse cross-over" which is negative on the left and positive on the right does not indicate an anomaly. Instead it corresponds to a "valley" in the EM field which possibly lies between two conductors.



SCHEMATIC DIAGRAM OF
VERTICAL LOOP
ELECTROMAGNETIC PROSPECTING METHOD

FIG. 2

3) Set-Up Method

This method is used for "detailing" or obtaining maximum information about a conductor. The transmitter is positioned over the conductor axis and is oriented perpendicular to the receiver as it follows the traverse line across the conductor. As shown in Fig. 3, the dip angle anomaly is considerably broader than that for the broadside configuration. This is because the transmitter stays above the conductor in a position of maximum electromagnetic coupling as the receiver makes the traverse. In the broadside method the transmitter is maximum-coupled with the conductor in only one position, usually where the dip angle is near the point of cross-over. When the transmitter and receiver are two stations away, the transmitter coupling with the conductor is very small and the dip angle response negligible; thus there is often only one strong anomalous reading on each side of the zone. Conversely, with the set-up method, the coupling between the transmitter and conductor stays relatively constant throughout the receiver traverse. Thus the anomalous dip angle profile is broader and more characteristic of the dip and depth of the source.

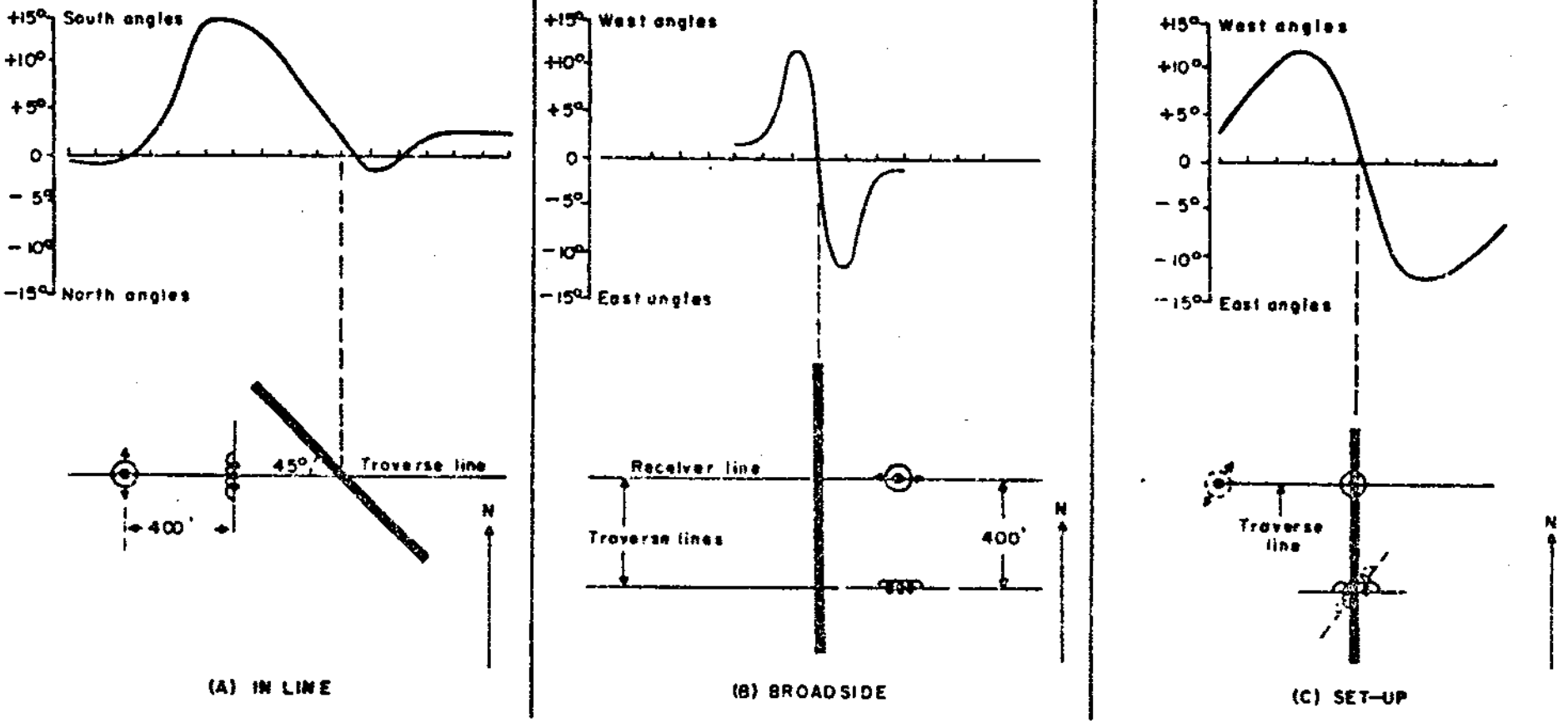
The same comments apply for the set-up method as well as the broadside method on the interpretation of "true" and "reverse" cross-overs. "Reverse" cross-overs may arise between two conductors but do not themselves indicate anomalies.

As a further aid to interpretation, two frequencies are usually used during a vertical-loop survey. The response parameter of a conductor depends upon the frequency of the electromagnetic field as well as its conductivity, magnetic permeability, thickness and size (in relation to the coil separation).

FIELD PROCEDURES

showing dip angle profiles—receiver and transmitter coils in plan

SCALE 1"= 500'



LEGEND

Transmitter

Receiver and tilt direction

Vertical sheet conductor

All readings are plotted at receiver location

FIG.3

Consequently, by varying the frequency, an estimate can be obtained of the other parameters. The following is a "rule of thumb" guide for estimating conductivity:

1000 cps response / 5000 cps response	Conductivity	Typical Sources
0.9 to 1.0	excellent	massive sulphides, graphite
0.7 to 0.9	good	fracture-filling sulphides, graphitic schists
0.4 to 0.7	moderate	fault zones, shear zones, clay overburden, disseminated sulphides
less than 0.4	poor	lake bottom sediments, swamp

Another estimate of conductivity can be obtained from the "width of null" of the operator's measurements. Poor conductors have eddy currents which lag behind the inducing field. These eddy currents produce an "out-of-phase" secondary field in a different direction from the primary field at a time when the primary field is zero. Thus there is no orientation of the receiving coil that will result in a complete null of the incoming signal. The number of degrees the receiver must be rotated through to obtain a noticeable increase in signal is called the "null" and is an additional measure of the response parameter or conductivity.

3. ORIENTATION ERROR

There is only one main source of error in vertical-loop dip angle measurements (aside from reading errors when the signal is very weak, or when there is large out-of-phase response). On perfectly flat ground the

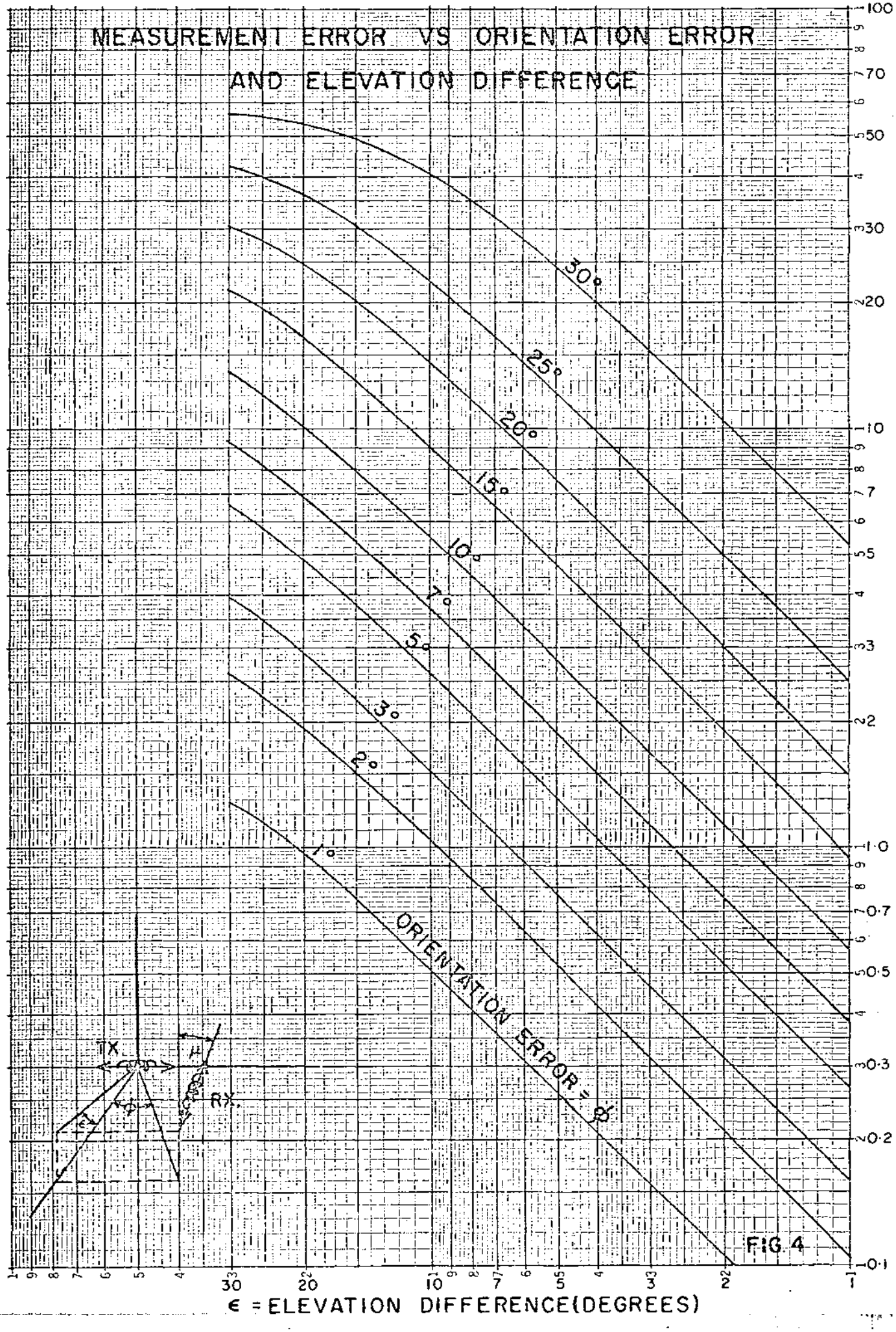

MEASUREMENT ERROR VS ORIENTATION ERROR
AND ELEVATION DIFFERENCE
30°
25°
20°
15°
10°
7°
5°
3°
2°
1°
ORIENTATION ERROR = β
μ = MEASUREMENT ERROR (DEGREES)
ϵ = ELEVATION DIFFERENCE (DEGREES)
TX
RX
μ
β
ϵ
100
70
50
30
20
10
7
5
3
2
1·0
0·7
0·5
0·3
0·2
0·1
30
20
10
9
8
7
6
5
4
3
2
1

FIG. 4

transmitter axis does not have to be kept absolutely perpendicular to the direction to the receiver. The dipole field is horizontal when both coils are in the same plane. However, when the survey is in rough topography and the receiving coil is above or below the transmitter, any departure of the transmitting coil from the perpendicular direction to the receiver will result in a fictitious anomalous dip angle. Fig. 4 shows the dip angles to be expected from various orientation errors and elevation differences. It can be seen that a misorientation of 15 degrees and an elevation difference of 10 degrees will result in a dip angle reading of 9 degrees.

Since few conductors have excellent conductivity, orientation errors may be suspected when the anomalous measurements are the same for both frequencies.