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GLAS BURTON, P. ENG. GEOPHYSICAL BURVEYS

APR 29 1971 PROJECTS SECTION

REPORT ON THE VLF AND THE MAGNETIC

GEOFHYSICAL SURVEYS ON THE PROPERTY OF

NICKEL RIM MINES LIMITED

IN BLOCKS 83 AND 84, GILLIES LIMIT, ONTARIO

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The Maps (numbered <u>70-72-1</u>, <u>-2</u> and <u>-3</u>) The Results of the VLF Survey The Results of the Magnetic Survey

CONCUESIONS AND RECOMMENDATIONS







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DOUGLAS BURTON, P. ENG.

GEOPHYSICAL SURVEYS

REPORT ON THE VIF AND THE MAGNETIC GEOPHYSICAL SURVEYS ON THE PROPERTY OF NICKEL RIM MINES LIMITED IN BLOCKS 83 AND 84, GILLIES LIMIT, ONTARIO

DIOEST

During fourteen field days in September and Qctober, 1970, magnetic intensities and VLF parameters were determined on <u>19.8 miles of taped picket lines in</u> Blocks 83 and 84 in Gillies Limit township, about eight miles south of Latchford, Ontario, by way of Highway 11.

A number of VLF anomalies are recorded, usually in the area of the magnetic basic rocks.

Several drill holes are recommended in order to evaluate the geophysical anomalies in terms of sulphide minerals.

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REPORT ON THE VIF AND THE MAGNETIC GEOPHYSICAL SURVEYS ON THE PROPERTY OF

NICKEL RIM MINES LIMITED IN BLOCKS 83 AND 84, GILLIES LIMIT, ONTARIO

INTRODUCTION

Through the dates <u>September 3rd to October 7th</u>. <u>1970, a Very Low Frequency (VLF) and magnetic geophysical</u> survey was completed on a <u>12-claim group in Blocks 83 and</u> 84 in Gillies Limit township, Ontario.

Mr. Ralph Benner, your consulting geologist, arranged for this survey and the line outting to position the geophysical observations. He reveiwed the geophysical results and advised about the correlation into geological terms and possibilities. His cooperation is greatly appreciated.

Nickel and copper are found south of this area examined in an east-west some along the south contact of an ultrabasic mass of pyroxenite and amphibolite. A similar mass is found in the area surveyed and it was believed that similar minerals may be found nearby.

The weather was rainy and this delayed the line cutting the geophysical field work. Black flies and mosquitoes were absent, but hornets were found in



nests built about three feet above the ground on brush and trees. At times these were vicious and persistent.

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DOUGLAS BURTON, P. ENG GEOPHYSICAL SURVEYS

Location, Area and Accessibility

The area surveyed straddles Highway No. 11 about eight miles south of Latchford. More than ten mining plaims were covered; an area of about 440 acres.

The Land Survey

The taped and picketed <u>lines</u> laid out <u>200 fest</u> <u>apart</u> were brushed out to carry on straight lines, and to facilitate movement along the lines for the personnel operating the geophysical apparatus.

An east-west base line was laid out approximately along the south boundary of Blocks 83 and 84 for 6400 feet with taping pickets every 100 feet. The 32 survey lines were tuned off at right angles every 200 feet and extended north for about 2700 feet to a second east-west base line laid out to determine the spacing between the lines at the north end. In addition six lines W4400 to W5400 were extended an additional 1000 feet.

In total, <u>19.8 miles of profile line were out</u> and taped and geophysical measurements were made at 50 and <u>100 foot intervals</u>. Topographical and geological mapping were related to these lines.

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GEOPHYSICAL SURVEYS

THE GEOLOGY

Geophysical Correlation with the Geolegy

Geophysical measurements act as a guide to indicate hidden geological and mineralogical conditions at depth in an area considered to be favorable for the deposition of ore minerals.

Geophysical results must be prepared and mapped in such a way that they may be translated into geological terms and possibilities in order to be of assistance in the exploration and testing of a mining property. Some geological knowledge must be available in order to derive the maximum benefit from a geophysical examination.

Governmental Maps and Reports

There is one map of this area with its accompanying report. This is the one inch equals one mile map entitled "Map of the Cobalt-Nickel-Arsenic-Silver Area near Lake Temiskaming, Ontario", to accompany the 4th Edition of Report by Willett G. Miller, Provincial Geologist, in Part 2 of the Nineteenth Report of the Bureau of Mines, 1910.

An aeromagnetic map, scale one inch equals one mile, covers the area. This is Sheet 31 - M/4, "Timagami", Geophysics Paper No. 510.

The Regional and Local Geology

The basement Keswatin rocks are composed of a series of acid to basic lava flows with interbedded tuffs and breceias. These formations have been violently folded until now they are in a more or less vertical attitude. Their strike is generally east-west with large variations, and they may be overfolded. Masses of magnetic basic rock complicate the magnence.

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In Huronian time Cobalt Series sediments were laid down on the erosional surface of the basement rocks. Erosion and glaciation then removed most of the sediments so that today we find large windows in these sediments exposing the older rocks.

Younger dikes cut across all of the older formations usually with a vertical attitude. In some cases they may be traced in a more or less straight line for many miles. In places these dikes are magnetic.

Large outcrops of Algoman granite are found to the south and west of the area examined. In this area surveyed, granite outcrops on the proservy between Highway (1) and Rib Lake. The south central portion of the area examined has many outcrops of coarse and fine-grained magnetic basic rocks. The remainder of the area has outcrops of conglomerate and greywacke.

GEOPHYSICAL SURVEYS

Economic Geological Conditions

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About 3000 feet south of the area of the present survey geological conditions favorable for the deposition of nickel and copper sulfides are found near the south contact of the large basic mass on this property.

As a result of geophysical surveys, drilling has located massive sulfides in a number of places along an eastwest zone more than 5000 feet long. At this time nickel and copper values are of less than economic grade.

The present survey covers the northern edge of this basic mass, and was laid out in order to determine if conductive sulfide deposits also occur nearby.

DOUGLAS BURTON, P. ENG.

GEOPHYSICAL SURVEYS

THE GEOPHYSICAL SURVEY

General

Two geophysical methods are used for this examination. The Very Low Frequency (VLF) method, made possible by the development of the <u>Ronka EMI6 receiver</u>, is used to indicate the location of zones of relatively higher conductivity; usually caused by shearing, faulting, fracturing and conductive sulfides in the bedrock.

The accurate recording of the vertical component of the earth's magnetic field at the surface will show the relative distribution of magnetic minerals in the underlying bedrock. This knowledge will assist in the interpretation of the geophysical data into geological terms and possibilities.

The writer, Douglas Burton, supervised the VIF and the magnetic field observations during the course of the geophysical examination on this property.

The VLF Method and Procedure for Geophysical Prospecting

Many Very Low Frequency (VLF) transmitters are located all over the world. These transmitters originate Morse Code and pulsed continuous wave carriers. Their particular application is for world-wide communication with submarines under conductive seawater. VLF radiation has considerable penetration into the earth.

GEOPHYSICAL SURVEYS

The radiation is vertically polarized and propagates radially in straight lines concentrically from the transmitter. The radiation is characterized by low path attenuation which is relatively stable with time.

Changes in the usual propagation pattern of VLF radiation are introduced by such factors as land-sea boundaries, and changes in the ground characteristics. Good conductors in the earth such as sulfides and graphite zones, and shears and faults of some considerable dimension, will have a tendency to concentrate and locally distort VLF radiation. Artificial conductors such as pipe lines, fences, electric lines and railroad tracks distort these fields.

VIF transmissions are most strongly concentrated by electrically conductive zones with a strike or longitudinal dimension along the radial path of propagation from each transmitter. In order to adequately explore an area where the strike of conductive zones may be at any angle it is advisable to use two transmitting stations so that the radiation direction is at right angles in order that the conductive zones may develop strong anomalous conditions.

The Ronka EMI6 receiver for VLF radiations has two directional antenna at right angles. It will determine the dip of the field and the phase difference from point to point in the area of survey. Usually two transmitting stations are used for determining these parameters. Readings are usually

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GEOPHYSICAL SURVEYS

taken at 100 foot intervals along a profile line crossing the general geological strike of the area examined. Conductive zones are indicated by anomalous dips of the field in the vicinity, with a vertical orientation directly over a conductive zone. When the dips are recorded and plotted on a map the approximate position of a conductive body is indicated, and possibly the dip of the conductive zone is shown.

The Magnetic Survey

The recordings are made by means of an accurate vertical component zero balance adjusted to a <u>sensitivity of</u> ten gammas per scale division.

The magnetic intensity at any point on the surface will usually differ from the average value for the region. Anomalous intensities are caused by changes in the magnetic minerals below. The magnetic susceptibility of rocks is generally accounted for by the contained magnetite although other magnetic minerals such as pyrrhotite may contribute to the observed intensity.

This method is used for the direct location of magnetic minerals such as magnetite. Magnetic surveys may assist in geological mapping. The plotted results, when compared with the known geological conditions, frequently yield information for the solution of geological problems, especially where rock outcrops are hidden by overburden.



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DOUGLAS BURTON, P. ENG GEOPHYSICAL SURVEYS COBALT, ONT

Magnetic anomalies are often found associated with formational contacts and structural features. Dikes and faults may be located and traced.

Zones of stronger magnetic intensity indicate concentrations of magnetite and pyrrhotite. These often accompany valuable non-magnetic mineral concentrations. On the other hand lower magnetic intensities may indicate important zones of alteration where magnetite is changed to non-magnetic minerals.

GEOPHYSICAL SURVEYS COBALT, ONT

THE RESULTS OF THE GEOPHYSICAL SURVEYS

The Maps (numbered 70-72-1, -2 and -3)

Accompanying this report are three maps drawn on a scale of one inch equals 200 feet. On these maps the taped and picketed north-south lines are shown with their east-west base- and tie-lines. Lakes, creeks and marked topographic relief are shown, together with roads and access trails, the gas pipe line, and mining claim numbers.

Map 70-72-1 shows the results of the magnetic examination. The relative magnetic vertical component intensity is shown in gammas on the profile lines examined. Lines of equal intensity are drawn. Areas with less intensity than 7800 gammas are tinted in red. The contour lines of 9000 gammas and above are colored blue.

In order to avoid continuous repetition in the mapping of the magnetic results, 50,000 gammas are deducted from the calculated magnetic intensity.

Maps 70-72-2 and -3 show the results of the VIF examination from two VIF transmitters with the Ronka EM16 receiver. Map 70-72-2 shows the results from JIM Creek, Washington to the west, and, Map 70-72-3 shows the results from Balboa in the Panama Canal Zone to the south. The dip of the VIF field together with a quadrature phase difference has been plotted along the profile lines and distinctively colored.

GEOPHYSICAL SURVEYS COBALT, ONT

The interpretation of the geophysical results are shown on all of the maps. Fault zones and dikes magnetically indicated are shown as well as the conductive zones indicated by the VLF cross-overs.

The locations chosen for exploration are shown on all of these maps.

The Results of the VLF Surveys

The VLF radiation from <u>Jim Creek</u>, <u>Washington to the</u> west, and from <u>Balboa in the Panama Canal Zone to the south</u> are distorted in a few places to indicate conductive sones. VLF anomalies have been selected for further exploration by drilling.

The electrically conductive gas pipe line on the east portion of the property distorts the VLF field so strongly that naturally conductive zones that may be in the ground nearby are completely masked.

The Results of the Magnetic Survey

The magnetic intensities in the area surveyed varied from 5000 gammas to 20,000 gammas with an average value of about 8000 gammas. The large variations are caused by a mass of magnetic basic rock in the south central portion of the area. The greater portion of the property has a magnetic variation between 8000 gammas and 8500 gammas indicating weakly magnetic rocks such as greywacke and conglomerate, and granite.

Two locations believed to be worthy of further exploration for sulphides are related to the strongly manetic basic rock mass.

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GEOPHYSICAL SURVEYS

CONCLUSIONS AND RECOMMENDATIONS

Three sections have anomalous conductive and magnetic conditions that are believed should be further tested by drilling. The targets selected in the order of their priority are centered at the following coordinates:

- (1) W2600 N550 and west
- (2) W5500 N700
- (3) W4700 N2400

These anomalous zones may be most conveniently examined by drilling from east to west from drill locations at:

			Dip of Hole	Azimuth	Horiz, and slope		
				221000101			
(1)	W2500	N620	-45° and 65°	2400	2501	3501 & 6001	
(2)	W5260	N640	-450	285°	3001	4201	
(3)	W4600	N2540	-450	2200	2501	3501	

when the results of this drilling is available and combined with the results from the geophysical survey just completed, further exploration may be recommended.

In the meantime, this report is,

age ESSINA, Respectfully submitted BURTON Douglas Burton, Geophysicist NCLOFON

Cobalt, Ontario, October 27th, 1970



• • •	ASSESSMENT WORK DETAILS				
Type of Survey	Magnetometer				
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Chief Line Cutter	John N. French	· · · · · · · · · · · · · · · · · · ·	MININ	G CLAIMS TRAV List numerically	ERSED
or Contractor	Name Latchford, Ontario		I	-263912	
Party Chief	Address Douglas Burton	·····		263913	
	Name Cobalt, Ontario			263914	
Consultant	Address Ralph I. Benner	· · · · · · · · · · · · · · · · · · ·		263915	
	Name Box 208, Cobalt, Ontario			263916	
Geological field map	Address	· · · · · · · · · · · · · · · · · · ·		263917 ()	K
0 1	Name Name			263918	
	Address			263919	2
COVERING DATES	2		****************	263920	
Line Cutting Aug. 2	4th to Sept. 28th, 1970		•••••	263021	
Field Sept. 3r	d to Sept. 29th, 1970			12 mot con	react
Office ' Sept. 30	Instrument work, geological mapping, sampling etc. th to Oct. 7th, 1970		part oi	20001	Clower ?
			part of	265342	iae n
INSTRUMENT DAT	ΓA		• • • • • • • • • • • • • • • • • • • •		
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Scale Constant or Se Or provide copy of instrum	ensitivity 10 gamma per scale divi nent data from Manufacturer's brochure.	sion			
Radiometric Backgr	ound Count		•••••		••••••
Number of Stations	Within Claim Group1056		•••••		••••••
Number of Readings	s Within Claim Group 1056	 ,	••••••	••••••	••••••••
Number of Miles of	Line cut Within Claim Group19.8		•••••	•••••••	••••••
Number of Samples	Collected Within Claim Group	······		*******	
-			тот	AL CLAIMS_12	
CREDITS REQUES	<u>TED 20 DAYS</u> <u>40 DAYS</u> per claim per claim (1	Includes Line cutting)			
Geological Survey			FRED W. M	ATTHEWS	
Geophysical Survey	$\left(\mathbf{E} \right) \qquad \Box \qquad Sh \\ Ch$	ow eck √	SUPERVIS DEPARTM	OR-PROJECTS SEC ENT OF MINES &	TIÔN
Geochemical Survey			WHITNEY	BLOCK	
DATE April 23/	71_SIGNED	in	TORONTO	, ONTARIO	

A STATEMENT

SUBMISSION OF GEOLOGICAL, GEOPHYSICAL AND GEOCHEMICAL SURVEYS

AS ASSESSMENT WORK

In order to simplify the filing of geological, geochemical and ground geophysical surveys for assessment work, the Minister has approved the following procedure under Section 84 (8a) of the Ontario Mining Act. This <u>special provision</u> does not apply to airborne geophysical surveys.

If, in the opinion of the Minister, a ground geophysical survey meets the requirements prescribed for such a survey, including:

- (a) substantial and systematic coverage of each claim
- (b) line spacing not exceeding 400 foot intervals
- (c) stations not exceeding 100 foot intervals or
- (d) the average number of readings per claim not less than 40 readings

it will qualify for a credit of 40 assessment work days for each claim so covered. It will not be necessary for the applicant to furnish any data or breakdown concerning the persons employed in the survey except for the names and addresses of those in charge of the various phases (linecutting contractor, etc.). It will be assumed that the required number of man days were spent in producing the survey to qualify for the specified credit.

Each additional ground geophysical survey using the same grid system and otherwise meeting these requirements will qualify for an assessment work credit of 20 days.

A geological survey using the same grid system, and meeting the requirements for submission of geological surveys for maximum credits will qualify for an assessment work credit of 20 days. If line cutting has not previously been reported with any other survey and is reported in conjunction with the geological survey a credit of 40 days per claim will be allowed for the survey.

Similarly, a geochemical survey using the same grid system with the average number of collected samples per claim being not less than 40 samples, and meeting the requirements for the submission of geochemical surveys for maximum credits, will qualify for an assessment work credit of 20 days. If line cutting has not previously been reported with any other survey and is reported in conjunction with the geochemical survey a credit of 40 days per claim will be allowed for the survey.

Credits for partial coverage or for surveys not meeting requirements for full credit will be granted on a pro-rata basis.

If the credits are reduced for any reason, a fifteen day Notice of Intent will be issued. During this period, the applicant may apply to the Mining Commissioner for relief if his claims are jeopardized for lack of work or, if he wishes, may file with the Department, normal assessment work breakdowns listing the names of the employees and the dates of work. The survey would then be re-assessed to determine if higher credits may be allowed under the provisions of subsections 8 and 9 of section 84 of the Mining Act.

If new breakdowns are not submitted, the Performance and Coverage credits are confirmed to the Mining Recorder at the end of the fifteen days.

ASSESS	SMENT WORK DETAIL	LS	SPECIAL PROVISION OPEDITS
Type of Survey Ele	ectromagnetic		for
As Gil	eparate form is required for eac Llies Limit	h type of survey	PERFORMANCE & COVERAGE
Chief Line CutterJob	hn N. French	••••••••••••••••••••••••••••••••••••••	MINING CLAIMS TRAVERSED
or Contractor	Name Lchford, Ont.		L-263612
Party Chief Dou	Address Iglas Burton		263913
Cot	Name Nalt. Ontario		287014
	Address		
Consultant Ral	lph I. Benner Name		263915
Box	c 208, Cobalt, Ont	tario	263916
Geological field mapping by	Address	·	263917
		Name	263918
		Address	263919
COVERING DATES		1	
Line Cutting August 24	to September 28,	1970	
mus Sent. 3rd to Ser	ot. 29th 1970	<u></u>	263921
Field Instrument	t work, geological mapping, san	npling etc.	part of 268341
Office Sept. 30th to 0	Oct. 7th, 1970		part of 265342
INSTRUMENT DATA			
Make, Model and TypeRo	onka Mk 16 (VLF)		
Scale Constant or Sensitivity	y		
Or provide copy of instrument data f	from Manufacturer's brochure.		
Radiometric Background Co	ount		
Number of Stations Within	Claim Group	1056	
Number of Readings Within	Claim Group	2112	
Number of Miles of Line cut	t Within Claim Group	19.8	
Number of Samples Collecte	ed Within Claim Group		
•	•		TOTAL CLAIMS_12
CREDITS REQUESTED	20 DAYS 40 DA	YS Includes	
Geological Survey	per claim per cla	aim (Line cutting)	Send in Duplicate to:
Geophysical Survey		Show	FRED W. MATTHEWS SUPERVISOR-PROJECTS SECTION
Geochemical Survey		Check /	DEPARTMENT OF MINES & NORTHERN AFFAIRS WHITNEY BLOCK
	Xalla		QUEEN'S PARK
DATE April 23/71 SI	GNED	Inne-	

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If new breakdowns are not submitted, the Performance and Coverage credits are confirmed to the Mining Recorder at the end of the fifteen days. 25 ADELAIDE ST. WEST SUITE 416 TORONTO 1, CANADA

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