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REPORT ON
GEOPHYSICAL AND GEOCHEMICAL SURVEYS
BEV GROUP OF CLAIMS
Kamloops Area - British Columbia
for
TORWEST RESOURCES (1962) LTD. (N. P. L.)
by
A. I. Betmanis, B.A.Sc., P. Eng.

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REPORT ON

GEOPHYSICAL AND GEOCHEMICAL SURVEYS

of the

B E V GROUP OF CLAIMS (BEV 1-12)

Kamloops Area - British Columbia

Kamloops Mining Division

for

TORWEST RESOURCES (1962) LTD. (N. P. L.)

by

A. I. Betmanis, B.A.Sc., P. Eng.

Claims:	BEV GROUP: BEV 1-12
Location:	On Trans-Canada Highway #1 10 miles west of Kamloops, B. C. Latitude 50°40' N; Longitude 120°34' W
Dates:	May 29, 1972 - July 31, 1972

GEOPHYSICAL ENGINEERING AND SURVEYS LIMITED

August 21, 1972 Vancouver, B. C.

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INTRODUCTION

The following report is based on work carried out by Geophysical Engineering and Surveys Limited and Torwest Resources (1962) Ltd. on the BEV Group of claims in the Kamloops area owned by Rolling Hills Copper Mines Ltd. (N. P. L.) and under option to Torwest Resources (1962) Ltd. (N. P. L.). The claims cover an area in the vicinity of known copper mineralization. The work done on the claims consisted of line cutting, geochemical and geophysical surveys, undertaken in June and July 1972.

The initial part of the program consisted of putting in a line grid to cover the claim area, and of collecting soil samples for analyses.

The second part of the program consisted of geophysical surveys. A V. L. F. electromagnetic survey was made to pick up possible conductors and structural features which may indicate mineralized zones. A magnetometer survey was made to locate anomalous high or low areas which may be associated with mineralization. McPhar Geophysics were contracted to carry out an induced polarization survey, which would indicate probable sulphide mineralization.

Results of the induced polarization survey are not covered in this report, although costs of the survey as obtained from McPhar Geophysics, and prorated according to the line-miles actually on the BEV claims are given in the declaration of costs in Appendix IV. Report of the survey will be submitted under separate cover by McPhar Geophysics.

The program on behalf of Torwest Resources (1962) Ltd. was directed by H. H. Waller. Line cutting and geochemical surveying were supervised by W. Petrie of Torwest Resources. The geophysical surveys other than induced polarization, were carried out by Geophysical Engineering and Surveys Limited, consultants to Torwest Resources, and were supervised by A. I. Betmanis.

LOCATION AND ACCESS

The BEV Group of claims covers an area just over one square mile on the Trans-Canada Highway #1, 10 miles west of Kamloops, in the Kamloops Mining Division of British Columbia. They are centred around latitude $50^{o}40'$ N and longitude $120^{o}34'$ W.

The edge of the Trans-Canada Highway was used for the location lines of the claims, with claims being laid out on either side of the highway, so that any of the claims in the group are accessible from the highway.

TORWEST RESOURCES (1962) LTD.

LOCATION MAP

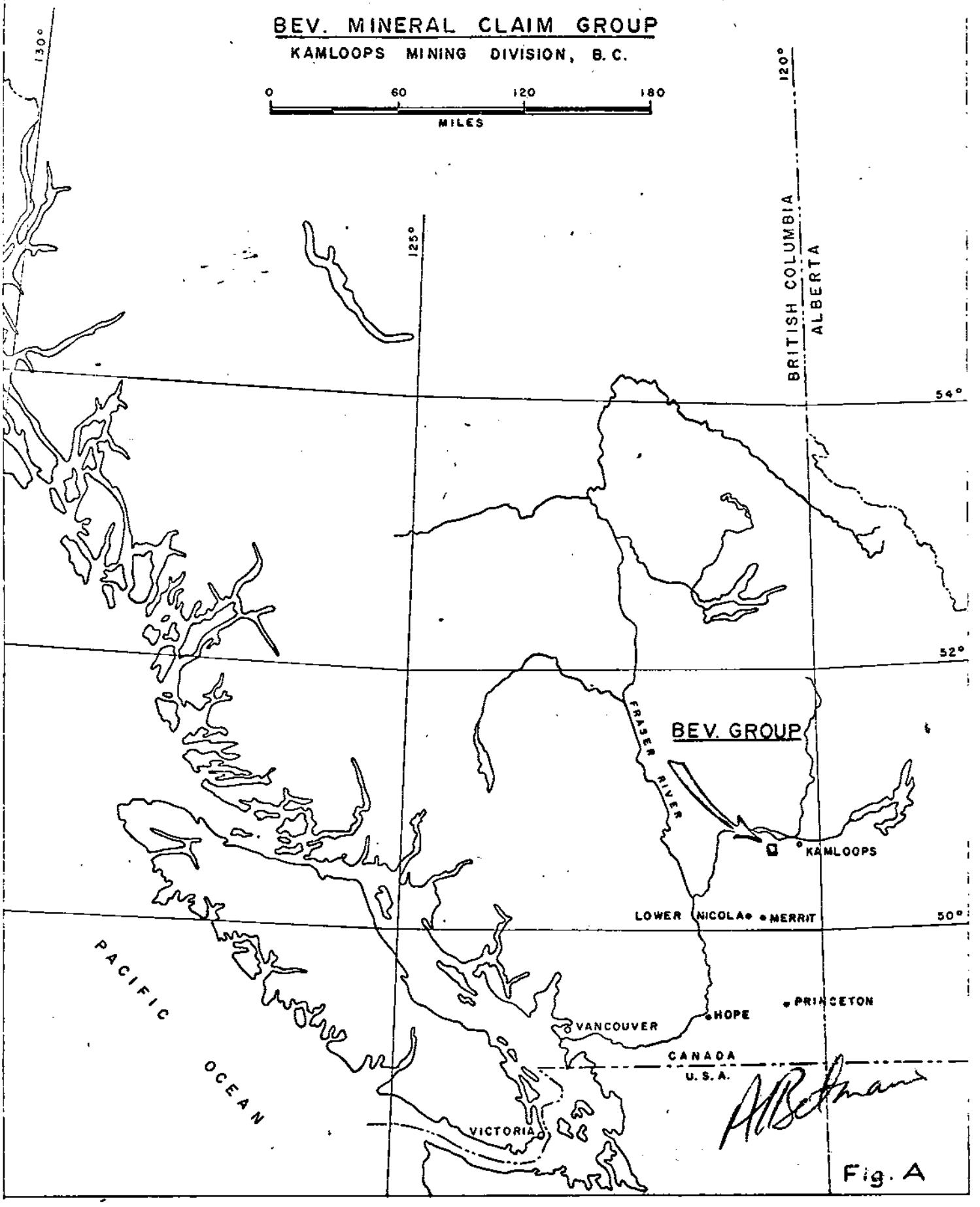


Fig. A

CLAIMS

The BEV claim group consists of twelve mineral claims. BEV 1-12, with record numbers 98982 to 98993 inclusive. They were staked for Rolling Hills Copper Mines Ltd. (N.P.L.), and recorded August 13, 1971. The claims were grouped into the BEV Group on August 3, 1972. Five years of work is being applied to each of the twelve claims in the group to give them an expiry date of August 13, 1977.

GENERAL GEOLOGY

Most of the claim group is underlain by Nicola rocks, consisting mainly of agglomerates and andesites, with some conglomerate and rhyolite. Parts of the north-eastern claims are underlain by the Kamloops volcanics which overlie the Nicola Group. The Kamloops volcanics consist of crystal tuff and vesicular basalt, with minor amount of tuffaceous shale interbedded in the crystal tuff. The Kamloops volcanics are not known to have any significant copper mineralization.

The Nicola group rocks are consistantly chloritized and epidotized. Magnetite occurs variably in the andesites and agglomerate. Sulphide mineralization, especially pyrite, occurs in minor to trace amounts.

Cherry Creek is presumed to follow a north-west striking fault of significant proportion, and which is the main structural feature of the immediate area.

GEOCHEMICAL SOIL SURVEY

Soil samples were collected from 100 foot stations along the grid lines. Samples were taken at a uniform depth of 6 to 10 inches, and placed in paper soil sample bags to be forwarded to Barringer Research in Vancouver for copper analyses by digestion in perchloric acid and analyses with atomic absorption. Details of sample preparation and method of analysis are described in Appendix I.

The majority of samples analysed were below 100 ppm total copper. This was considered to be background for the geological environment where the survey was made. Contouring of values above 100 ppm Cu. outlined several areas which peaked at plus 200 ppm. These areas are considered possibly to probably anomalous. One or two station anomalies should be considered insignificant.

The area grid north of baseline 3 and grid east of line 80 E is generally anomalous. This area is in Nicola agglomerates and andesites near the Kamloops volcanic contact. It is also an area of shallow overburden, so that

the copper values in soils are likely representative of the underlying bedrock.

A small anomaly exists on line 52E between 5N and 7N. This anomaly coincides with geophysical responses, and is probably caused by anomalous conditions in the underlying rock.

The above mentioned anomalous areas require checking in the field to be properly evaluated.

GEOPHYSICAL SURVEYS

A. V.L.F. Electromagnetic Survey

The electromagnetic survey of the property was done using a VLF-EM Radem unit manufactured by Crone Geophysics. It uses very low frequency (12-24 kilocycles) radio waves broadcast by the U.S. Navy. Since this frequency is very much higher than the normal frequency range employed in electromagnetic prospecting, the effect of relatively poor conductors such as water-filled shears and deep swamps may be comparable to that over more conductive sulphide zones. Since the signal derives from an essentially infinite source, faults of great horizontal and vertical extent give a particularly strong anomalous response.

The data are recorded as inclinations of the electromagnetic field. A conductor is indicated by a "cross-over" in the angle of inclination. This can be observed in profile form; however, presentation of the data is awkward when only profiles are plotted, and misleading cross-overs can be obtained due to topographical effects. A filter operator was designed by Dr. D.C. Fraser, Chief Geophysicist of Geophysical Engineering and Surveys Ltd., to phase shift the dip angle data by 90 degrees. It is a variation of the first derivative method for partially correcting for topography, and thus shows actual cross-overs as positive values. Negative values are meaningless, and are not shown on the accompanying VLF-EM map.

For efficient use of the VLF-EM method, a transmitter station should be chosen which is in a direction on strike with the expected conductors, and the lines of traverse should be parallel to the primary field; that is perpendicular to the direction to the transmitting station. Due to the narrow range about a conductor in which the primary field will be affected, readings at an interval of 50 feet should be used for filtering. These can sometimes be interpolated from 100 foot readings.

For purposes of the electromagnetic survey, a transmitting station at Cutler, Maine (NAA) was used to pick up approximately east-west striking structures or conductors. Readings were taken along the picket lines at 100 foot

intervals unless appreciable dip angle changes were noted, in which case readings were taken at 50 foot spacings. The data was filtered, and the filtered values are shown on the accompanying map. Where correlation between lines could readily be made, possible and probable conductors are indicated by dashed and solid lines. The survey was carried out by G. W. Davies.

The suspected fault along Cherry Creek was not indicated by the VLF-EM survey. This may be due to non-existance of the fault, or to it being a series of short en-echelon structures.

A number of the indicated possible conductors may be due to geological features caused by bedding planes of the volcanics, or they may be small north-west trending faults. The probable conductors correspond either to magnetic or to geochemical expression, and warrant further field investigation.

B. Magnetometer Survey

The magnetometer survey of the property was made using a Scintrex MF-2 fluxgate magnetometer to measure vertical intensity in gammas. At the start of the survey, absolute values were obtained along the base lines by a process of "looping" to correct for diurnal variation. Once the absolute values were known, further diurnal variation was corrected for by looping back to a known station on the base lines at least once every half-hour.

Readings were taken along all grid lines at 100 foot stations, with a constant magnetometer height of approximately two feet above ground at each station. The survey was carried out by K. W. Davies.

Not much difference in magnetic response was found between the Nicola and Kamloops rocks. Readings generally varied between 1000 and 3000 gammas, with the higher values being in the north-eastern part of the property. A low trend starting at approximately the baseline on line 124 E and running north-east follows the suspected fault at Cherry Creek, and is probably due to it. Several small magnetic highs in the northern part of the property are suspected to be caused by linear or localized magnetite mineralization. A comparison of probable conductors from that area, shows them to be associated either with magnetic highs, or with magnetic lows.

C. Induced Polarization Survey

A separate report covering the induced polarization survey is being prepared by McPhar Geophysics, and will be submitted independantly. Partial prorated costs of the survey, as obtained from McPhar, are given in the statement of costs in Appendix IV.

CONCLUSIONS

Examination of the geochemical, magnetometer, and electromagnetic surveys of the BEV claim group indicates that there is a chance of copper mineralization occurring on the claims. It is understood that the induced polarization survey conducted by McPhar Geophysics also outlined some anomalous zones, and when final results of their survey are obtained, final recommendations for continued work on the group will be made.

The geochemical survey outlined one broad anomalous area, and several smaller anomalous zones in soils. There is a probability that these anomalies represent mineralization in bedrock, and therefore will have to be checked in the field.

The VLF electromagnetic survey obtained numerous cross-overs, of which several correspond with anomalous conditions obtained from the magnetometer survey or the geochemical soil survey. These cross-overs are believed to be due to conductors or structures, and warrant further investigation.

The magnetometer survey shows that some of the VLF-EM anomalous zones, and geochemical soil anomalies are related to either magnetic highs or lows, and suggests that two types of mineralization could occur: copper mineralization associated with magnetite mineralization, and copper mineralization introduced by hydrothermal solutions which resulted in the break down of pre-existing magnetite.

Before any physical work is done on the claims as a result of geochemical and geophysical surveys, it is recommended that a detailed geological mapping be done of the property, with particular attention being paid to the areas indicated to be of interest by the surveys.

Respectfully submitted,

A. I. Betmanis, B.A.Sc., P.Eng.

Vancouver, B. C.
August 21, 1972

APPENDIX I

Analytical Procedures

ANALYTICAL PROCEDURES USED TO DETERMINE TOTAL COPPER IN GEOCHEMICAL SOIL SAMPLES USING ATOMIC ABSORPTION SPECTROPHOTOMETER

I. Sample Preparation

(a) Geochemical soil samples were received at the laboratory in paper bags.
(b) The wet samples were dried in an oven at 110°C.
(c) The dried samples were sifted, using an 80 mesh sieve. The plus 80 mesh fraction was rejected, and the minus 80 mesh fraction was transferred into a new bag for analysis.

II. Method of Analysis

(a) 0.5 gm. of the minus 80 mesh samples were weighed out into test tubes.
(b) 2 ml. of perchloric nitric acid mixture (85% $HClO_4$ + 15% HNO_3) were added to the samples in test tubes.
(c) The samples with acid mixture were digested on a sand bath at 160°C for three hours.
(d) At the end of the digestion period, test tubes were removed from the sand bath and cooled 15 minutes.
(e) The volume of each test tube was made up to 10 ml. with de-mineralized water.
(f) The mixture in the test tubes was capped and shaken vigourously, and then allowed to settle.
(g) The samples were aspirated in atomic absorption spectrophotometer with proper parameters. The concentration of copper was determined by comparing with a set of known standards.

APPENDIX II

Author's Certificate

CERTIFICATE

I, Andris I. Betmanis, do hereby certify that:

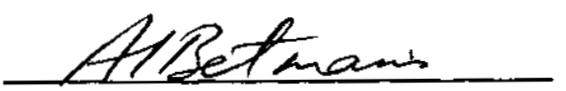
1. I am a geologist with residence at 1235 Deep Cove Road, North Vancouver, British Columbia.

2. I am a graduate of the University of Toronto with the degree of B.A.Sc. in Applied Geology in 1965.

3. I am a Professional Engineer registered in the Provinces of British Columbia and Ontario.

4. From graduation to present I have been employed as a geologist with Geophysical Engineering and Surveys Limited.

5. From May to August 1972, I supervised the geochemical and geophysical surveys described in this report.



A. I. Betmanis

August 21, 1972

APPENDIX III

Personnel and Dates

Name and Address	Position	Employed From-To	Days worked
A. I. Betmanis 1235 Deep Cove Road North Vancouver, B. C.	Geologist	May 29-July 31/72	3
W. Petrie Box 578 Merritt, B. C.	Field Superintendent	May 29-July 31/72	5
K.W. Davies 141½ Riverside Drive North Vancouver, B. C.	Geophysical Operator	June 20-July 6/72	11
G.W. Davies 141½ Riverside Drive North Vancouver, B. C.	Geophysical Operator	June 20-July 6/72	9½
W. Brown 1859 Granville Ave. Richmond, B. C.	Line cutter	May 29-June 30/72	23½
L. Maldidier General Delivery Merritt, B. C.	Line cutter	May 29-June 15/72	13
E. Hanes General Delivery Merritt, B. C.	Line cutter	June 16-June 30/72	7
D. Dolen General Delivery Merritt, B. C.	Line cutter	June 16-June 30/72	5

APPENDIX IV

Cost of Surveys

COST OF SURVEYS

Supervision		
A. I. Betmanis	3 days @ $90/day	$ 270.00
W. Petrie	5 days @ $50/day	$ 250.00
Magnetometer Survey		
K. W. Davies	10 days @ $50/day	$ 500.00
Calculations	1 day @ $50/day	50.00
V. L. F. Electromagnetic Survey		
G. W. Davies	8 days @ $50/day	$ 400.00
Calculations	1½ days @ $50/day	$ 75.00
Induced Polarization Survey		
McPhar contract		$3,000.00*
Line Cutting and Soil Sampling		
W. Brown	23½ days @ $29/day	$ 681.50
L. Maldidier	13 days @ $29/day	$ 377.00
E. Hanes	7 days @ $29/day	$ 203.00
D. Dolen	5 days @ $29/day	$ 145.00
Sample Analyses		
704 samples @ $1.20/sample		$ 844.80
Accommodations		
74 man-days @ $12.50/day		$ 925.00
Vehicle Rentals and Costs		
2 WD	3 days @ $200/mo.	$ 20.00
4 WD	10 days @ $435/mo.	$ 145.00
Operational costs		$ 37.50
Report Preparation		$ 422.00
Miscellaneous, Sundries		$ 107.20
	TOTAL	$8,453.00

* 68,900 line-feet surveyed of which 31,000 line feet on actual claims. Prorated cost of survey $3,000 from interim statement of $6,650.89 from McPhar Geophysics.

(cont.)

Declared before me at the City

of Vancouver, in the

Province of British Columbia, this 31

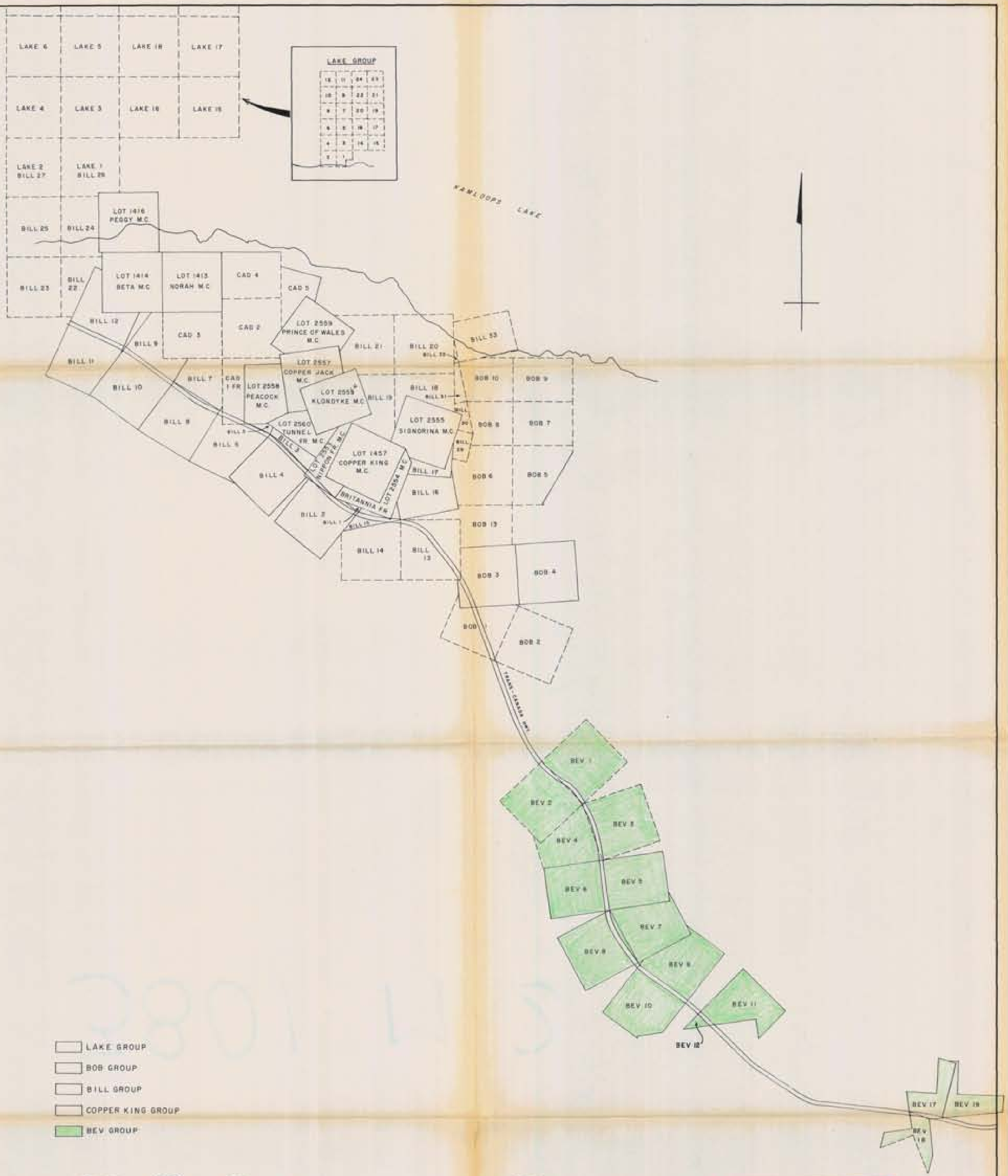
day of August, 1972, A.D.

A Betrami

L. Jeannotte

~~A Commissioner for taking Affidavits within British Columbia or~~
~~A Notary Public in and for the Province of British Columbia.~~

SUB-MINING RECORDER



3801 M-2

TO ACCOMPANY A REPORT ON GEOPHYSICAL AND GEOCHEMICAL SURVEYS OF THE KAMLOOPS AREA, KAMLOOPS MINING DIVISION.
BY A.I. BETMANIS P. ENG.
DATED AUG. 21, 1972.

A.I. Betmanis

Job No. 1034

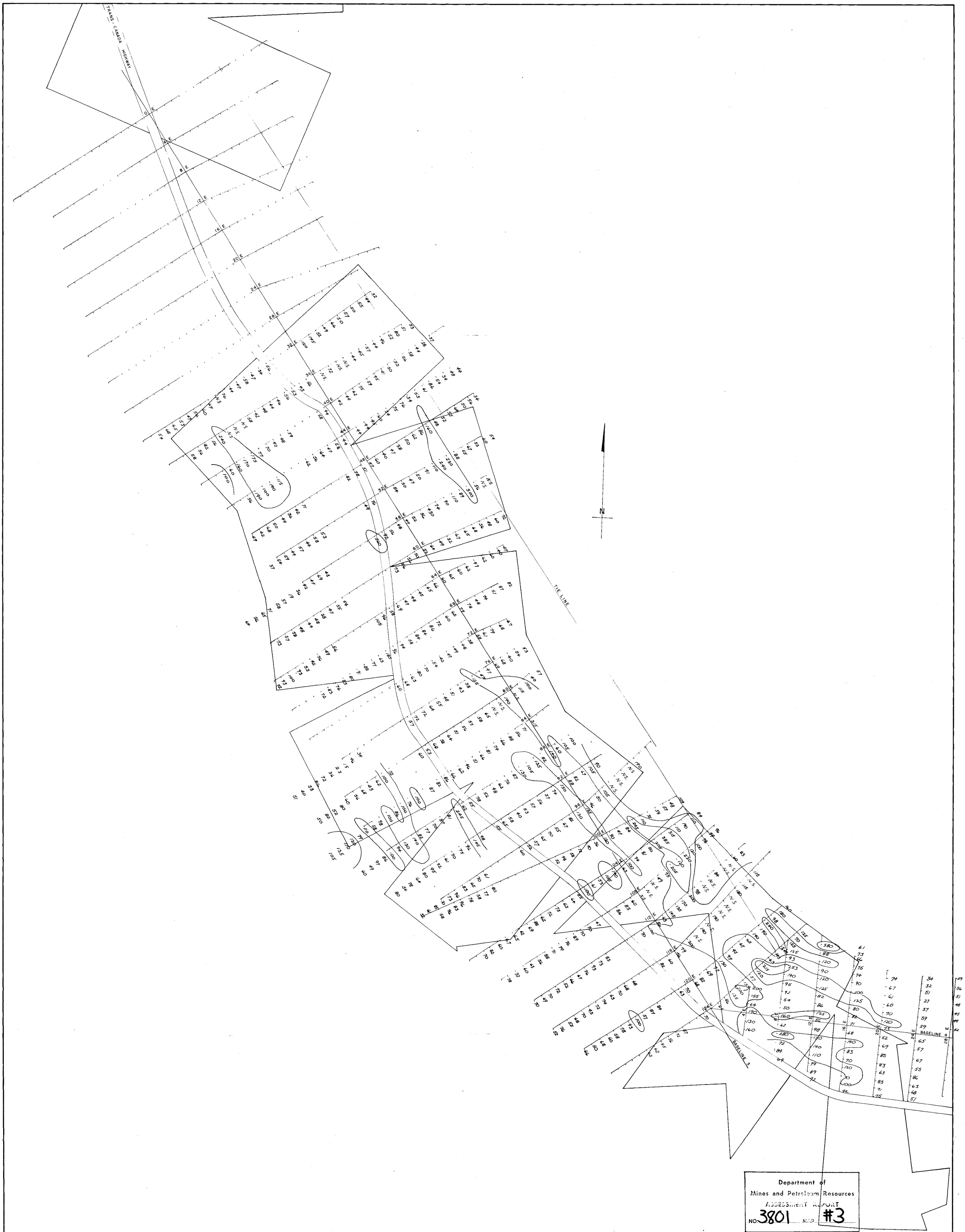
TORWEST RESOURCES (1962) LTD.

CHERRY CREEK
KAMLOOPS AREA, BRITISH COLUMBIA

CLAIM MAP

0 1/4 1/2 3/4 1
Scale - Miles

DRAWN: G.C.	REVISED:	MAP No. 6-105
DATE: AUG. 1972	DATE:	N.T.S. 92/1



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3801 MAP #3

ABOVE 100 PPM

TO ACCOMPANY A REPORT ON GEOPHYSICAL AND GEOCHEMICAL SURVEYS OF THE BEV GROUP, KAMLOOPS AREA, KAMLOOPS MINING DIVISION. BY A.I. BETMANIS P. ENG. DATED AUG. 21, 1972.

A.I. Betmanis

Job No. 1034

TORWEST RESOURCES (1962) LTD.

BEV GROUP

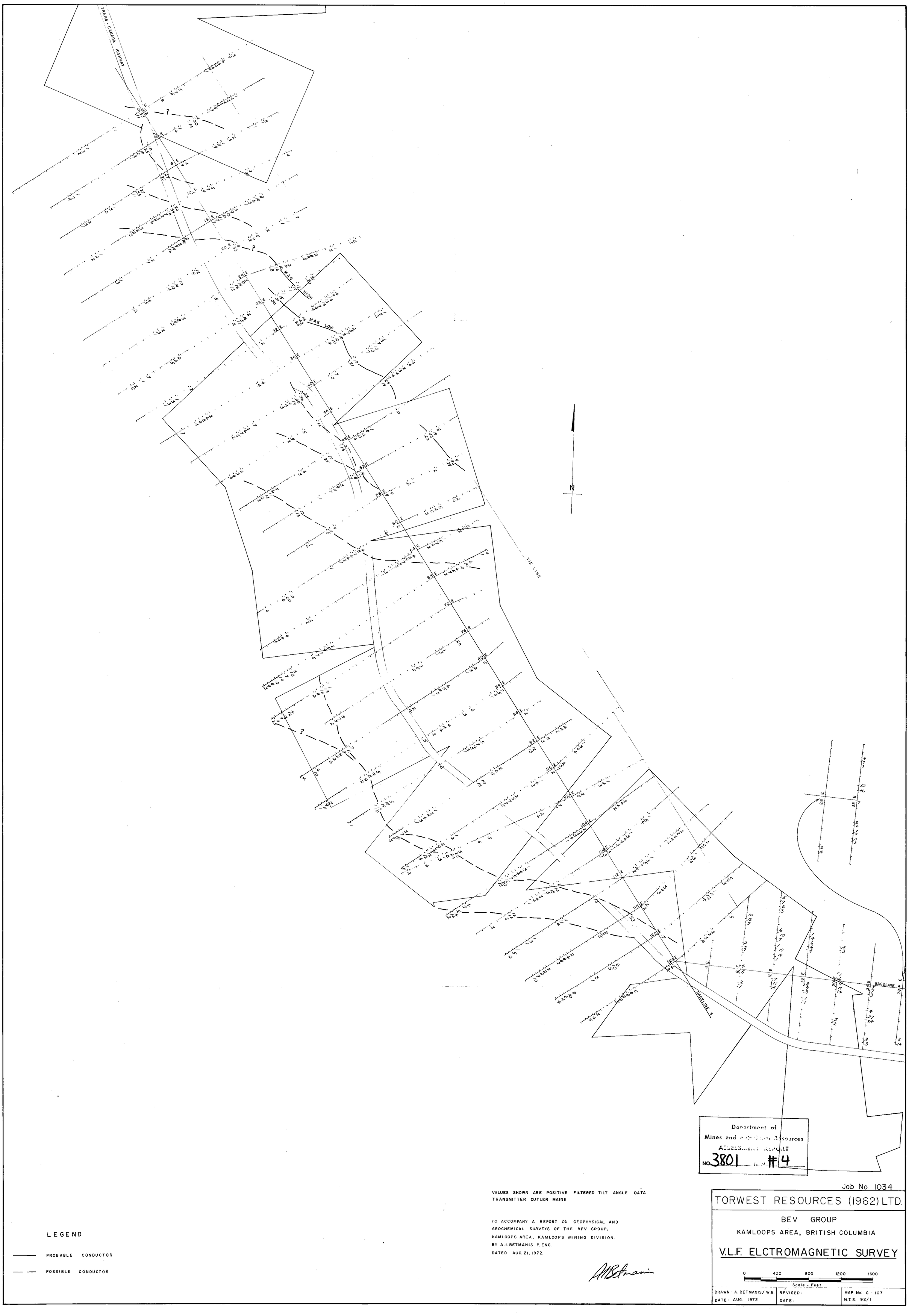
KAMLOOPS AREA, BRITISH COLUMBIA

GEOCHEMICAL SURVEY

PERCHLORIC ACID — ATOMIC ABSORPTION

0 400 800 1200 1600
Scale - Feet

DRAWN: A. BETMANIS / W.B.	REVISED:	MAP No: C - 106
DATE: AUG. 1972	DATE:	N.T.S. 92/1



LEGEND

——— PROBABLE CONDUCTOR

— — — POSSIBLE CONDUCTOR

VALUES SHOWN ARE POSITIVE FILTERED TILT ANGLE DATA
TRANSMITTER CUTLER MAINE

TO ACCOMPANY A REPORT ON GEOPHYSICAL AND GEOCHEMICAL SURVEYS OF THE BEV GROUP, KAMLOOPS AREA, KAMLOOPS MINING DIVISION.
BY A.I. BETMANIS P. ENG.
DATED AUG. 21, 1972.

A.I. Betmanis

Job No. 1034

TORWEST RESOURCES (1962) LTD.

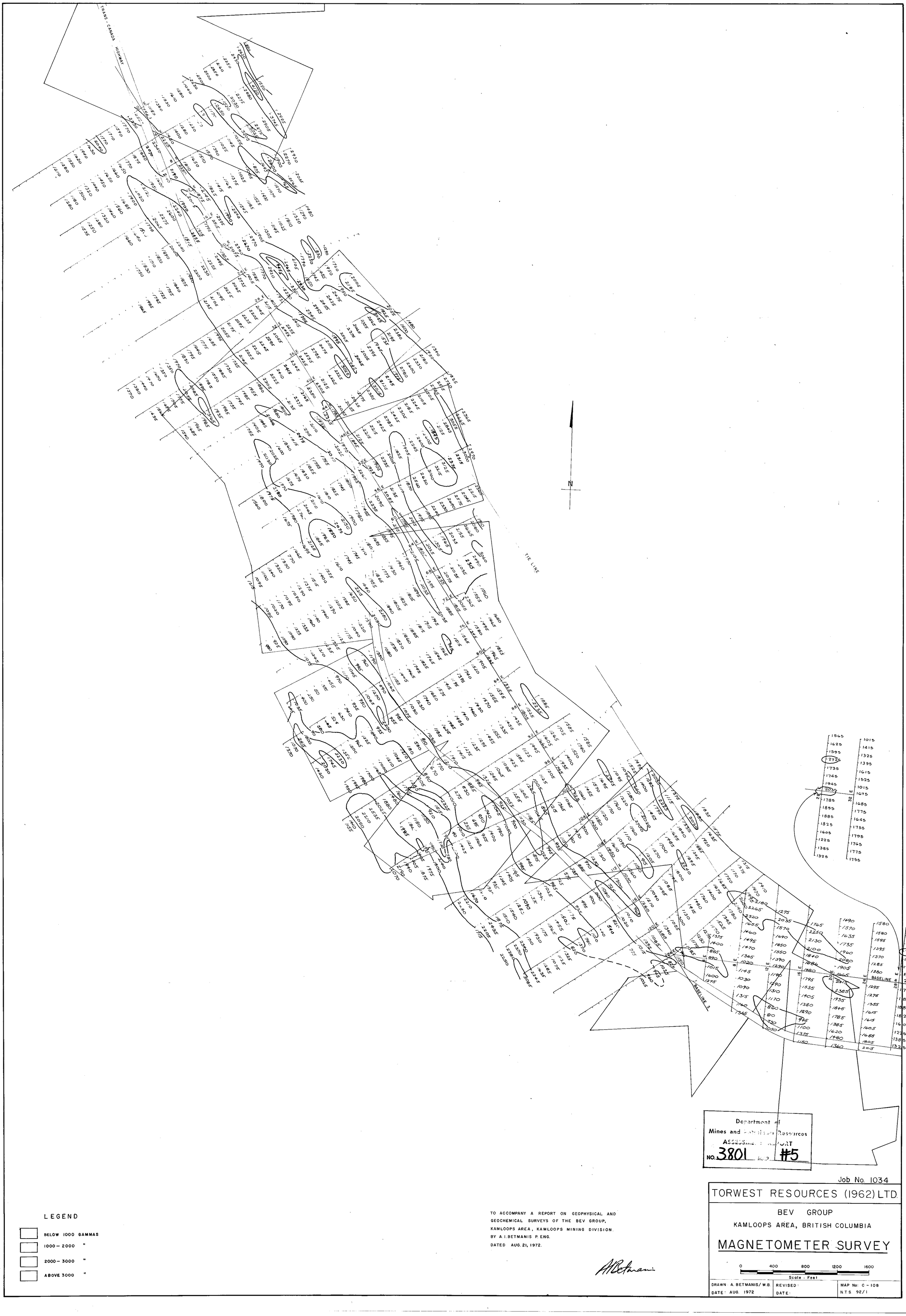
BEV GROUP

KAMLOOPS AREA, BRITISH COLUMBIA

V.L.F. ELCTROMAGNETIC SURVEY

0 400 800 1200 1600
Scale - Feet

DRAWN: A. BETMANIS/ W.B.	REVISED:	MAP No: C - 107
DATE: AUG. 1972	DATE:	N.T.S. 92/1



LEGEND

- BELOW 1000 GAMMAS
- 1000 – 2000 "
- 2000 – 3000 "
- ABOVE 3000 "

TO ACCOMPANY A REPORT ON GEOPHYSICAL AND GEOCHEMICAL SURVEYS OF THE BEV GROUP, KAMLOOPS AREA, KAMLOOPS MINING DIVISION. BY A. I. BETMANIS P. ENG. DATED AUG. 21, 1972.

A. I. Betmanis

Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3801 MAP #5

Job No. 1034

TORWEST RESOURCES (1962) LTD.

BEV GROUP

KAMLOOPS AREA, BRITISH COLUMBIA

MAGNETOMETER SURVEY

0 400 800 1200 1600
Scale - Feet

DRAWN: A. BETMANIS/ W.B.	REVISED:	MAP No: C - 108
DATE: AUG. 1972	DATE:	N.T.S. 92/I