

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. **2831** MAP.....

VLF - ELECTROMAGNETIC SURVEY
JUMBO MINES LTD. (N.P.L.)
FEED CLAIM GROUP
HIGHLAND VALLEY AREA
KAMLOOPS M.D., B. C.
FEBRUARY 1970

921111E
plotted
NO DEPOSIT
50° 33'
121° 05'

FEED CLAIM GROUP: 15 miles S35E of Ashcroft
50°, 121° NE

Submitted to: Jumbo Mines Ltd. (N.P.L.)
617 - 402 W. Pender Street
Vancouver 2, B. C.

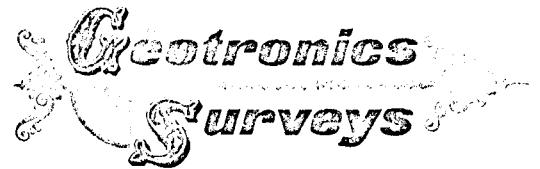
Report by : David Mark, B.Sc.
Geophysicist

2831

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RESUME - DAVID MARK, B.Sc.	
MAP IN FOLDER:	
#1 Sheet 1 - Electromagnetic - V.L.F.	
#2 Sheet 2 - Claim Location Map	

2931



517 - 802 West Hastings Street, Vancouver, British Columbia, Canada X; Telephone 688-4142

GEOPHYSICAL REPORT ON ELECTROMAGNETIC SURVEY

ON

THE FEED CLAIM GROUP

HIGHLAND VALLEY AREA, B. C.

JUNE, 1970

Submitted to: Jumbo Mines Ltd. (N.P.L.)
617 - 402 W. Pender Street
Vancouver 3, B.C.

INTRODUCTION

A VLF (very low frequency) electromagnetic survey was carried out on the Feed Claim Group under supervision of the writer and under direct supervision of Eugene Dodd.

The survey covered claims, in part or in full, Feed 16-22, 27-29, 31 and 32. The length of the survey was approximately 10 line miles and took 10 field days to complete, from February 10 to 21, 1970.

The survey's objective was to locate conductors; firstly, ones that are covered by sulphide zones and, secondly, ones that indicate structure such as faults, shear zones, fracture zones and contacts.

LOCATION

The property is located on the southeast corner of Cinder Hill, 15 miles S35E of Ashcroft and 5 miles N50W of the Bethlehem Copper Ore Body, at latitude $50^{\circ} 33'$ and longitude $121^{\circ} 5'$. Access to the property is excellent being by a good jeep road that leaves the paved Highland Valley Road about $3\frac{1}{2}$ miles northwest of Twenty-four Mile Lake. The property is situated from 2-3 miles up the jeep road.

TOPOGRAPHY

Generally the Feed Claims are on a gentle hill with a southwest slope and elevation varying from approximately 4400 feet at the bottom of the claim group to 5100 feet at the top. Three small creeks run through the group in approximately a southwest direction, the extreme east creek being Burr Creek. Most of the property is fairly dry with a few spots, here and there, being swamp-like.

INSTRUMENTATION

The VLF EM used was an instrument manufactured by Geotronics Instruments Ltd. of Vancouver, B. C. This instrument is designed to measure the electromagnetic component of the very low frequency field, transmitted at 18.6 KHz from Seattle, Washington. The direction of this field, in particular the dip angle, is distorted by the presence of a conductor within the earth. Thus, by measuring the dip angle, the presence of a conductor can be detected and its location determined.

LOCATION MAP
JUMBO MINES LTD.
HIGHLAND VALLEY AREA
Scale - 1" = 110m.



FEED CLAIM GROUP

SURVEY PROCEDURE

The EM survey was completed over the pre-existing grid. The lower Feed Claim line was used for the main base line (called BL) and the upper Feed Claim line was used as a sub-base line (called FCL)(see enclosed map at back in folder). These lines had been chained, cut, and marked every 100 feet with blue flagging tape. Every 500 feet, on these lines; cross-lines were compassed, chained, cut out, and marked every 100 feet with orange flagging tape. The average direction of the base lines is due SE-NW and thus the crosslines, SW-NE. Instrument readings were taken every 100 feet on the crosslines, on parts of the base lines and on the road between the 2 base lines.

GEOLOGY

The Feed Claim Group is located on the now well-known Guichon Creek Batholith that hosts 3 major deposits: Bethlehem, Lornex and Valley Copper. This batholith, as noted by Northcote (see reference), is composed of several phases, 2 of which are divided into 2 or 3 varieties. According to Northcote's geology map, the Feed property is on the Highland Valley phase on the contact line between the Guichon variety (Bethlehem is located on this variety) to the north and the Chataway variety to the south. Both varieties are mainly granodiorite with the Guichon variety being richer in mafic minerals, principally biotite. Also, on this property, variety B of Witches Brook phase intrudes into the Chataway variety as dyke-like bodies and/or irregular shaped masses. Variety B is mainly granodiorite to quartz monzonite and is

finer grained than the Highland Valley phase granodiorites. Also, according to Northcote's structural map, 2 shear planes are located on the Feed property, both striking approximately northeast-southwest.

INTERPRETATION

The map shows several conductors, almost all southwest of the road. Though not surprising, there does not seem to be any correlation between the EM map and the magnetic contour map.

It is almost impossible to say what the conductors are caused from, whether it is sulphides, structure and/or conductive overburden. The interpretation of what these conductors are would be greatly aided by a copper geochemical survey. Thus, if there were any geochem. anomalies and if they coincided with some of the indicated VLF EM conductors, then one would almost be assured that these ones were sulphides. The rest would likely be due to shear zones, fracture zones, faults and/or contacts.

It is also difficult to say what the dip of the conductors are (mostly because of the nature of a VLF EM), but if anything is to be said, they are close to vertical.

On a VLF EM survey, it is best to choose a transmitter approximately in the direction of the strike of the sought after conductor (usually a sulphide zone) since conductors in this direction are most easily picked up and those in a perpendicular direction are most difficult to pick up.

Therefore, in this particular case, since it was the Seattle transmitter chosen at a direction of S20W, a southerly direction is favoured, as can be seen on the map, and no conductors are shown in a perpendicular direction (except a possible one on the south end of lines 55 and 60W). Of course, there could be no other conductors in any other direction.

It must be remembered that there is a source of error, probably about ± 10 in the readings that is due to human limitations and instrumental error. Therefore, any 0's shown could in actual value be either plus or minus 1 and vice versa. This is thus the justification for some of the possible conductors.

CONCLUSIONS AND RECOMMENDATIONS

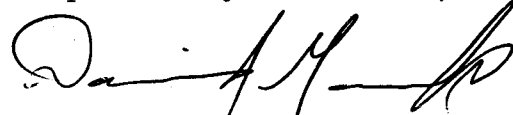
The survey has shown 2 or 3 major conductors on the property and many smaller ones. Whether these are due to sulphides or structure is difficult to say and, as mentioned before, the differentiation could be greatly aided by a copper geochemical survey.

The whole property should be prospected and geologically mapped comprehensively. This is extremely useful in any further geophysical interpretation.

As recommended by the writer in the previous magnetic report, an induced polarization survey should be completed over the

whole property, especially since a porphyry copper deposit is the main exploration target.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'David Mark', written in a cursive style.

DAVID MARK, B.Sc.
Geophysicist

DM:ly
June 26, 1970

REFERENCES

Cockfield, W. E. GEOLOGY & MINERAL DEPOSITS OF THE NICOLA MAP AREA. G.S.C., Memoir 249, 1948.

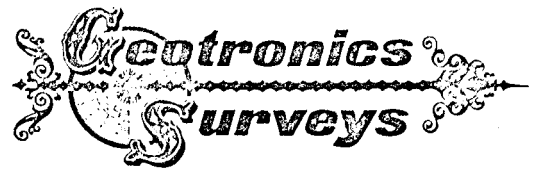
Department of Energy, Mines & Resources, Ottawa. AIRBORNE MAGNETIC MAP - ASHCROFT, Map 5219G, Sheet 921/11, 1967

Duffel, S., McTaggart, K.C. ASHCROFT MAP AREA, B. C. G.S.C., Memoir 262, 1952.

Mark, David GEOPHYSICAL REPORT ON MAGNETIC SURVEY ON THE FEED CLAIM GROUP, HIGHLAND VALLEY AREA, B. C. - Jumbo Mines Ltd., March, 1970.

Northcote, K.E., GEOLOGY & GEOCHRONOLOGY OF THE GUICHON CREEK BATHOLITH, Victoria, Queen's Printer, 1969. (Department of Mines, B. C., Bulletin No. 56).

White, W. H., Thompson, R. M., McTaggart, K. C. THE GEOLOGY & MINERAL DEPOSITS OF THE HIGHLAND VALLEY, British Columbia, C.I.M.M., Trans., Vol. 60, pp. 273-289, 1957.



.517 · 602 West Hastings Street, Vancouver, British Columbia, Canada ✪ Telephone 688-4342

RESUME OF TECHNICAL AND FIELD EXPERIENCE
of
DAVID MARK, B.Sc.

EDUCATION

Graduate of University of British Columbia in Science (B.Sc.)
in Geophysics.

EXPERIENCE IN INDUSTRY

1. Prospecting and geological evaluation for New Taku Mines Ltd. during exploration season of 1965.
2. Field supervisor for geophysical and geochemical work and prospecting for Mastadon - Highland Bell Mines Ltd. during exploration season of 1966.
3. Field supervisor in geochemical work and geological mapping for Anaconda (Canada) Company during exploration season of 1967.
4. Field geophysicist for Geo-X Surveys Ltd. during exploration season of 1968.
5. Presently geophysicist for Geotronics Surveys Ltd., Vancouver, B. C.
6. Experience in various geophysical instrument surveys: magnetometer, electromagnetic, self potential, gravity, induced polarization, resistivity and seismic methods.
7. Member of British Columbia Geophysical Society and Vancouver Branch of The Canadian Institute of Mining and Metallurgy.
8. P. Eng. applied for with Association of Professional Engineers of B. C.

July 27, 1970

Mr. Tom Rolston, Pres.
Geotronics Surveys
517-602 W. Hastings Street
Vancouver, B. C.

Dear Mr. Rolston:

At your request I have reviewed the references cited below and examined the report prepared by your Company's personnel, "Geophysical Report on Electromagnetic Survey, Feed Claim Group, Highland Valley Area, B. C., for Jumbo Mines Ltd. (N.P.L.)"

The claim group is located on the southeast corner of Cinder Hill, 15 miles S 35°E of Ashcroft and 5 miles N 50°W of the Bethlehem Copper Mines Ltd. ore body. Lat. 50° 33', long. 121° 5'.

Access is by a jeep road that turns off from the Highland Valley Road 3½ miles northwest of Twenty-four Mile Lake. The property is situated about 3 miles along the jeep road.

The topography is gentle with elevations ranging from 4400 feet to more than 5100 feet.

Geology. The Feed group of claims is underlain by rocks of the Guichon Creek batholith. The batholith is composed of several varieties of rocks, two of which are divided into two or three types. The Feed property is on the Highland Valley phase on the contact line between the Guichon variety to the north and the Chataway to the south. Both varieties are mainly granodiorite with the Guichon being richer in mafic minerals, principally biotite. Also, on this property, variety B of Witches Brook phase intrudes into the Chataway variety as dyke-like bodies and irregular

Feed Claim Group

- 2 -

shaped masses. This variety is mainly granodiorite to quartz monzonite and is finer grained than the Highland Valley phase granodiorites.

Two shear zones striking northeasterly are located on the property, according to Northcote's structural map. The three major copper mines of the area are located in similar geologic environment.

Geophysical Survey. An electromagnetic survey was carried out over Feed Claims 16-22, 27-29, 31 and 32. 10 miles of line were completed.

Several conductors were outlined, located within Feed 17-22. They trend northwesterly and appear to be fairly continuous. They do not correspond with the magnetics. In view of the present knowledge of the area it is uncertain whether the EM conductors outlined are caused by sulphides or are merely shears or conductive overburden.

It is recommended that a geochemical survey and geologic mapping be carried out concurrently on the property. An I.P. survey would be in order if the geochemical survey indicated anomalous areas.

E. P. Sheppard

E. Percy Sheppard, P.Eng.
Consulting Geologist



REFERENCES

- Cockfield, W.E. GEOLOGY & MINERAL DEPOSITS OF THE NICOLA MAP AREA. G.S.C. Memoir 249, 1948
Dept. of E., M. & R., Ottawa, AIRBORNE MAGNETIC MAP-ASHCROFT. Map 5219G, Sheet 921/11, 1967
Duffel, S., McTaggart, K.C. ASHCROFT MAP AREA, B.C. Memoir 262, 1952
Mark, David. GEOPHYSICAL REPORT ON MAGNETIC SURVEY ON THE FEED CLAIM GROUP, HIGHLAND VALLEY AREA, B.C. - Jumbo Mines Ltd., March 1970
Northcote, K.E. GEOLOGY & GEOCHRONOLOGY OF THE GUICHON CREEK BATHOLITH, Victoria, Queen's Printer, 1969. (Dept. of Mines, Bulletin No. 56)
White, W.H., Thompson, R.M., McTaggart, K.C. THE GEOLOGY & MINERAL DEPOSITS OF THE HIGHLAND VALLEY, B.C., C.I.M.M., Trans., Vol. 60, pp 273-289, 1957.

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.

In the Matter of JUMBO MINES LTD.

To Wit:

Geophysical Survey conducted on the FEED CLAIM GROUP, Highland Valley Area, Kamloops Mining Division, B.C. from February 10 to 21, 1970 by Geotronics Surveys Ltd.

I, Thomas W. Rolston, representing GEOTRONICS SURVEYS LTD.

of 514 - 602 W. Hastings St., Vancouver 2,

in the Province of British Columbia, do solemnly declare that the following expenses were incurred in conducting a geophysical survey on the FEED CLAIM GROUP during the period February 10 to 21, 1970:

WAGES

E. A. Dodd, 10 days @ \$75.00	\$750.00	
B. Dodd, 10 days @ \$40.00	<u>400.00</u>	\$1,150.00
E.M. INSTRUMENT RENTAL, 2 weeks @ \$60.00		120.00
SKIDOO RENTAL, 2 weeks @ \$125.00		250.00
TRUCK RENTAL, 10 days @ \$15.00		150.00
P.D.T. DRAFTING SERVICES, MAPPING & PLOTTING		200.00
GEOPHYSICIST'S INTERPRETATION & REPORT		400.00
ENGINEERING FEES		200.00
LINE CUTTING, 13 line miles @ \$55.00		<u>715.00</u>
T O T A L		<u><u>\$3,185.00</u></u>

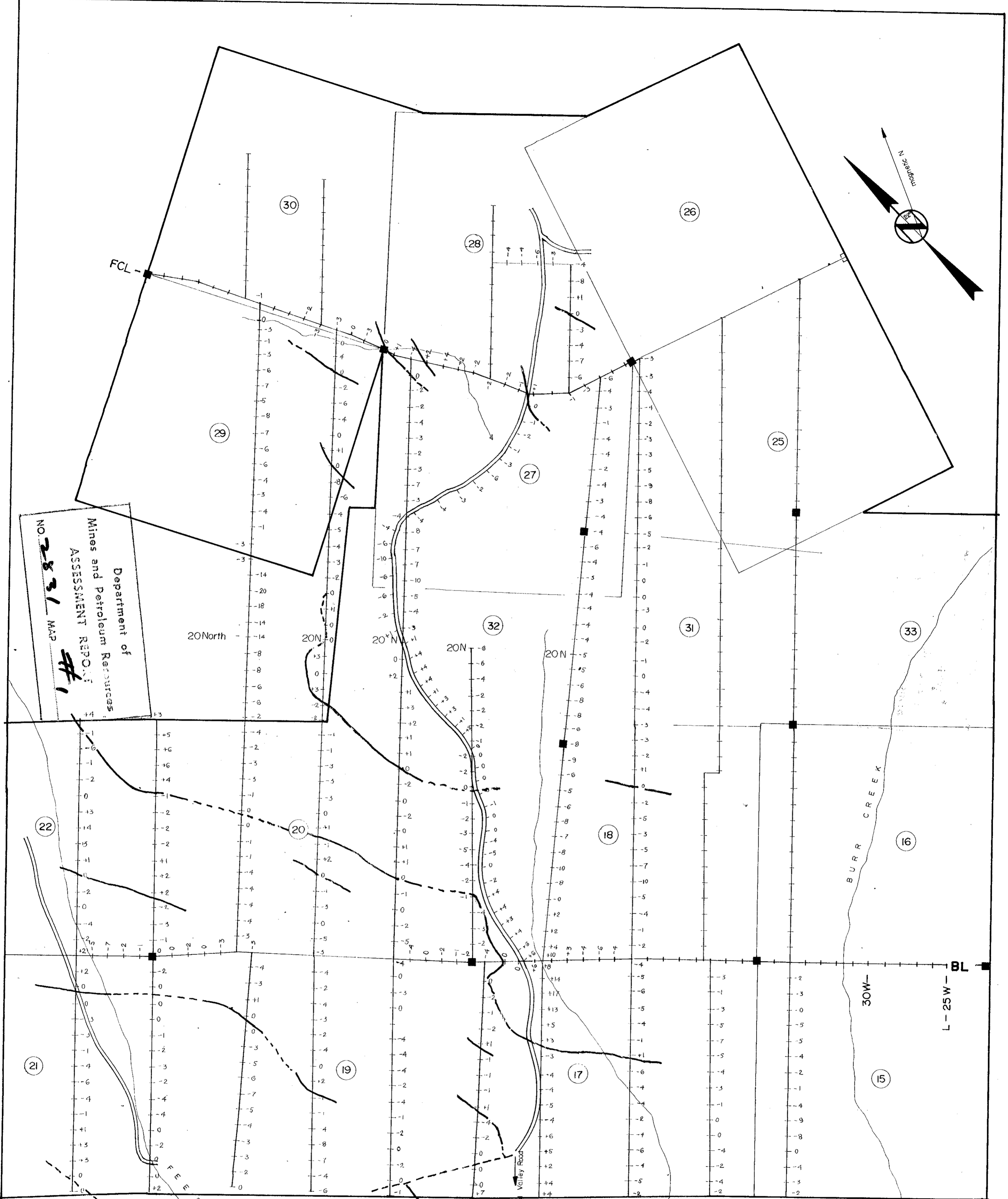
And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the CITY
of VANCOUVER, in the
Province of British Columbia, this 28th
day of JANUARY 1971, A.D.

Tom Rolston

[Signature]

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



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO 2831 MAP #1

- LEGEND**
- road
 - creek
 - located claim post
 - border of FEED Claim Group
 - claim No.
 - conductor / possible conductor

2831 M-1

- NOTE**
- (1) Readings are in degrees
 - (2) Seattle Radio Transmitter Station used - 18.6Khz
 - (3) Direction facing while taking readings was South - 20° West
 - (4) Negative values mean conductor is to East of Station, Positive values mean conductor is to West of Station

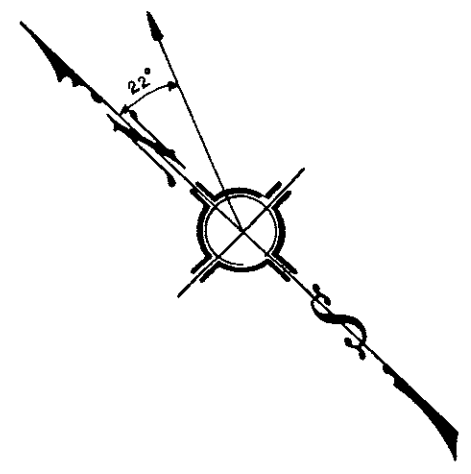
To accompany geophysical report by D. Mark, B.Sc.
June 26 / 70 David Mark

JUMBO MINES LTD
FEED CLAIM GROUP
HIGHLAND Valley, Kamloops M.D., B.C.

ELECTROMAGNETIC - V.L.F.
type of survey

scale 1" = 400'	date JUNE 70	job no. 70-08	sheet no. 1	drawn by P.P.
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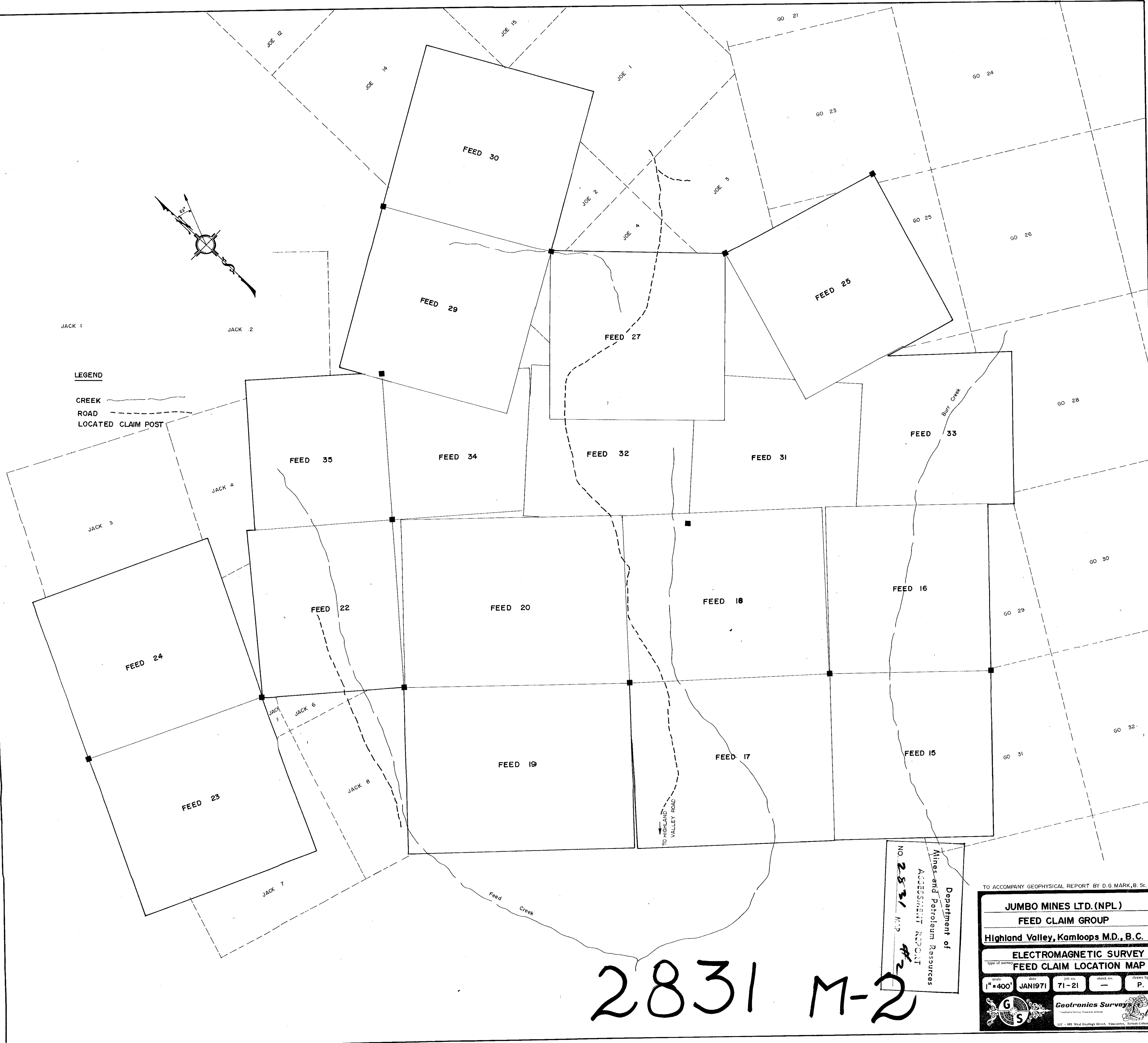
Geonics Survey
Geophysical Surveys, Ground & Airborne
517 - 602 West Hastings Street, Vancouver, British Columbia.



JACK 1 JACK 2

LEGEND

CREEK
ROAD
LOCATED CLAIM POST



TO HIGHLAND VALLEY ROAD

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2831 M.P. #2

2831 M-2

TO ACCOMPANY GEOPHYSICAL REPORT BY D.G. MARK, B.Sc.

JUMBO MINES LTD. (NPL)
FEED CLAIM GROUP
Highland Valley, Kamloops M.D., B.C.

ELECTROMAGNETIC SURVEY
FEED CLAIM LOCATION MAP

Type of survey	scale	date	job no.	sheet no.	drawn by
	1" = 400'	JAN 1971	71-21	-	P.

Geotronics Survey Ltd.
Geophysical Services, Consultants & Software
 313 - 682 West Hastings Street, Vancouver, British Columbia