NORTHGANE MINERALS LTD.

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Geophysical Report on an Airborne VLF-EM & Magnetometer Survey Cr l - Cr 6 claims, Omenica M.D.

Latitude 54⁰55'N Longitude 125⁰22'W NTS 93 K/14W

AUTHORS: E. Trent Pezzot, B.Sc., Geophysicist

> John S. Vincent, P.Eng., Consulting Geologist

DATE OF WORK: March 11-15, 1982

DATE OF REPORT: April 5, 1982

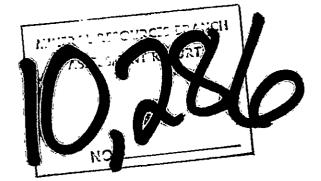


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INTRODUCTION

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On March 13, 1982 Western Geophysical Aero Data Ltd. flew approximately 310 line kilometers of magnetometer and VLF-electromagnetometer survey across the Cr claim group on behalf of Northgane Minerals Ltd. This claim group covers chromite occurrences in ultrabasic rocks which have intruded limestones. This survey was intended to be used as a mapping tool to define boundaries of the ultrabasic rocks and indicate trends in the rocks favorable for further chromite occurrences.

PROPERTY

The Cr claim group is comprised of 69 contiguous claims as described below and illustrated on Figure 1:

NAME	# OF UNITS	RECORD #	RECORD DATE	RECORDED
Cr 1 Cr 2 Cr 3	10 20 15	1714	12 Apr./79	Mar. 5/82 Mar. 5/82
Cr 4 Cr 5 Cr 6	8 6 10	1717 2214	12 Apr./79 20 Oct./79	Mar. 5/82

LOCATION & ACCESS

The claim group is located approximately 100 kilometers northwest of Fort St. James, B.C. on the flank of Mt. Sidney Williams, in the Omenica Mining Division, NTS 93 K/14W. (Figure 1). Approximate geographical co-ordinates are latitude $54^{\circ}55$ 'N and longitude $125^{\circ}22$ 'W.

The area is most readily accessible by helicopter from Ft. St. James although a railroad which follows the Middle River passes within 4 kilometers of the claim group. No ground vehicle access available.

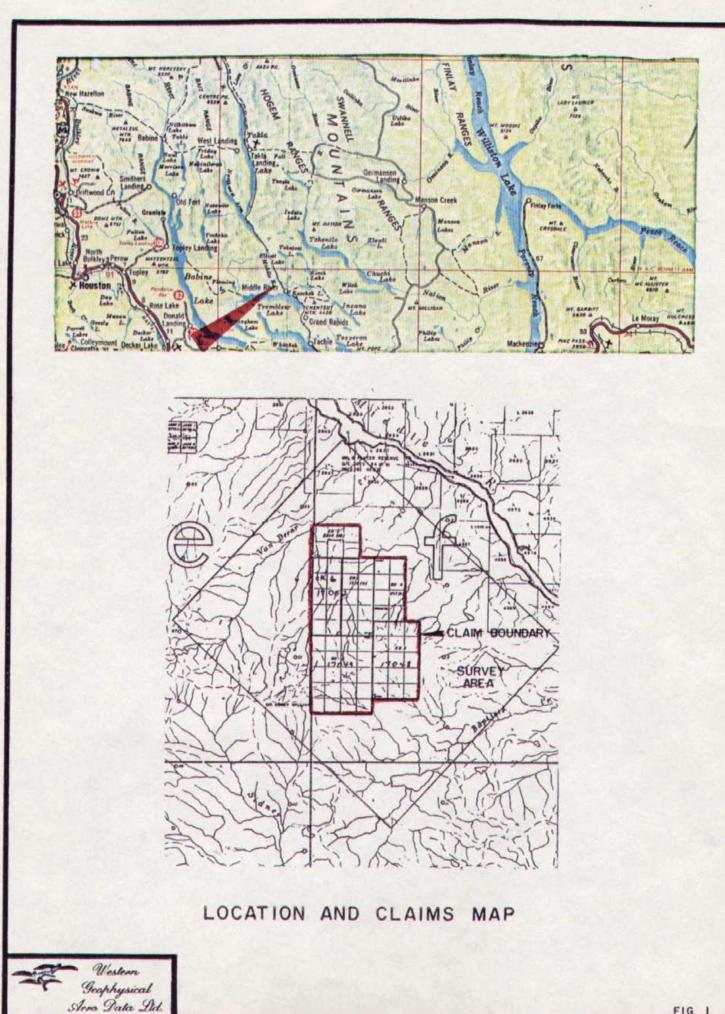


FIG I

LOCAL GEOLOGY

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The claims area is underlain by the Cache Creek formation and invaded by Trembleur ultrabasic intrusions (Plate 1). The Trembleur intrusions consist of peridotites and dunites with minor pyroxenite and gabbroic phases and serpentinized equivalents. During the 1942 field season these ultrabasic masses were prospected for chromite and several deposits were found as flagged on Plate 1 and described below.

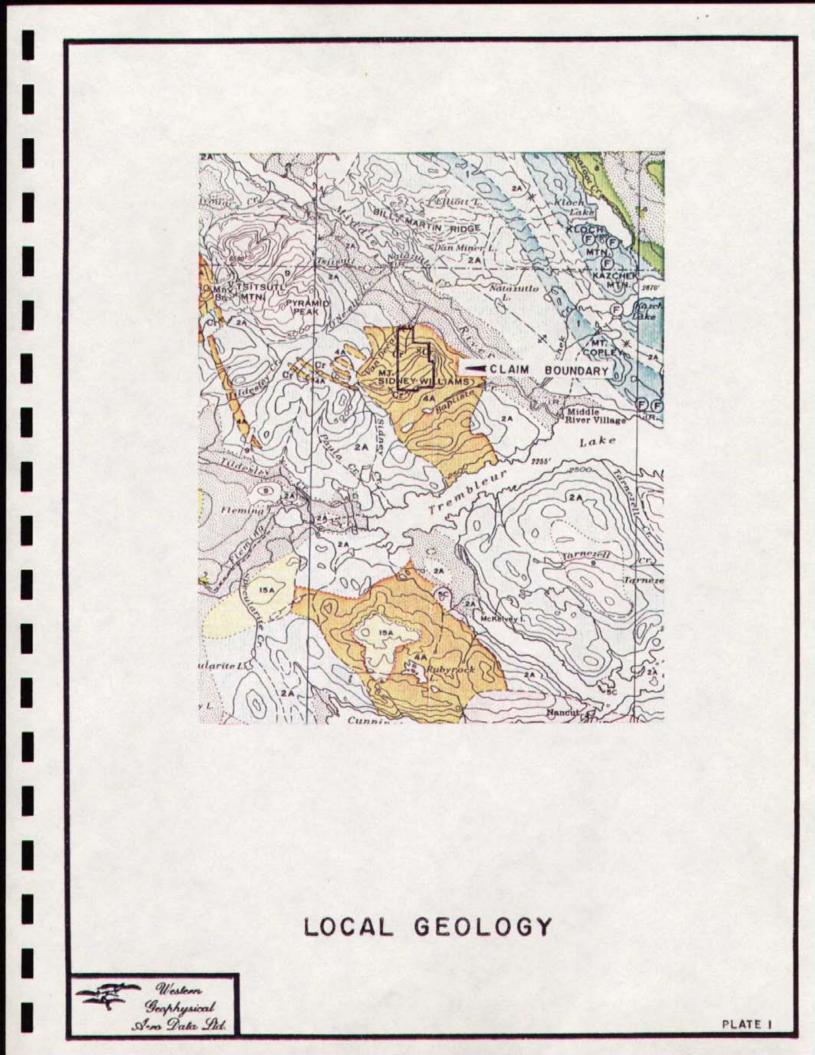
Approximately 2 miles east of Mt. Sidney Williams, on the southeast slope of the long ridge extending to Middle River, a dunite body measuring 30 feet by 280 feet on surface is exposed in the peridotite dunite batholith. The entire body is mineralized, averaging 3% to 5% chromite.

Near the end of this same ridge, approximately 2 miles from Middle River a chromite showing was noted in an area of brown weathering, serpentinized dunite. The best deposit in this area consists of a lens of nearly pure chromite, 8 feet by 5 feet in surface area. A second lens of ore, 65 feet to the west, contains 20% to 30% chromite and the dunite adjoining these lenses contains 2% to 5% chromite.

The Van Decar Creek deposit occurs a mile southeast of the forks of Decar Creek and about 3 miles from Middle River. The chromite occurs as an irregularly shaped lens (5 feet by 25 feet) in serpentinized dunite and contains at least 50% chromite. Disseminated chromite occurs at the south end of this lens and, approximately 1000 feet to the southeast, a small body of dunite contains an average of 10% disseminated chromite.

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PREVIOUS WORK

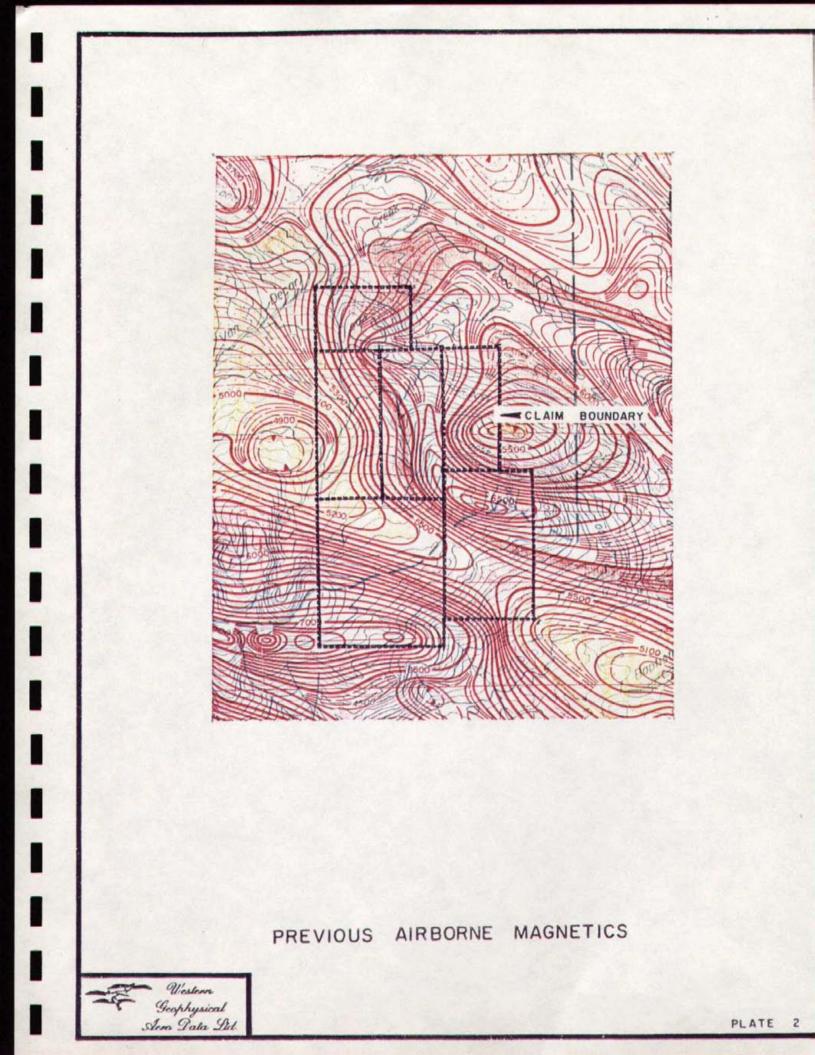
No complete description of previous exploration activity was made available to the authors however it is known that the Geological Survey of Canada sponsored regional geological mapping of the area by J.E. Armstrong and H.W. Little in 1942 (GSC Memoir #252).

Of particular interest to this survey are the results of a high elevation regional airborne magnetometer survey flown in 1967. The results of this survey are illustrated in Plate 2 of this report. Magnetic variations of approximately 2300 gammas were encountered across the claims area on this survey with two major magnetic highs being separated by a northwest trending magnetic low in the southern half of the claim group. Based on these results, the more recent low level survey should be expected to encounter magnetic variations of approximately 5000 gammas across the claim group.

SURVEY GRID

An idealized survey grid composed of 40 northwest-southeast trending lines was established over the claims area with line separations of 200 meters in the northwest section and 400 meters in the southeast section. The actual position of the survey lines as recorded by the video flight path recovery system are illustrated on the magnetic intensity contour map, Figure 2. Some 310 line kilometers were required to cover the survey area.

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AIRBORNE VLF-ELECTROMAGNETIC AND MAGNETIC SURVEY

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This survey system simultaneously monitors and records the output signal from a proton precession magnetometer and two VLF-EM receivers installed in a bird designed to be towed 50 feet below a helicopter. A gimbal and shock mounted TV camera, fixed to the helicopter skid, provides input signal to a video cassette recorder allowing for accurate flight path recovery by correlation between the flight path cassette and air photographs of the survey area. A KING KRA-10A radar altimeter allows the pilot to continually monitor and control terrain clearance along any flight path.

Continuous measurements of the earth's total magnetic field intensity and of the total horizontal VLF-EM field strength of two transmission frequencies are stored in three independent modes: `an analogue strip chart recorder, digital magnetic tapes and a digital video recovery system. A three-pen analogue power recorder provides direct, unfiltered recordings of the three geophysical instrument output signals. A Hewlett-Packard 9875 tape drive system digitally records all information as it is processed through an onboard micro-computer. The magnetic and electromagnetic data is also processed through the onboard micro-computer, incorporating an analogue to digital converter and a character generator, then superimposed along with the date, real time and terrain clearance upon the actual flight path video recording to allow exact correlation between geophysical data and ground location. The continuous input magnetic signal is processed at the maximum A/D converter rate, averaged and updated on the video display every second. Correlation between the strip chart, digital tape and the video flight path recovery tape is controlled via fiducial marks common to all systems. Line identification, flight direction and pertinent survey information are recorded on the audio track of the video recording tape.

DISCUSSION OF RESULTS

I MAGNETOMETER SURVEY

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The results of the 1967, high elevation magnetic survey are illustrated as Plate 2 in this report. Three regional magnetic features are observed across the survey area; two zones of high magnetic intensity separated by a northwest trending low.

The results from this more recent low elevation survey are presented in contour form over a photomosaic base as Figure 2. The same regional trends are observed that were noted in the 1967 survey data however a large number of local variations within the major trends have been delineated. These variations are often quite severe, one to two thousand gammas over short distances, and can be very small in areal extent.

The major magnetic highs are interpretted as areas of ultrabasic rocks at surface and the magnetic lows as areas of limestone cover. No absolute magnetic field intensity value can be determined as a threshold to differentiate between limestone and ultrabasic rocks, however, it appears that the strongest magnetic gradients occur near 58,500 gammas. This contour value can be used as a general guideline when analyzing the magnetic data as a geological mapping tool.

The major magnetic low separating the magnetic highs is very wide in the northwest section (line 3 to line 30) and southeast section (line 15 to line 33) of the map area. It narrows dramatically in the centre of the grid, across the claims area, and likely reflects a narrow bridge of nearsurface ultrabasic rocks which connect the two major high magnetic trends. A number of isolated magnetic highs of varying size are noted within this regional low. Many of these anomalies are present in the northwest area, on line 7 at 12: 29:45 (Figure 3) and a larger anomaly which extends from line 7 through 11 (Figure 4). In addition, an anomaly located on the northwest ends of lines 24 through 29 is considered open

to the northwest.

A large magnetic high is located in the centre of the southeastern portion of the regional low. This anomaly is approximately 2 kilometers across (line 23 to line 31) and irregular in shape. It appears to split the regional low in two with the major thrust of the low extending off the ends of lines 15 through 27 and a more narrow low trending northeast from line 40.

In the central area of the grid, where the major magnetic low narrows, three small, closed magnetic highs are observed. The most reliable anomaly occurs across three lines (15, 16, 17 - Figure 5). Two other anomalies occur on single lines, 21 and 23 as shown on Figure 2.

Four occurrences of chromite mineralization are flagged by the GSC (Plate 1) in the area of the Cr claims. These occurrences have been transferred to the magnetic contour map, Figure 2, however the scale (1:380,160) of Plate 1 allows for only approximate positioning. Three of the four chromite occurrences correlate with high magnetic anomalies. The occurrence on the east slope of Mt. Sidney Williams ties to line 1 at time 11:31:50 (Figure 6). This is near the centre of a magnetic high approximately 500 meters across and open to the southwest. The occurrence midway between lines 7 and 9 is located on the edge of a large, irregularly shaped magnetic high which makes up part of the regional magnetic anomaly in this area. This same magnetic environment extends to the north on claim Cr 2. A third chromite occurrence is located on line 26 at time 15:42:45. This location correlates with a localized high along the edge of major magnetic anomaly (line 29, Figure 7). This zone extends 2 kilometers to the northwest and exhibits more localized highs of similar amplitude along its' length. The fourth chromite occurrence is located within the large magnetic low (line 20 at 16:04: 55).

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Insufficient information concerning the geology of these chromite deposits is known to explain the absence of a magnetic anomaly near the fourth chromite occurrence. A simple explanation could be that the deposit is very small and can not be detected from the air.

A compilation map has been constructed to illustrate a possible interpretation based upon the results of this latest survey. Figure 8(a) delineates the regional magnetic trends defined by the 1967 high elevation survey. Figure 8(b) overlays this base and delineates an interpretted outline of the ultrabasic mass. This outline is based primarily on the 58, 500 gamma total field intensity contour measured by the recent low level magnetometer survey. Figure 8(c) delineates areas of significantly higher magnetic field intensity within the interpretted ultrabasics. These responses may reflect zones of increased serpentinization. A study of chromite occurrences in the Cordillera demonstrates a close relationship between the development of podiform massive chromite mineralization and the process of serpentinization. This is often accompanied by the formation of magnetite and an associated increase in relative magnetic intensity. Thus the areas outlined in Figure 8(c) can be considered as priority follow-up locations for this type of mineralization.

II VLF-ELECTROMAGNETOMETER SURVEY

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The VLF-EM system employed measures a relative intensity of the electromagnetic field in the horizontal plane for two transmission frequencies. The system is very sensitive to surface or very near surface conductivity features but has very limited depth penetration.

All the VLF-EM anomalies observed across this survey were very weak. Most can be seen on the video flight path and data recovery tape to originate from small streams and swamps. In addition many topographic ridges appear to generate VLF-EM anomalies because of the change in the electro-

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magnetic field orientation at these locations.

None of the VLF-EM anomalies observed are interpretted as resulting from conductive geological units. There were also no field strength changes which paralleled the magnetically defined contacts between limestone and ultrabasic rocks.

SUMMARY AND RECOMMENDATIONS

In March, 1982, 310 line kilometers of low level airborne magnetometer and VLF-electromagnetometer survey were flown across the Cr claim group on behalf of Northgane Minerals Ltd. The survey was flown with the intent of detecting and delineating any zones of ultrabasic rocks in the area.

The regional magnetic lineaments in the area strike northwest and define three major magnetic features; two zones of high magnetic intensity separated by a prominent northwest trending low. Based on limited geological information the magnetic highs are interpretted as areas of ultrabasic rock and the magnetic low as an area of limestone cover. A number of localized magnetic anomalies have been delineated which are also interpreted as reflections of the ultrabasic rocks.

The magnetic contour map, Figure 2, should be used as a general guide to direct future exploration activity to areas with ultrabasic rocks at the surface. No exact geological contacts can be determined on the basis of this survey however reliable estimates are possible. If a lack of geological outcrop hinders prospecting a ground magnetometer survey would likely delineate more precisely the limestone-ultrabasic contacts.

Particular interest should be afforded to the areas of very high magnetic intensity within the larger magnetic highs. Whereas the regional magnetic highs are believed to outline the peridotite and dunite batholith, these high intensity areas are likely reflecting serpentinized phases within the

intrusive. A direct relationship between massive, podiform chromite occurrences and serpentinization is well documentated in both Canada and the United States in the Cordillera rocks, and three of the four chromite occurrences noted in the Cr claims area are associated with high intensity magnetic values. Surface geological mapping and prospecting of these areas are warranted as the next exploration phase.

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Respectfully submitted,

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E. Trent Pezzot, B.Sc., Geophysicist

John S. Vincent, B.Sc., P.Bngt, Consulting GeologistINCENT BRITISH Cumel NGINEER

INSTRUMENT SPECIFICATIONS

BARRINGER AIRBORNE MAGNETOMETER

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MODEL:	Nimbin M-123
TYPE:	Proton Precession
RANGE:	20,000 to 100,000 gammas
ACCURACY:	\pm l gamma at 24 V d.c.
SENSITIVITY:	l gamma throughout range
CYCLE RATES:	Υ.
Continuous	0.6, 0.8, 1.2 and 1.9 seconds
Automatic	2 seconds to 99 minutes in 1 second steps
Manual	Pushbutton single cycling at 1.9 seconds
External	Actuated by a 2.5 to 12 volt pulse longer than 1 millisecond.
OUTPUTS:	•
Analogue	0 to 99 gammas or 0 to 990 gammas - automatic stepping
Visual	5 digit numeric display directly in gammas
EXTERNAL OUTPUTS:	
Analogue	2 channels, 0 to 99 gammas or 0 to 990 gammas at 1 m.a. or 1 volt full scale deflection.
Digital	BCD 1, 2, 4, 8 code, TTL compatible.
SIZE:	Instrument set in console 30 cm X 10 cm X 25 cm
WEIGHT:	3.5 Kg
POWER	
REQUIREMENTS :	12 to 30 volts dc, 60 to 200 milliamps maximum.
DETECTOR:	Noise cancelling torroidal coil installed in airfoil.

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Instrument Specifications

SABRE AIRBORNE VLF SYSTEM

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Source of Primary Field	: VLF radio stations in the frequency range of 14 KH _z to 30 KH _z .
Type of Measurement:	- Horizontal field strength
Number of Channels:	- Two; Seattle, Washington at 18.6 KH $_{z}$
	- Annapolis, Maryland at 21.4 KH
Type of Sensor:	- Two ferrite antennae arrays, one for each channel, mounted in magnetometer bird.
Output: .	- 0 - 100 mV displayed on two analogue meters (one for each channel)
-	- recorder output posts mounted on rear of instrument panel
Power Supply: -	- Eight alkaline 'AA' cells in main instrument case (life 100 hours)
-	- Two 9-volt alkaline transistor batteries in bird (life 300 hours)
Instrument Console: -	- Dimensions - 30 cm x 10 cm x 25 cm
-	- Weight - 3.5 Kg.

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INSTRUMENT SPECIFICATIONS

FLIGHT PATH RECOVERY SYSTEM

· i) T.V. Camera

ii) Video Recorder

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iii) <u>Altimeter</u>

INSTRUMENT SPECIFICATIONS

DATA RECORDING SYSTEM

i) Chart Recorder

Esterline Angus Miniservo III Bench AC Ammeter -Type: Voltmeter Power Recorder MS 413 B Model: Specification: S-22719, 3-pen servo recorder Three independent isolated DC amplifiers Amplifiers: (1 per channel) providing range of acceptable input signals 10 cm calibrated width 2-fold chart Chart: Chart Drive: Multispeed stepper motor chart drive, Type D850, with speeds of 2, 5, 10, 15, 30 and 60 cm/hr. and cm/min. Controls: Separate front mounted slide switches for power on-off, chart drive on-off, chart speed cm/hr - cm/min. Six position chart speed selector. Individual front zero controls for each channel. Power Requirements: 115/230 volts AC at 50/60 Hz (Approximately 30 VA) Writing System: Disposable fibre tipped ink cartridge (variable colors) Dimensions: 38.6 cm X 16.5 cm X 43.2 cm Weight: 9.3 Kg

ii) <u>Digital Video Recording</u> System

Type: L.M. Microcontrols Ltd. Microprocessor Control Data Acquisition System Model: DADG - 68 Power Requirements: 10-14 volts dc, Maximum 2 amps Input Signal: 3, 0-100 mvolt dc signals 1, 0-25 volt dc signal Microprocessor: Motorola MC-6800 CRT Controller: Motorola MC-6845 Character Generator: Motorola MCM-6670 Analogue/Digital Convertor: Intersil 7109 Multiplexer: Intersil IH 6208 Digital Clock: National MM 5318 chip 9 volt internal rechargeable nicklecadmium battery Fiducial Generator: Internally variable time set controls relay contact and audio output Dimensions: 30 cm X 30 cm X 13 cm Weight: 3 Kq

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DATA RECORDING SYSTEM (CON'T)

iii) Digital Magnetic Tape

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Type: Hewlett Packard cartridge tape unit Model: 9875A Power Requirements: 24 volt d.c. Data Format: HP's Standard Interchange Format (SIF) Tape Cartridge: HP 98200A 225K byte cartridge compatible with HP Series 9800 desktop computers. Tape Drive: Dual tape drives providing up to 8 hours continual recording time. Controller: Internal micro-computer provides 23 built in commands. : External computer generated commands.

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COST BREAKDOWN

PERSONNEL	PRODUCTION	DATES	RATE/DAY	SUBTOTAL
J. Behenna	Photomosaic Const.	Feb. 15-17	\$150.00	\$ 450.
J. Behenna	Survey Preparation	Mar. 2-5	\$150.00	\$ 600.
T. Pezzot	Survey Preparation	Mar. 8	\$250.00	\$ 250.
J. Behenna/ J. Harrington	Mobilization	Mar. 11-12	\$450.00	\$ 900.
J. Behenna/ J. Harrington	Survey	Mar. 13	\$450.00	\$ 450.
J. Behenna/ J. Harrington	Demobilization	Mar. 14-15	\$450.00	\$ 900.
J. Behenna	Flight Path Recovery	Mar. 19-31	\$150.00	\$1,350.
T. Pezzot	Data Recovery	Mar. 30-31	\$250.00	<u>\$</u> 500.
Vehicle Rental Meals & Accomma Airphotography Photographics Drafting Reproduction & Materials Interpretation	odation Binding & Report			\$ 3,241. \$ 450. \$ 500. \$ 24. \$ 350. \$ 300. \$ 110. \$ 125. \$ 1,000.
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Total \$12,500.

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STATEMENT OF QUALIFICATIONS

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NAME: PEZZOT, E. Trent

PROFESSION: Geophysicist - Geologist

EDUCATION: University of Brisish Columbia -B.Sc. - Honors Geophysics and Geology

PROFESSIONAL

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j. F ASSOCIATIONS: Society of Exploration Geophysicists

EXPERIENCE: Three years undergraduate work in geology - Geological Survey of Canada, consultants.

> Three years Petroleum Geophysicist, Senior Grade, Amoco Canada Petroleum Co. Ltd.

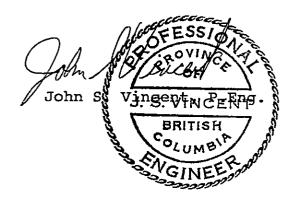
Two years consulting geophysicist, Consulting geologist - B.C., Alberta, Saskatchewan, N.W.T., Yukon, western U.S.A.

Two years geophysicist with Glen E. White Geophysical Consulting & Services Ltd.

CERTIFICATE

I, John S. Vincent, DO HEREBY CERTIFY:

- 1. That I am a consulting geologist resident at 4859 12A Ave., Delta, B.C., V4M 2B6.
- 2. That I am a graduate of Queen's University in Geological Sciences, B.Sc. - 1959; and of McGill University, M.Sc. - 1962.
- 3. That I am a Registered Professional Engineer (Geological) in the Association of Professional Engineers of the Province of British Columbia.
- 4. That I am a Fellow of the Geological Association of Canada, and a member of the Canadian Institute of Mining and Metallurgy.
- 5. That I have practiced my profession as a geologist for the past twenty-two years.

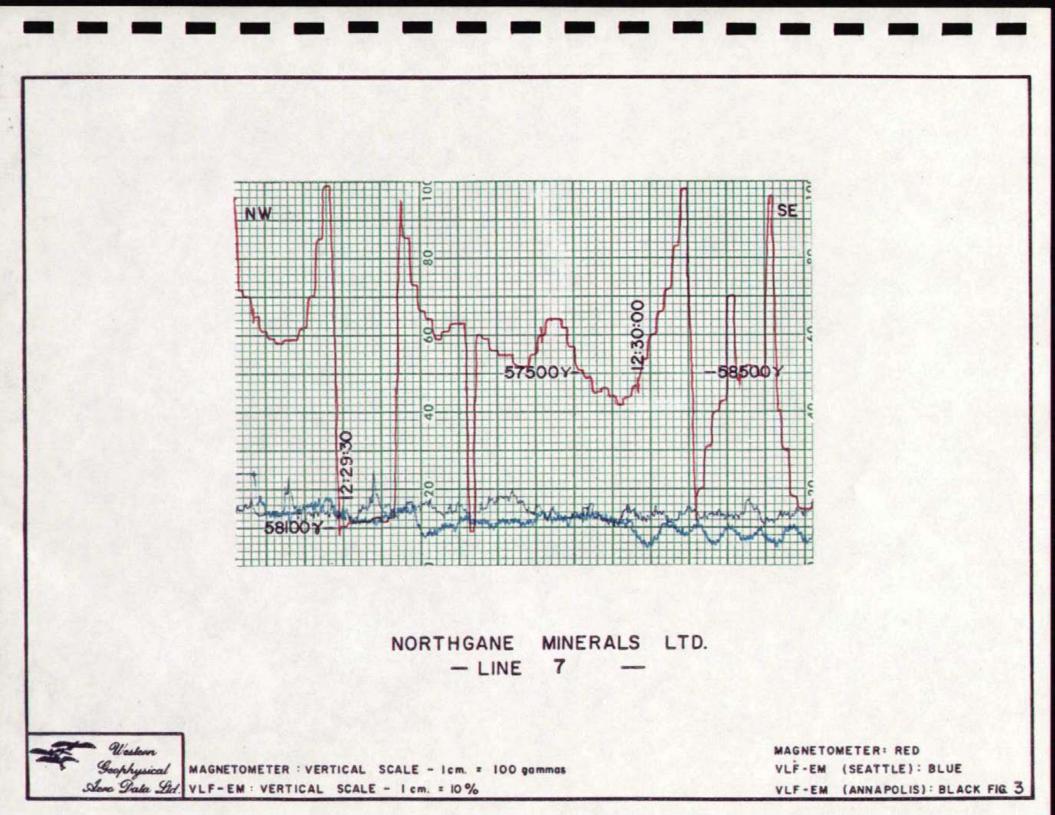


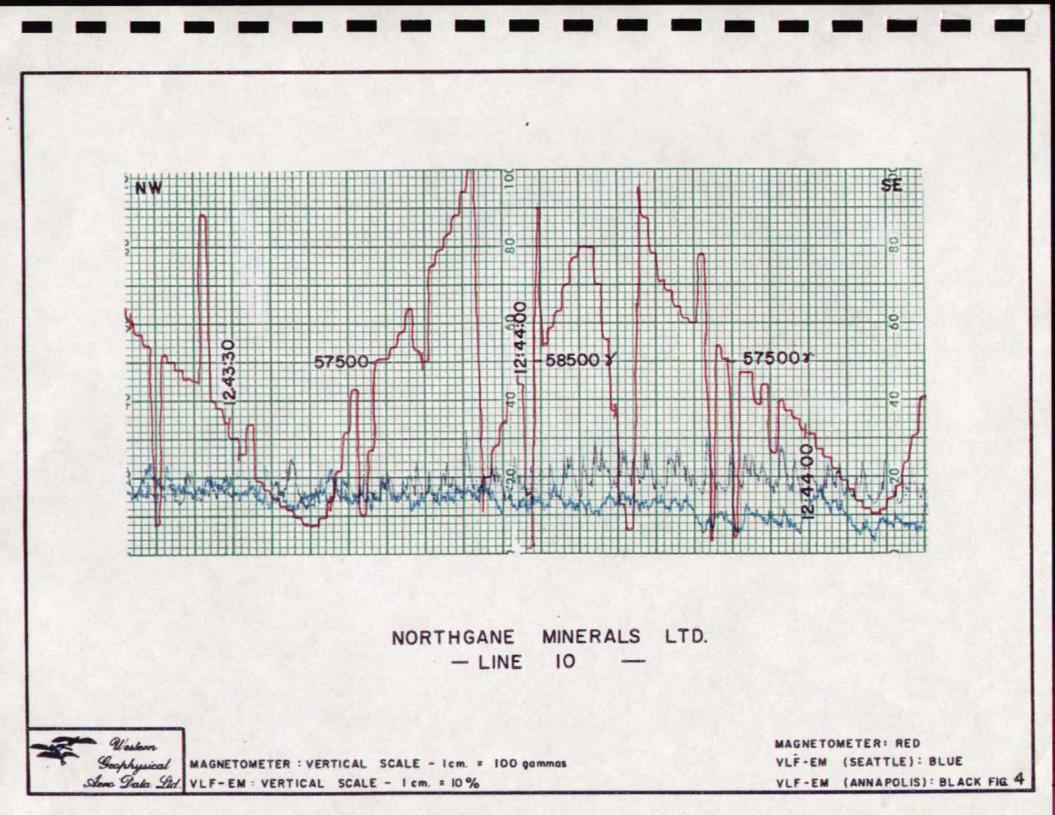
Richmond, B.C.

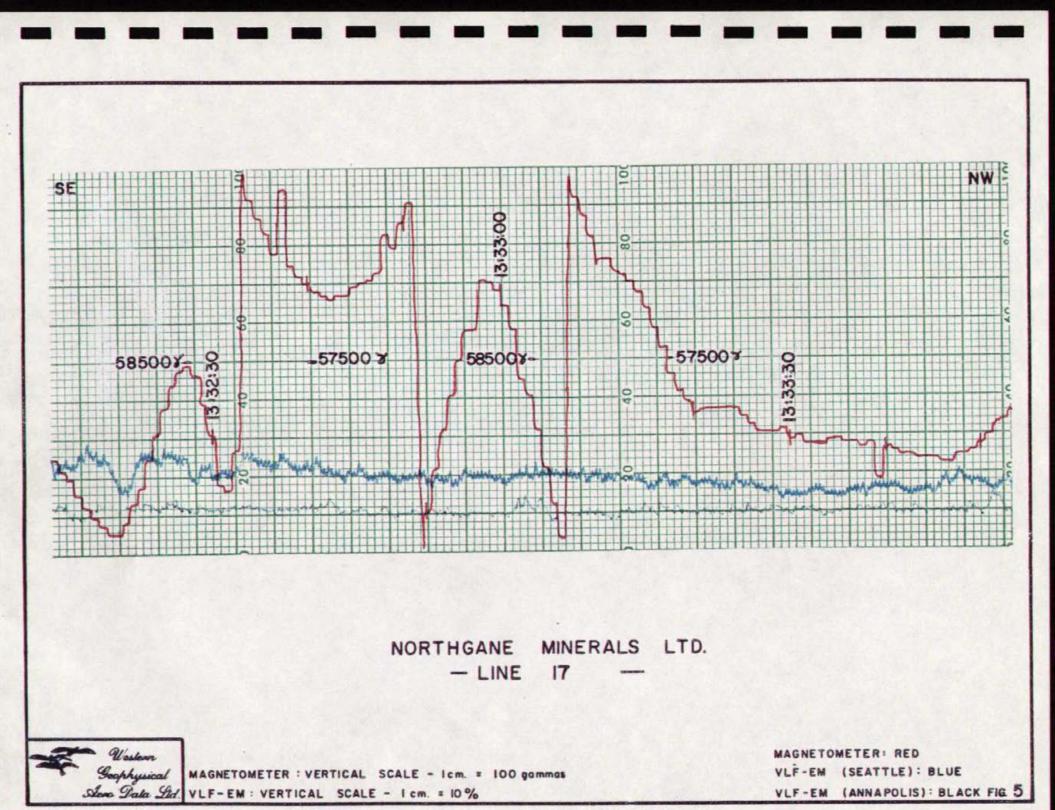
April 05, 1982.

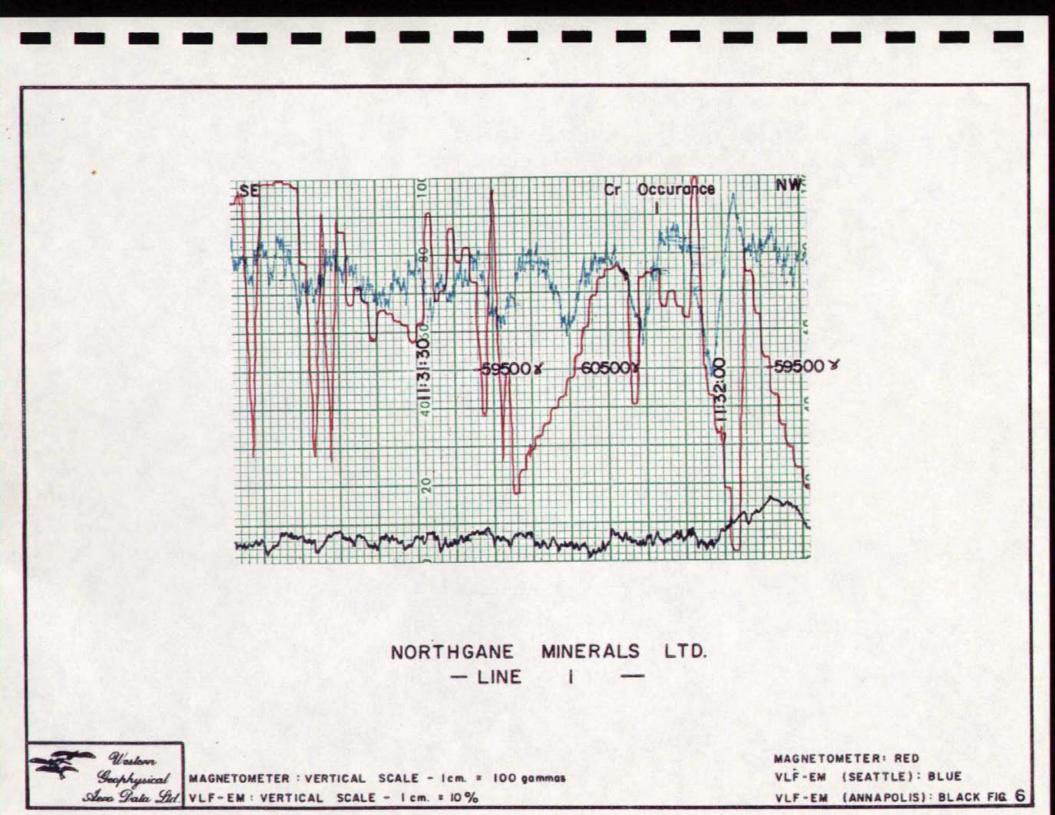
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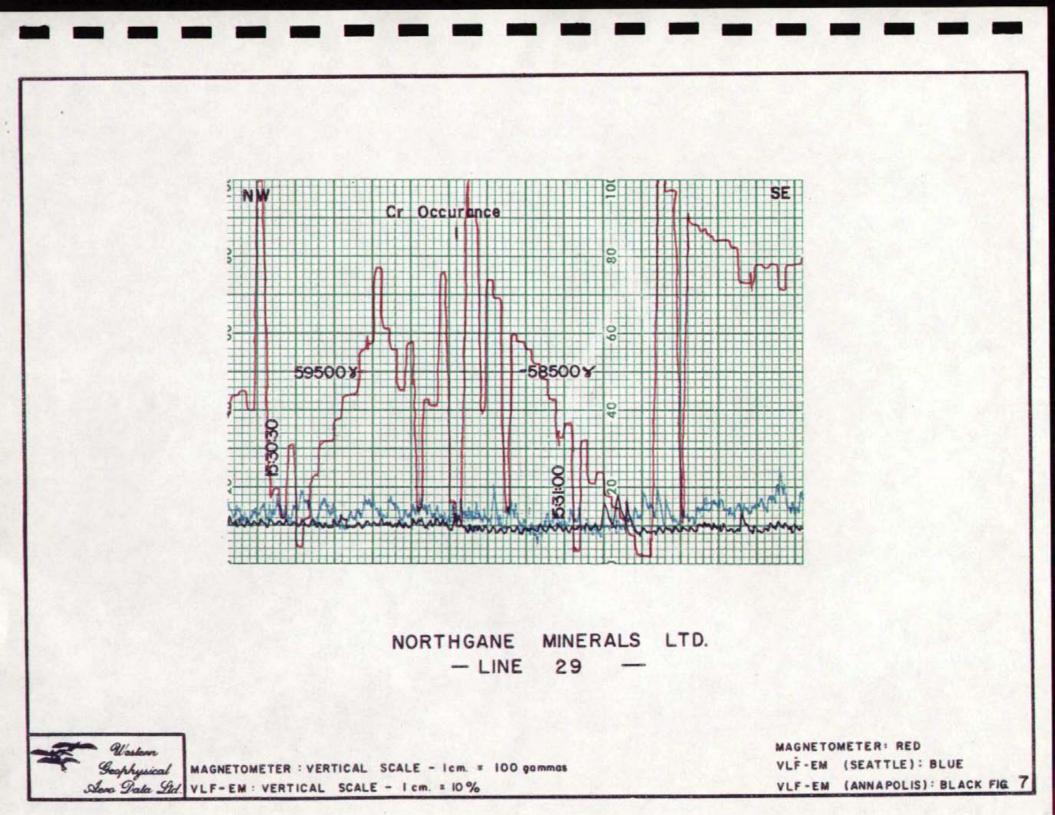
17

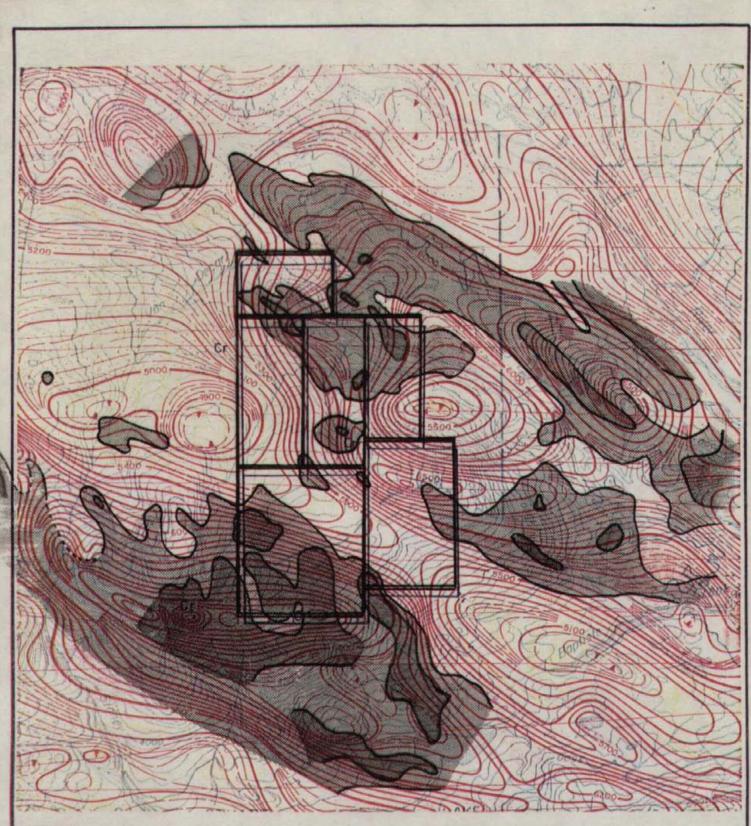














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Interpretted Outline of Ultrabasic Mass Low Level Survey

Areas of High Magnetic Intensity

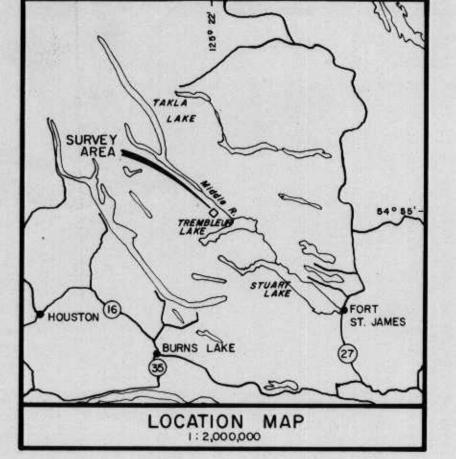
NORTHGANE MINERALS LTD. - Cr CLAIMS-INTERPRETATION MAP

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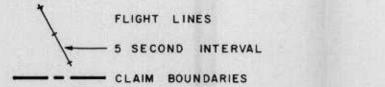
FIG. 80,6 €







LEGEND:



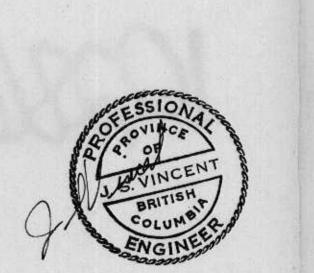
57100 TOTAL FIELD MAGNETIC INTENSITY CONTOURS - gommos

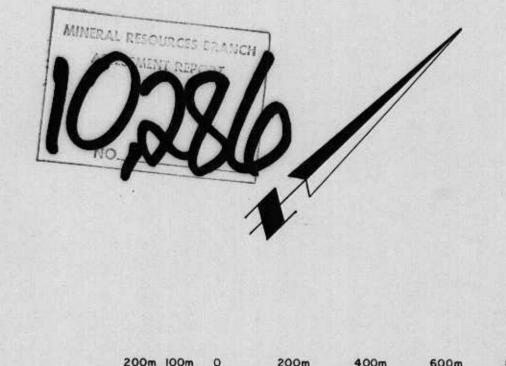
Cr * KNOWN CHROMITE OCCURRANCE (APPROXIMATE LOCATION)

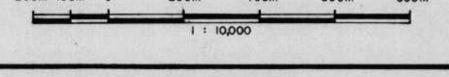
INSTRUMENTS:

BARRINGER MAGNETOMETER: NIMBIN 123 SABRE AIRBORNE VLF-ELECTROMAGNETOMETER 1) SEATTLE, WASHINGTON - 24.8 Khz. 11) ANNAPOLIS, MARYLAND - 21.4 Khz.

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MAGNETIC INTENSITY CONTOUR MAP

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Geoflysical Acro Data Ltd.

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Interpreted By: E.T.P. Drawn By: N.L.P. Checked By: E.T.P. Date: APR./81 Fig. No.: 2