86-394 - 14992

QL 4, 2 Owner: D. Stecyk Operator: BROHM RESOURCES INC. GEOPHYSICAL REPORT ON A AIRBORNE VLF-EM AND MAGNETOMETER SURVEY INDIAN GOLD 3 & 4 CLAIMS LIARD MINING DIVISION LAT. 57°28'N, LONG. 127°29'W, NTS 94E/6W, 94E/5E AUTHORS: E. Trent Pezzot, B.Sc. GEOPHYSICIST GLEN E. WHITE, B.Sc., P.Eng. CONSULTING GEOPHYSICIST DATE OF WORK: March 13-14, 1986 DATE OF REPORT: July 22, 1986 FILMED GEOLOGICAL BRANCH ASSESSMENT REPORT WESTERN GEOPHYSICAL AERO DATA LTD.

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FIGURE 1 - Location and Claims Map
FIGURE 2 - Magnetic Intensity Contour Map
FIGURE 3 - VLF-EM Profiles (Seattle)
FIGURE 4 - VLF-EM Profiles (Annapolis)

PLATE 1 - General Geology PLATE 2 - Magnetic Response Examples PLATE 3 - Sample Location Map

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INTRODUCTION

A regional program, totalling over 10,000 line kilometres of airborne magnetometer and VLF-electromagnetometer surveying, was conducted across the Toodoggone Gold Belt area in early 1986. Western Geophysical Aero Data Ltd. was commissioned by Brohm Resources Ltd. to recover and examine in detail the data gathered across the Indian Gold 3 and 4 claims.

These claims are located approximately 4 kilometres west of the Thesis gold deposits (Energex Minerals Ltd). The geology of the area is essentially unknown due to extensive overburden in the area. It was the intention of this survey to assist the geological mapping and direct ground exploration to the more favourable areas.

A limited amount of geological mapping and soil and silt sampling of the claims was conducted by Ellen Lambert in Sept, 1985. The results of this study are included in this report.

PROPERTY

The Indian Gold 3 and 4 mineral claims are comprised of 40 contiguous units covering approximately 2,400 acres as described below and illustrated on Figure 1.

CLAIM NAME	RECORD NO. UNITS		EXPIRY DATE	
Indian Gold 3	3323	20	April 29, 198	6
Indian Gold 4	3324	20	April 29, 198	6

LOCATION AND ACCESS

The Toodoggone River area is located approximately 280 kilometres north of Smithers B.C. The Indian Gold 3 and 4 claims are situated on immediately south of Moyez Creek, some 5 kilometres east of the Stikine River and 4 kilometres

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west of the Thesis II and III gold deposits. They lie within NTS 94E/6W and the Liard Mining Division. Approximate geographical co-ordinates of the centre of the claim group are latitude 57°28'N and longitude 127°29'W (see Figure 1).

Access to the area is by fixed wing aircraft from Smithers to the Sturdee River airstrip (35 km southeast of the Indian Gold claims) or to many of the larger lakes in the area. Historically, a number of helicopter companies have established summer bases at the Sturdee River airstrip and are available for casual charter to nearby properties.

GENERAL GEOLOGY

The claim group lies within what is often termed the Toodoggone River epithermal precious metal district which is mapped as a 20 kilometer wide belt of volcanic, sedimentary and intrusive rocks extending from McConnell Creek to the Stikine River. Permian age limestones, argillites and cherts of the Asitka group are the oldest rocks in the area and normally are in fault contact with Takla volcanic rocks of Upper Triassic age. Lower Jurassic Toodoggone volcanics, consisting predominantly of subaerial dacite, latite, trachyte and rhyotite pyroclastics, unconformably overlie the Takla group. These rocks are bordered to the east by the Hazelton Group, consisting of intermediate volcanic conglomerate, breccia, lakas and feldspar porphyry dikes and sills. The Hazelton Group ranges from Lower to Upper Jurassic age and may include members of the Toodoggone Group. Acid to intermediate stocks and plugs intrude many of the sedimentary and volcanic rocks of the area.

Epithermal deposits are the most common type of precious metal mineralization in the area and are predominantly associated with the Toodoggone volcanics. They occur as massive quartz veins or as slicified and amenthystine breccia zones generally close to major northwest faults and associated with siliceous volcanic centres, exhalative vents and zones of alteration within the Triassic and Jurassic volcanics. Vein minerals are acanthite, pyrite, electrum, chalcopyrite, native gold, sphalerite and galena and grades range from 0.1 to 1.0 oz/T Au and 1.0 to 20.0 oz/T Ag.

LOCAL GEOLOGY

The British Columbia Department of Mines Preliminary Map #61 by Diakow, Panteleyev and Schroeder, 1985 is the most recently published geological map pertaining to the Indian Gold 3 and 4 claim area. This map shows the claim area to be covered by unconsolidate till and alluvium in all but the immediate vicinity of Moyez Creek. Outcrop along the Creek is mapped as undivided Toodoggone volcanics.

PREVIOUS WORK

One document detailing previous work on the Indian Gold 3 and 4 claims was made available to the authors. It is a geological report by Colin Hardvel, B.Sc., F.G.A.C., dated Sept. 20, 1985. This report reviews the general geological setting of the claims area and compares it with the environment of the mineralization observed on the properties immediately to the east.

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AIRBORNE VLF-ELECTROMAGNETIC AND MAGNETIC SURVEY

This survey 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 100 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 recording to correlation video allow exact between geophysical data and ground location. The input signals are 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.

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DATA PROCESSING

Field data is digitally recorded, with the time of day fiducial, on magnetic cassettes in a format compatible with the Hewlett-Packard 9845 computer. The recovered flight path locations are digitized and the field data is processed to produce plan maps of each of the parameters. A variety of formats are available in which to display this data.

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Total field intensity magnetic information is routinely edited for noise spikes and corrected for any diurnal variations recorded on a base magnetometer located in the survey area.

Total field intensity VLF-EM signals are sensitive to topographic changes and sensor oscillation. Oscillation effects can be reduced by filters tuned to the dominant period. Long period effects attributable to topography can be removed by high pass filtering the planimetric data.

DISCUSSION OF RESULTS I) GEOLOGICAL REPORT ON INDIAN GOLD CLAIMS 3 AND 4 BY ELLEN LAMBERT

During the period of September 16 through September 19, 1986, Ray Cournoyer, Ron Himmelright and Ellen Lambert completed 4 days of assessment work on Indian Gold claims 3 and 4 for Wayne McClay of Brohm Petroleum. The work consisted of collecting rock samples from existing outcrops, silt samples from streams and soil samples from glacially covered regions.

The area consists of low relief, on the order of 180 m total relief for the two claims; hence, the majority of the property is covered with glacial overburden and swamp. Glacial ovrburden on Indian Gold 4 is estimated to be approximately 20-40 m thick, as evidenced along Moyez Creek where the overburden is easily seen overlying bedrock. The only samples taken in this region are soil and silt samples whose chemistry may or may not reflect the nature of the underlying bedrock. No samples were taken in the swampy regions of the claims.

The only outcrop exposures occur on Indian Gold 3 along the Moyez Creek. Exposures extend from the northern E-W claim line (separating Indian Gold 1 & 2 from 3 & 4) 1500 m to the southwest before the swamp is reached and the low hills confining Moyez Creek become glacial gravels only. The outcrops vary in height from only a few meters to tens of meters and invariably consist of Toodoggone volcanics. The volcanics are marcon-red to orange-brown in color varying in lithology from agglomerate to crystal-lithic tuff. Some minor flows may also be present. In all cases there is a predominance of white-to orange plagioclase crystals with a lesser abundance of hornblende and/or biotite. The volcanics fresh with only minor, are very local Stringers of calcite plus a bright orange zeolitization. VESTERN GEOPHYSICAL AERO DATA LTD. 🗕

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zeolite (heulandite?) are locally abundant as fracture fillings. The rocks are not metamorphosed or deformed to any noticeable extent, except for the presence of jointing. Only one small outcrop was found where the rocks were highly fractured with abundant, contorted calcite-plus-zeolite veining (sample EL85-64). The veins average about 1-3 mm in width at this outcrop. Calcite veins elsewhere never exceed 2 cm in width and are generally 3-5 mm.

Included as Plate 3 is a sample location map of Indian Gold 4 and most of 3 (maps were not available for the rest of 3). It should be noted that the E-W baseline is approximately 250 m north of where it is drawn on the map, and is so indicated in blue ink.

Finally, if further work on these claims is so desired, it is suggested that the northeast corner on **Indian Gold 4** may be the best location. Here the glacial overburden may be at its minimum on this property, and known mineralization in the Albert's Hump region may extend onto **Indian Gold 4** under the glacial overburden.



DISCUSSION OF RESULTS II AIRBORNE SURVEY

The Brohm Resources Inc. claim block was surveyed from March 13 to march 14, 1986 inclusive and 115 line kilometers of magnetic and VLF-electromagnetic data have been examined to evaluate the property. Survey lines were flown in an east-west direction on 200 metre centres with data being digitally recorded at one second intervals, providing an average station spacing of 25 metres. The geophysical sensors maintained a terrain clearance of approximately 60 metres. The magnetic data is presented in contour form as Figure 2 of this report and the VLF-EM data in profile format as Figures 3 and 4 corresponding to the Seattle and Annapolis frequencies respectively.

This survey was flown as part of a regional package covering the Toodoggone Gold Belt from the Finlay River northwest to the Chuckachida River. Over 10,000 line kilometers of data was gathered to assist the mapping of the area as well as to locate specific targets for ground exploration.

Two distinctive magnetic signatures are observed within this geological environment. Firstly, Jurassic intrusives appear as magnetic highs; typically with an intensity of greater than 59,300 nT. Secondly, faults and shear zones appear as linear magnetic lows, generally with intensities of less than 58,600 nT, and often located along the flanks of intrusive bodies. The two major rock types of the area are the upper Triassic Takla Group and the lower to middle Jurassic Toodoggone Volcanics. The magnetic intensities mapped do not differentiate between these two units.

Regional magnetic lineations in the Toodoggone Gold Belt are

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mirroring the northwesterly, dominant geological The area of the Indian Gold orientation. claims is anomalous in that it reflects a small pocket of relatively quiet magnetic activity. Furthermore, the magnetic field in this area is aligned to the east-northeast and a gentle gradient of decreasing magnetic intensity to the southeast is observed. This response is generated by and centred about a major northeasterly trending magnetic low which crosses the southeast corner of the Indian Gold 4 claim. This trend crosses local topography and continues off the map (Figure 2) as far as the Thesis II and III deposit areas. This anomaly is interpretted as reflecting a major fault zone as delineated on Figure 2.

The magnetic response to three of the larger epithermal precious metal deposits discovered in the area, Baker mine, Lawyers and Thesis II and III are illustrated on Plate 2 of this report. At these locations, precious metals have been found within linear magnetic lows flanking distinct magnetic highs. The magnetic highs are interpretted as reflecting Jurassic intrusives and the magnetic lows as fault or shear zones. No similar magnetic features are observed within the subject property.

The VLF-EM data is presented as profiles on Figures 3 and 4. Both the Seattle and Annapolis frequency data are extremely quiet, indicating a thick and uniformly conductive blanket of overburden. The strongest anomalies observed correlate with Moyez Creek (line 3099) and a small lake (line 3096). A couple of very weak (less than 4% amplitude) conductivity lineations are observed in the Annapolis frequency data. These trends may be tracking basement lineations but are too weak to be reliably interpretted.

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SUMMARY AND CONCLUSIONS

The area of the Indian Gold 3 and 4 claims was included as part of a regional airborne magnetometer and VLF-electromagnetometer survey conducted in the Toodoggone Gold Belt area. One hundred and fifteen line kilometers of data was recovered and examined in detail on behalf of Brohm Resources Inc. to evaluate these claims.

The magnetic and electromagnetic data both suggest the claims are underlain by Toodoggone volcanics which are covered by a relatively thick blanket of overburden.

A northeasterly trending magnetic low crosses the southeast corner of the Indian Gold 4 claim and is interpretted as reflecting a major fault zone.

No magnetic evidence of Jurassic intrusive activity, similiar to that observed in the vicinity of the Thesis, Lawyers and Baker deposits is observed on the Indian Gold 3 and 4 claims.

RECOMMENDATIONS

Based on the results of the airborne survey, the potential for either massive sulphide or Thesis, Lawyers or Baker type precious metal deposits on the Indian Gold 3 and 4 claims is considered very low.

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Any future exploration of these properties should not be directed towards these targets.

Respectfully submitted

E. Trent Pezzot, B.Sc.



Glen E. B.Sc., P.Eng.

Consulting Geophysicist

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BARRINGER AIRBORNE MAGNETOMETER

MODEL:		Nimbin M-123
TYPE:		Proton Precession
RANGE:		20,000 to 100,000 gammas
ACCURACY:		\pm 1 gamma at 24 V d.c.
SENSITIVITY:		1 gamma throughout range
CYCLE RATES:		
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 OUTPUT	rs:	
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 air foil.

SABRE AIRBORNE VLF SYSTEM

Source of Primary Field:	-VLF radio stations in the
	frequency range of 14 KHz to 30 KHz
Type of Measurement:	-Horizontal field strength
Number of Channels:	Two;
	Seattle, Washington at 24.8 KHz
	Annapolis, Maryland at 21.4 KHz
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 300 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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FLIGHT PATH RECOVERY SYSTEM

i) <u>T.V. Camera:</u>

Model:	RCA TC2055 Vidicon
Power Supply:	12 volt DC
Lens:	variable, selected on basis of
	expected terrain clearance.
Mounting:	Gimbal and shock mounted in
	housing, mounted on helicopter
	skid.

ii) <u>Video Recorder:</u>

Model:	Sony SLO-340
Power Supply:	12 volt DC / 120 volt AC (60Hz)
Tape:	Betamax 1/2" video cassette - optional length.
Dimensions:	30 cm X 13 cm X 35 cm
Weight:	8.8 Kg
Audio Input:	Microphone in - 60 db low impedance microphone
Video Input:	1.0 volt P-P, 75Ω unbalanced, sync negative from camera.

iii) Altimeter:

Model:	KING KRA-10A Radar Altimeter
Power Supply:	27.5 volts DC
Output:	0-25 volt (1 volt /1000 feet) DC
	signal to analogue meter,
	0-10 v (4mv/ft) analogue signal to
	microprocessor.
Mounting:	fixed to T.V. camera housing,
	attached to helicopter skid.

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DATA RECORDING SYSTEM

i) <u>Chart Rećorder</u> Type:

> Model: Specification: Amplifiers:

Chart:

Chart Drive:

Controls:

Power Requirements:

Writing System:

Dimensions: Weight:

Esterline Angus Miniservo III Bench AC Ammeter - Voltmeter Power Recorder. MS 413B S-22719, 3-pen servo recorder Three independent isolated DC amplifiers (1 per channel) providing range of acceptable input signals. 10 cm calibrated width z-fold chart. Multispeed stepper motor chart drive, Type D850, with speeds of 2,5,10,15,30 and 60 cm/hr. and cm/min. 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. 115/230 volts AC at 50/60 Hz (Approximately 30 W). Disposable fibre tipped ink

cartridge (variable colors) 38.6 cm X 16.5 cm X 43.2 cm 9.3 kg.

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ii) Digital Video Recording System

Type:	L.M. Microcontrols Ltd.
	Microprocessor Control Data
<i></i>	Acquisition System.
Model:	DADG - 68
Power Requirements:	10 - 14 volts DC, Maximum 2
Input Signal:	3,0 - 100 mvolt DC signals
	1,0 - 25 DC signals
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
	nickle-cadmium battery.
Fiducial Generator:	internally variable time set
	controls relay contact and
	audio output.
Dimensions:	30 cm X 30 cm X 13 cm
Weight:	3 kg.

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iii) Digital Magnetic Tape

Hewlett Packard cartridge Type: tape unit. Model: 9875A Power Requirements: 24 volt d.c. Data Format: HP'S Standard Interchange Format (SIF) HP 98200A 225K byte cartridge Tape 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

The geophysical data was analyzed and this report prepared for an all inclusive fee of \$6500.00. This figure includes the proportional cost of the larger field program as well as the computer and office expenses incurred in producing this report.

Airborne geophysical survey, report	\$6,500.00
Geological Examination (Ellen Lambert).	\$1,500.00
TOTAL ASSESSMENT VALUE	\$8,000.00



STATEMENT OF QUALIFICATIONS

NAME: PEZZOT, E. Trent

PROFESSION: Geophysicist - Geologist

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

PROFESSIONAL

ASSOCIATIONS: Society of Exploration Geophysicist

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 - British Columbia, Alberta, Saskatchewan, N.W.T., Yukon, Western U.S.A.

Seven years geophysicist with White Geophysical Inc. and Western Geophysical Aero Data.

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STATEMENT OF QUALIFICATIONS NAME: WHITE, Glen E., P.Eng. PROFESSION: Geophysicist EDUCATION: B.Sc. Geophysics - Geology University of British Columbia Registered Professional Engineer, PROFESSIONAL Province of British Columbia. ASSOCIATIONS:

Associate Member of Society of Exploration Geophysicists.

Past President of B.C. Society of Mining Geophysicists.

EXPERIENCE:

-Pre-Graduate experience in Geology -Geochemistry - Geophysics with Anaconda American Brass.

- -Two years Mining Geophysicist with Sulmac Exploration Ltd. and Airborne Geophysics with Spartan Air Services Ltd.
- -One year Mining Geophysicist and Technical Sales Manager in the Pacific north-west for W.P. McGill and Associates.
- -Two years Mining Geophysicist and supervisor airborne and ground geophysical divisions with Geo-X Surveys Ltd.
- -Two years Chief Geophysicist Tri-Con Exploration Surveys Ltd.
- -Fourteen years Consulting Geophysicist.
- -Active experience in all Geologic provinces of Canada.

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Western - Geophysical Acro Data Ltd.



KEY -----INSTRUMENT: Barringer M-123 Magnetometer Data corrected for diurnal variations Base value= 58000 nT Contour interval= 100 nT Sensor Elevation: 60 metres ---- Claim boundary 📕, Claim post WWWW Inferred Fault VLF-EM Conductor Axis



FIG.:2



LINE 3108 LINE 31 LINE 3104 LINE 3102. LINE 3100 LINE 3098 - Western Geophysical - Geophysical Acro Data Ltd.

