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A GEOPHYSICAL REPORT ON AN INDUCED POLARIZATION AND MAGNETIC SURVEY KV CLAIM GROUP GRAND FORKS, B.C. (49°, 118°, S.W.) – for – THE GRANBY MINING COMPANY LIMITED – by – A. R. Dodds, B.Sc., P.Geoph. J. B. Prendergast, M.A., P.Eng.



REPORT ON

AN INDUCED POLARIZATION AND MAGNETIC SURVEY

OVER

KV CLAIM GROUP

FOR

THE GRANBY MINING COMPANY LIMITED

KENTING EARTH SCIENCES

CALGARY, ALBERTA

OCTOBER 1970

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INTRODUCTION

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This report describes a combined Induced Polarization and magnetic survey carried out by Kenting Earth Sciences for The Granby Mining Company Limited over the KV claim group, located four miles northwest of Grand Forks, British Columbia.

The topography of the survey area is fairly rough, comprising basically a ridge extending west from Goat Mountain. Access is by bush roads running north from Grand Forks.

The reconnaissance work was done between May 8th and 16th, 1970, followed by detail work from June 1st to 11th and on September 6th, 1970. The party chief was D. Ragan, supervised from Calgary by A. R. Dodds. All decisions regarding survey specifications were made in consultation with Mr. J. Paxton of The Granby Mining Company Limited.

The I.P. reconnaissance survey comprised concurrent readings of chargeability and resistivity taken at 200 feet intervals on pre-cut survey lines spaced 400 feet apart and oriented approximately north. Detailing comprised surveying of fill-in lines at 200 foot intervals and the use of varying survey parameters.

The purpose of the survey was to prospect for economic sulphide mineralization similar to that being mined at Phoenix, approximately six miles to the west. The effectiveness of the I.P. method for this purpose was demonstrated in test profiles run over the mine workings in 1967.

The reconnaissance 1, P, and magnetic data are presented in the form of contoured

plan maps of apparent chargeability, apparent resistivity and vertical magnetic intensity at a scale of 1 inch to 200 feet (Drawing No's. 1227A-1 to 3). Data for lines detailed with more than one electrode separation are shown as profiles at the same horizontal scale (Drawings 1227A-4 to 14).

SURVEY SPECIFICATIONS

Equipment

The survey was carried out using pulse-type Induced Polarization equipment manufactured in Toronto by Huntec Limited. The following specifications apply:

Type of Current

Direct Current broken at periodic intervals.

1.5 seconds "current on" and

0.5 seconds "current off". Alternate pulses have reverse

polarity.

15 milliseconds

400 milliseconds

7.5 kilowatts

8.0 amperes

Period

Delay Time

Integrating Time

Maximum Power Available

Maximum Current Available

Measurements taken in the field are:

1. The current flowing through the current electrodes C_1 and C_2 .

2. The primary voltage Vp between the measuring electrodes during "current on" time.

3. The secondary voltage Vs between the measuring electrodes during "current off" time.

The apparent chargeability (Ma) in milliseconds is calculated by dividing the secondary voltage by the primary voltage and multiplying by 400, which is the sampling time in milliseconds of the receiver unit. The apparent resistivity is calculated by dividing Vp by the current and multiplying by the geometrical factor appropriate to the electrode array being used. The magnetic values were taken using a Scintrex MF-1 fluxgate magnetometer, measuring the vertical component of the magnetic field to an accuracy of + 20 gammas.

Electrode Configuration

The pole-dipole electrode array was used for this survey. In this array, one current electrode, C_1 , and the two potential electrodes, P_1 and P_2 , are moved in unison along the survey lines. The second current electrode, C_2 , is placed sufficiently far from the moving electrodes that it does not affect the direction of current flow within the moving array. The electrode separation, "a", is defined as the distance between electrodes C_1 and P_1 , and controls the depth penetration of the array. The length of the potential dipole must be less than or equal to "a", and is generally kept in a constant ratio, e.g. a/2 or a/4, for a survey area.

For this survey, the reconnaissance work was done using an "a" value of 400 feet, keeping the potential dipole at a/2. Detailing, to provide additional data for interpretation purposes, was done with "a" values of 100 feet and 200 feet.

GEOLOGY

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The geology of the area is taken from data provided by The Granby Mining Company Limited, primarily a geologic plan at a scale of 1 inch to 200 feet dated June 1970.

The northeast part of the grid is underlain by sediments, chiefly argillite and chert, intruded in places by diorite, possibly in the form of dykes. The predominant rocktype over the remainder of the area is andesite, probably forming a thin flow overlying the sediments. There are occasional outcrops of andesite within the area of sediments and some limestone outcrops within the andesite, possibly in windows in the flow cover. Fairly extensive serpentine outcrops, with associated talc carbonaceous rock, chiefly occur near the sediments and presumably intrude these rocks.

There are scattered weak pyrite disseminations in the andesite, but most sulphide showings occur in the sediments, comprising primarily pyrite and pyrrhotite with some copper sulphides.

INTERPRETATION

Magnetics

The most prominent features of the magnetic survey over this area are two linear highs located over the sediments in the northeast corner of the grid. These anomalies are expected to be caused by narrow dyke-shaped bodies striking northwesterly and topping off within 100 feet of surface. There appears to be no correlation between these sources and known geology, although there is a diorite intrusive striking approximately north near the southern anomaly. Weak pyrrhotite mineralization in chert has been observed here also, and might be an indication of the source.

The strong negative anomaly on Baseline 2 between Lines 12W and 16W appears to be associated with serpentine, though why this should give a magnetic low is uncertain. Possibly all of the readings are on the flank of the magnetic material, representing lows associated with unmeasured strong highs over the source. However similar but weaker lows are associated with serpentines elsewhere and it would seem improbable that all are located on the side of the source material.

Induced Polarization

All of the 1.P. anomalies are in or near areas mapped as chert and argillite, the peak at the southern end of Line 4E being a possible exception as geology is not known here. Areas underlain by andesite show background levels varying gently from 4 to 8 milliseconds. The anomalous zones are outlined on the chargeability contour map.

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Zone 1

This zone is located between Lines 12W and 20W just south of Baseline 2. The geology here is quite complex, showing areas of sediments and intrusive with some overlying andesite. The centre of the anomaly occurs over andesite, probably only a thin cover, which terminates a short distance to the northeast and is replaced as outcrop by sediments – argillite and sharpstone conglomerate. Further northeast again is a serpentine intrusive with associated talc carbonaceous rock. A pit with copper minerals is located 300 feet east of the I.P. peak. The serpentine is apparently the cause of a strong magnetic low at this point, but there is no magnetic response over the I.P. anomaly. Resistivity values in this area are uniformly high.

This zone was detailed on Line 16W, the results indicating a source located between 10+50N and 12+50N and centred about 200 feet below surface as shown under the detail profile. There are indications of shallower, less extensive chargeable material on either side of this main source, possibly a halo. The whole source is non-conductive and non-magnetic, and is interpreted as disseminated sulphides. The recommended drilling target for testing this anomaly is 200 feet below 11+50N on Line 16W, the hole to be drilled at 60° from either north or south (DDH 1A or 1B). However the apparent limited areal extent of the source, about 600 feet by 200 feet unless becoming more deeply buried to east or west, may eliminate it as a zone of interest.

Zone 2

This zone comprises two reconnaissance readings at the south end of Line 4E. Detailed geology does not show any outcrop in the immediate area, but the general picture

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indicates andesite throughout this part of the grid. The magnetics are flat and the resistivity uniformly high over the zone.

The interpreted location of the source is shown under the detail profile. There is no significant indication of the anomaly on either of the adjoining lines, so any extension must be in a southerly direction outside the survey area. The depth to top appears to be about 100 feet, from the limited information available.

No further work on this zone is recommended at present, because of the small extent of the anomaly within the claim boundaries. Ownership of additional claims to the south would change this recommendation to one of additional I.P. work to further outline the anomaly.

Zone 3

This is an extensive zone of generally higher chargeabilities covering the northeast corner of the survey area. The zone coincides with an area of sedimentary rocks, predominantly chert and argillite with some diorite intrusive and small isolated areas of andesite. Serpentine intrusives, with associated talc carbonaceous rock, occur on the south and west edges of the anomalous area. Sulphide mineralization in outcrop is sparse, such as has been observed comprising weak disseminations of pyrite and pyrrhotite in chert. Iron stain is rather more common, and may indicate that some surface sulphides have been weathered out.

The northern part of this zone, generally north of Baseline 2, is associated with an area of low resistivities focussing on a conductive zone at 3+00N on Lines 35E to 41E. There is no indication in the geology of a cause for this conductor, which appears to swing

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northerly on the west side of Line 35E to about 7+00N on Line 33E. The chargeability results would indicate a non-metallic source for this feature.

The high chargeabilities in this zone are analyzed as an increase in background to the 10-15 millisecond level, indicating generally more chargeable rock types containing possibly 1% sulphides, with some stronger peaks resulting from smaller sources having a much higher sulphide content potential. One such source is located between Lines 12E and 16E at about 8+00N. An extension to the east outside the claims is possible. There is some association between this anomaly, a magnetic high and a resistivity low but this is not consistent so magnetic massive sulphides are not anticipated. Probable source locations are shown under each survey line, but continuity between lines is unknown because of the apparent complexity of the sources. Under Line 16E the source appears simple with a possible north dip. Data on Line 14E shows a rather more complex source, still single near surface but apparently dividing at depth. Under Line 12E the source splits into four bands, the two southerly ones having, apparently, poor depth extent. Recommended drill-holes for testing these anomalies are:

- DDH 2 Collar at 7+60N on Line 14E, drilled at 60° south for a hole length of 200 feet. To test chargeability high.
- DDH 3 Collar at 9+00N on Line 14E, drilled at 60^o south for a hole length of 200 feet. To test combined magnetic and chargeability high.
- DDH 4 Collar at 8+20N on Line 16E, drilled at 60° south for a hole length of 300 feet. To test combined magnetic and chargeability high.

Chargeabilities on the north side of Baseline 2 are complex with no clear indications of discrete anomalous sources, so that all variations could result from widespread inhomogeneous disseminations of sulphides. On the other hand, the apparent complexity could be

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caused by sources striking at an acute angle to the survey lines, as indicated by the linear magnetic high and a possible anomalous trend between this magnetic feature and the northeast edge of Zone 3. The former explanation is considered more probable.

It would appear that the source of the magnetic high has a relatively low chargeability, as have the rocks immediately adjoining and on the strike extension of this feature. The increase in magnetic susceptibility is therefore expected to result from magnetite rather than pyrrhotite.

All of the high chargeabilities in this area are therefore interpreted as being caused by extensive weak sulphide disseminations, generally less than 3% sulphides by volume. These extend to within 100 feet, and probably less, of surface. Such concentrations of sulphides as may exist are expected to be either of small extent or only marginal increases over the average sulphide percentages. The only probable exception is indicated by detailing on Line 37E, and it is suggested that this anomaly be drilled to test the general chargeability source and to check for the possibility of a concentration at this location. The target is 200 feet below 10+00N on this line, a 60° hole being recommended (DDH 5A or 5B).

SUMMARY

The survey showed that most geophysical activity in this area is associated with sedimentary or intrusive rocks. The andesites show generally flat results except for some weak magnetic fluctuations.

All serpentine showings in the area are marked by some magnetic variation, ranging from strong to weak and from positive to negative anomalies. In addition, there are two pronounced linear magnetic anomalies in the northeast part of the area that have no evident geological source.

Three zones of high chargeability were selected for discussion. Drilling has been recommended on Zone 1 and parts of Zone 3, where concentrated sources are possible, and drilling targets given. The remainder of Zone 3 has been interpreted as being caused by extensive weak sulphide disseminations. Zone 2 is located at the boundary of the survey area, insufficient data being obtained for a detailed analysis or selection of drilling targets. An extension of the 1.P. work has been suggested here, depending on ownership of the claims to the south.

KENTING EARTH SCIENCES Western Division

Respectfully submitted,



Expire bates may 80, 1971

A. R. Dodds, P. Geoph. B.Sc.

APPENDIX

CLAIMS SURVEYED

The following mineral claims were surveyed in whole or in part:-

P and R	1 and 2
BOM	1 Fraction, 2 Fraction, 3 Fraction
KV	1-4 inclusive, 7

MILES SURVEYED

The following list gives the number of readings taken and miles of line covered by this survey:7

Electrode Separation	Station Interval	Line-Miles	Readings
400'	200'	7.54	183
200'	100'	3.41	190
100'	100*	0.17	10
		11.12	383
Magnetics	100'	7.88	432

PERSONNEL

Name	Position	Dates	<u>Rate/Day</u>	Charges
D. Ragan	Party Chief	May 8-Sep. 6/70	\$80,00	\$1,520.00
J. Wilson	Operator	May 8-June 11/70	\$66,00	1,188.00
G. Teske	Operator	Sept. 6/70	\$66,00	66.00
B, Regan	Helper	June 1-11/70	\$40,00	400.00
M. Hicke	Helper	May 8-16/70	\$40.00	320,00
G. Simard	Helper	Sept. 6/70	\$40.00	40.00
B, Ragan	Helper	Sept. 6/70	\$30,00	30.00
A.R.Dodds	Geophysicist	May 28,29/70) Sep. 23–30/70)	\$135.00	675.00
M. Cole	Draftsman		\$75,00	450.00
G. McVeigh	Typist	Oct. 9 & 13/70	\$25,00	27.50
I.P.Unit		May 8-Sep.6/70	\$58,00	1,022.00
Vehicle		ditto	\$20,00	380.00
Board & Lodging	g, etc.	If	\$33,60	779.88
				<i>.</i>

TOTAL CHARGES

\$6,898.38







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INDUCED POLARIZATION SURVEY

DETAIL PROFILE: LINE - 8E

THE GRANBY MINING COMPANY LIMITED KV CLAIM GROUP, GRAND FORKS, B.C.

LEGEND



INTERPRETED CAUSATIVE BODY

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= 400'

-O RECOMMENDED D.D.HOLE.

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INDUCED POLARIZATION SURVEY

DETAIL PROFILE: LINE - 12E

THE GRANBY MINING COMPANY LIMITED KV CLAIM GROUP, GRAND FORKS, B.C.

LEGEND



INTERPRETED CAUSATIVE BODY (General Outline, Probable Defined Source)

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Geophysicist	
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INDUCED POLARIZATION SURVEY

DETAIL PROFILE: LINE -4/E

THE GRANBY MINING COMPANY LIMITED KV CLAIM GROUP, GRAND FORKS, B.C.

LEGEND



INTERPRETED CAUSATIVE BODY

-O RECOMMENDED D.D.HOLE.

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XX	a	=	200'
ΔΔ	a	=	400'

POLE - DIPOLE ARRAY



Horizontal Scale: linch : 200 feet. Vertical Scales: Chargeability — Linch: 5 milliseconds Resistivity — 2 inches: 1 logarithmic cycle (ohm-meters) INSTRUMENT PARAMETERS 1.5 secs. 0 N OFF 0.5 secs.

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To accompany report by:

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Andrew R. Dodds, B. Sc. P. Geophi Geophysicist

CALGARY CANADA

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