

83-#448-11869

AQUARIUS RESOURCES LTD.  
VLF AIRBORNE MAGNETOMETER  
VLF ELECTROMAGNETOMETER SURVEY  
Gold Valley I - IV and HJ 1-4  
claims, Tillicum Mt. area,  
Slocan M.D., B. C.  
Lat. 50°07'N, Long. 117°47'W  
N.T.S. 82 K/4W  
AUTHOR: Glen E. White, P. Eng.  
DATE OF WORK: November, 1982  
DATE OF REPORT: March 2, 1983

8

104x2

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**11,869**

Part 1  
of 2

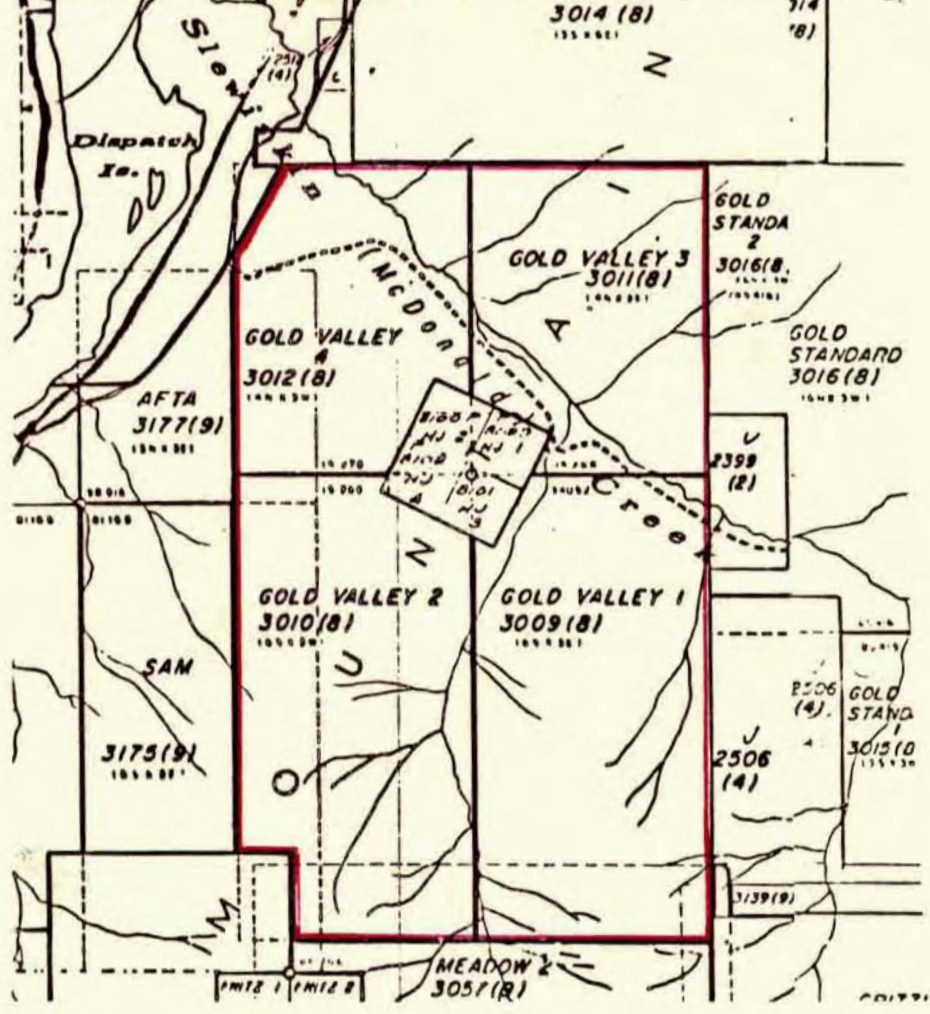
C O N T E N T S

	<u>PAGE</u>
Introduction.....	1
Property.....	1
Location and Access.....	1
General Geology.....	2
Airborne Magnetometer and VLF Electromagnetometer Surveys.....	3
Data Processing.....	4
Discussion of Results.....	5 - 6
Conclusion and Recommendations.....	6
Instrument Specifications.....	7 - 11
Statement of Qualifications.....	12
Cost Breakdown.....	13

ILLUSTRATIONS

- Figure 1 - Location and Claims Map
- Figure 2 - Magnetic Intensity, gammas
- Figure 3 - VLF-EM, Seattle
- Figure 4- VLF-EM, Annapolis
- Figure 5 - VLF-EM, Seattle less Annapolis
- Figure 6 - Photomosaic
- Plate 1 - General Geology





AQUARIUS RESOURCES LTD.  
 GOLD VALLEY 1-4 CLAIMS & HJ 1-4 CLAIMS

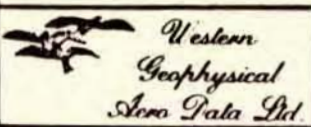


FIGURE 1

## INTRODUCTION

During the month of November, 1982, a regional airborne magnetometer and VLF electromagnetometer survey was flown by Western Geophysical Aero Data Ltd. over the Tillicum Mountain Gold Prospect. The data was recorded on chart, video tape and digitally on magnetic tape and has been processed to examine in detail the area of the Gold Valley I - IV and HJ 1 - 4 mineral claims on behalf of Aquarius Resources Ltd. Some 90 line km were processed.

The purpose of the survey was to try and delineate variations in magnetic intensity and any conductive responses that would assist in the search for gold or massive sulphide mineralization.

## PROPERTY

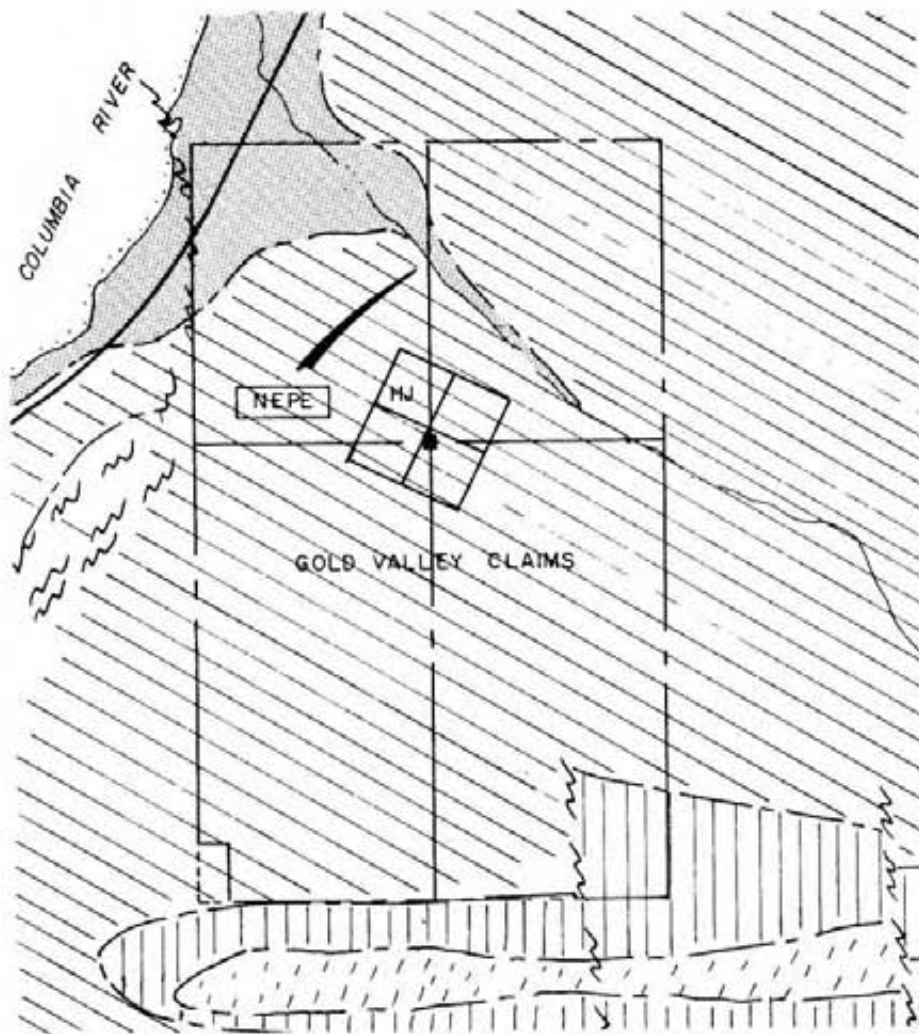
The property consists of the Gold Valley I - IV and HJ 1 - 4 mineral claims as illustrated on Figure 1. The area covers some 60 contiguous units. The claims were recorded August 19, 1982.





## LOCATION AND ACCESS

The claim block is immediately east of Upper Arrow Lake and some 11 km due south of Nakusp, B. C. Latitude  $50^{\circ}07''N$ , Longitude  $117^{\circ}47''W$ , N.T.S. 82 K4W

Access to the property is provided by the Slewiskin Creek secondary gravel road which bisects the northerly two Gold Valley claims.





-  *Pelitic to silty phyllite and slate, argillite; shale to siltstone, tuff*
-  *Foliated hornblende quartz diorite; minor quartz monzonite*
-  *Meta-andesite to metadacite, tufts and flows*
-  *Glacial deposits, alluvium*

## GENERAL GEOLOGY

### GENERAL GEOLOGY

The property area is underlain by grey to black phyllites, argillites, quartzites and minor tuffaceous sediments of the Slocan group of Triassic age. Intrusives of monzonite, syenite and granite envelop the Slocan group and occur as small stocks and plugs within the enveloped group. The southern boundary of the claims are underlain by Rossland group volcanics and the Mountain Meadow Pluton which is elongate in an east-west direction.

Mineralization in the area consists of gold-silver-lead-zinc values within quartz veins or quartz flooded meta sediments and/or meta volcanics.

The HJ claims contain a northwest trending structure containing a quartz filled or breccia zone. Mineralization reportedly consists of blebs and disseminations of galena, sphalerite, tetrahedrite and chalcopyrite.



AIRBORNE VLF-ELECTROMAGNETIC AND MAGNETIC SURVEY

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 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 on-board 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.

## DATA PROCESSING

Field data is digitally recorded on magnetic cassettes in a format compatible with the Hewlett-Packard 9845 computer. The flight path locations are digitized, thus the information can be processed as either time series or space point data.

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 receiver oscillation. Oscillation effects can be removed by filters tuned to the dominant period. Long period terrain effects can be removed by subtracting a polynomial fitted base level from the data. The degree of the polynomial can be selected to best represent terrain variations observed in the survey area.

Short period terrain effects often have similar response parameters to target conductive features. An interpretational technique often useful in distinguishing between terrain anomalies and conductor anomalies is to observe the difference between the responses from two transmitter stations. Terrain variations normally affect both data sets to a similar degree and are much reduced on a difference plot. The amplitude of the response due to a conductive body is dependent upon the relationship between the conductors' strike and direction to the transmitter station. In most instances the anomalous responses will vary between frequencies and therefore remain evident on the difference plot.



## DISCUSSION OF RESULTS

The magnetic intensity map, Figure 2, has several distinctive magnetic terrains. In the south are two large magnetic anomalies which likely relate to volcanic flow rocks, intrusives or meta volcanics. The eastern anomaly is cut by a magnetic linear which follows the mountain ridge but on the regional map, Plate 1, is shown as a major fault. The VLF-EM data gives a well-shaped conductor-like response but there is some ambiguity as to whether or not the response is partially terrain effect. A strong fault appears to separate the two magnetic anomalies. This inferred fault trends northwestward until it intersects the second distinctive magnetic pattern and that is a magnetic low band which arcs from east-west to southwestward across the survey area. The HJ mineral showings lie in this band. The third magnetic terrain is the flat plateau-like response in the northern portion of the property. This zone relates to a uniform rock type. An interesting magnetic dipole response was mapped on the western edge of this plateau-like response. A small lense like magnetic response was detected on Line 32B in the middle of the survey area. In general these three magnetic terrains appear to be transversed by a number of magnetic linears which may be major structural zones.

The VLF-EM data detected a series of well-shaped responses in the southeastern corner of the survey grid which under normal circumstances would be considered anomalous. However, as mentioned previously, they follow the topographic ridge. It is a remarkable coincidence that the regional mapping shows an important lithologic fault in this area. Thus, the EM anomalies could be real. A weak VLF-EM anomaly was detected on Line 35 on the flank of the western magnetic high.




The VLF-EM data is illustrated on three maps. A portion of the Seattle data is not available as this portion of the survey was flown on a Thursday. Thus, the difference map could not be completed.

#### CONCLUSION AND RECOMMENDATIONS

The airborne magnetometer and VLF electromagnetometer surveys detected a pronounced magnetic low band which arcs east-west to southwest across the survey area. The known mineralization on the HJ claims lies in this band and shows a similar trend. Two strong magnetic anomalies were detected in the southern portion of the claim group which appear to be cut by major fault structures. The intersection of a major structure and the magnetic low band should be an area of tectonic interest. A small lense-like magnetic response, a dipole response and a weak VLF-EM conductor were also detected and should be further investigated.

Respectfully submitted,

  
Glen E. White, P. Eng.  
Consulting Geophysicist

INSTRUMENT SPECIFICATIONSBARRINGER 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  
 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.

Instrument SpecificationsSABRE AIRBORNE VLF SYSTEM

- Source of Primary Field: VLF radio stations in the frequency range of 14  $\text{KH}_z$  to 30  $\text{KH}_z$ .
- Type of Measurement: - Horizontal field strength
- Number of Channels: - Two; Seattle, Washington at 18.6  $\text{KH}_z$   
- Annapolis, Maryland at 21.4  $\text{KH}_z$
- 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.

INSTRUMENT SPECIFICATIONSFLIGHT PATH RECOVERY SYSTEMi) T.V. Camera

Model: RCA TC2055 Vidicon  
Power Supply: 12 volt dc  
Lens: variable, selected on basis of expected terrain clearance  
Mounting: Gimbal and shock mounted to housing  
- housing bolted to helicopter skid

ii) Video Recorder

Model: Sony SLO - 340  
Power Supply: 12 volt dc / 120 volt AC (60Hz)  
Tape: Betamax  $\frac{1}{2}$ " 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, 75 $\Omega$  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

INSTRUMENT SPECIFICATIONSDATA RECORDING SYSTEMi) Chart Recorder

Type: Esterline Angus Miniservo III Bench AC Ammeter -  
Voltmeter Power Recorder

Model: MS 413 B

Specification: S-22719, 3-pen servo recorder

Amplifiers: Three independent isolated DC amplifiers  
(1 per channel) providing range of acceptable input signals

Chart: 10 cm calibrated width 2-fold 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) Digital Video Recording 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 Converter: 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



DATA RECORDING SYSTEM (CON'T)iii) Digital Magnetic Tape

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.

STATEMENT OF QUALIFICATIONS

NAME: WHITE, Glen E., P.Eng.

PROFESSION: Geophysicist

EDUCATION: B.Sc. Geophysicist - Geology  
University of British Columbia.

PROFESSIONAL ASSOCIATIONS: Registered Professional Engineer,  
Province of British Columbia.  
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.  
Eleven years Consulting Geophysicist.  
Active experience in all Geologic provinces  
of Canada.





COST BREAKDOWN

A. Survey Date                    November, 1982

B. Personnel

Survey: J. Behenna    - Operator-Navigator  
          T. Pezzot        - Geophysicist-Operator  
          M. McDermitt - Navigator

Data Processing:    January, 1983

          M. McDermitt - Technician  
          T. Pezzot        - Geophysicist  
          N. Porter        - Draftsman

Supervisor:    Interpretation, March 2, 1983

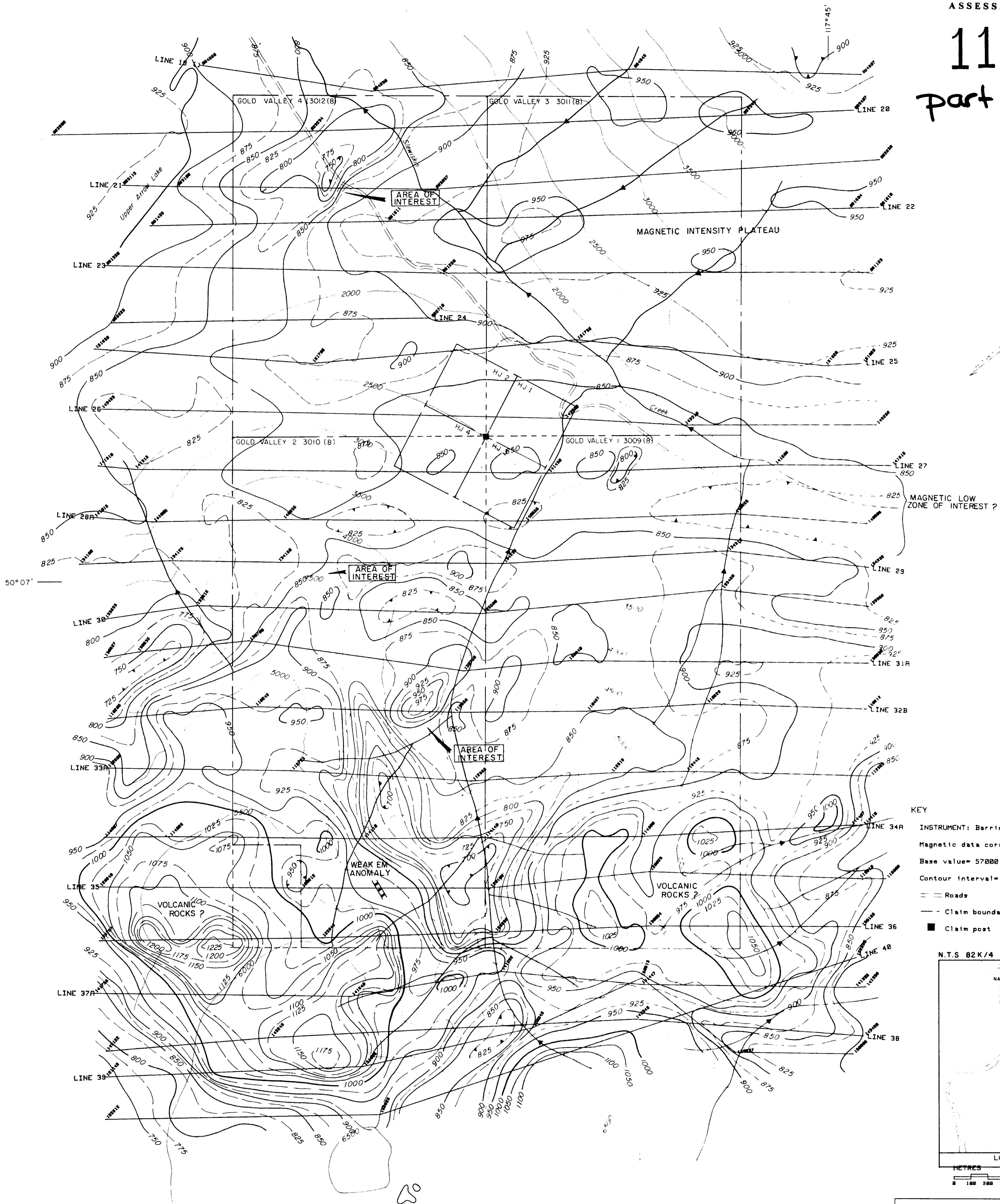
          Glen E. White, P. Eng. - Geophysicist

C. Project Fee

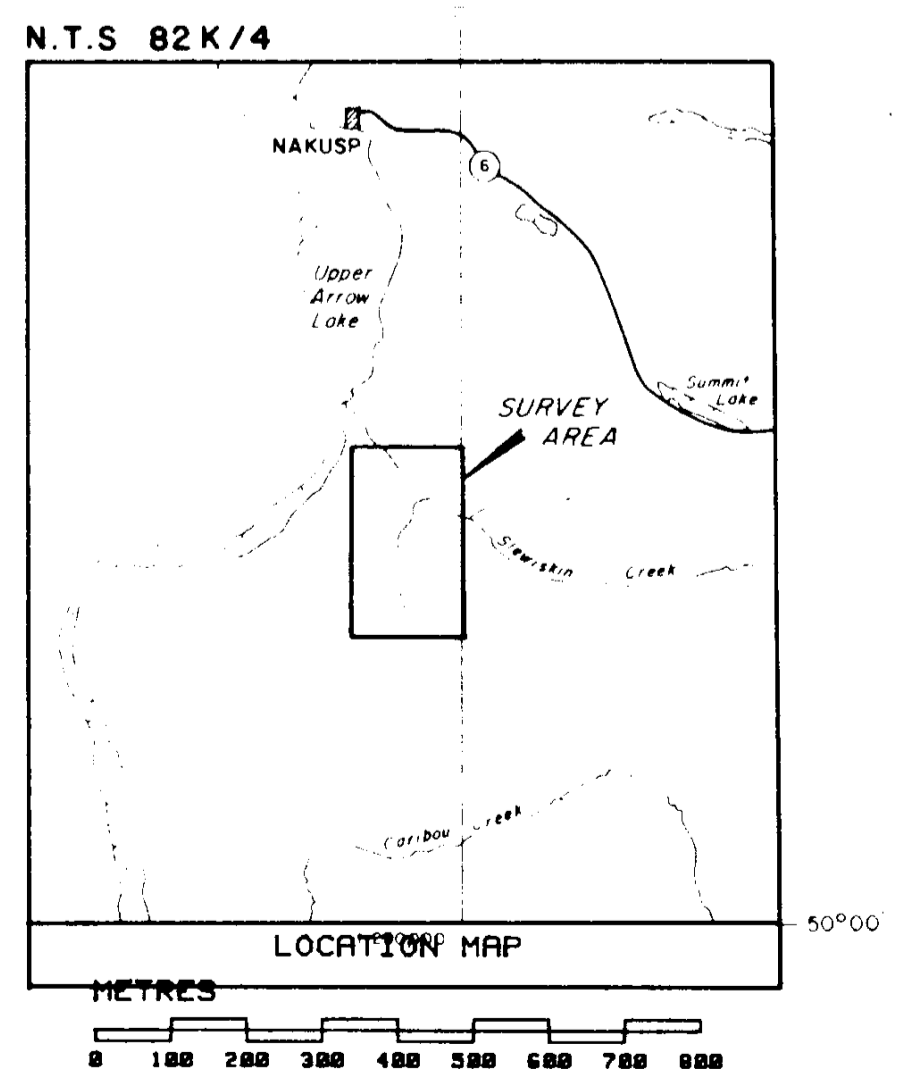
This survey was processed by agreement  
for an all inclusive fee of.....\$4,200.00  
which includes an overall proportioned  
helicopter charge.



11,869  
part 1 of 2



KEY  
 INSTRUMENT: Barringer M-123 Magnetometer  
 Magnetic data corrected for diurnals  
 Base value= 57000 gammas  
 Contour interval= 25 gammas  
 ——— Roads  
 - - - Claim boundary  
 ■ Claim post



AQUARIUS RESOURCES LTD.  
 GOLD VALLEY GROUP  
 MAGNETIC CONTOUR MAP  
 TOTAL FIELD INTENSITY (gammas)

DATE: NOV/82

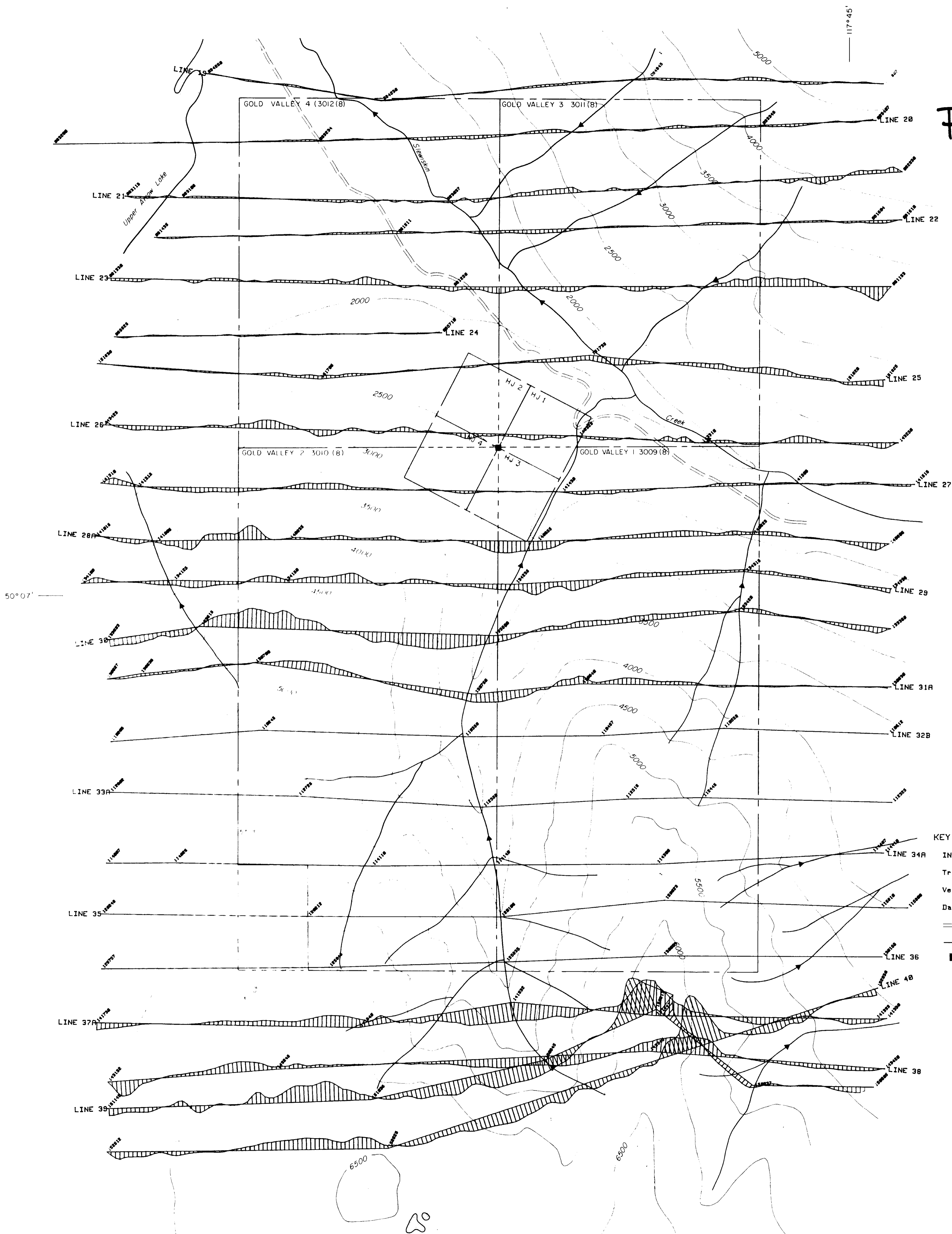
FIG.: 2

To accompany the Geophysical Report on Gold Valley

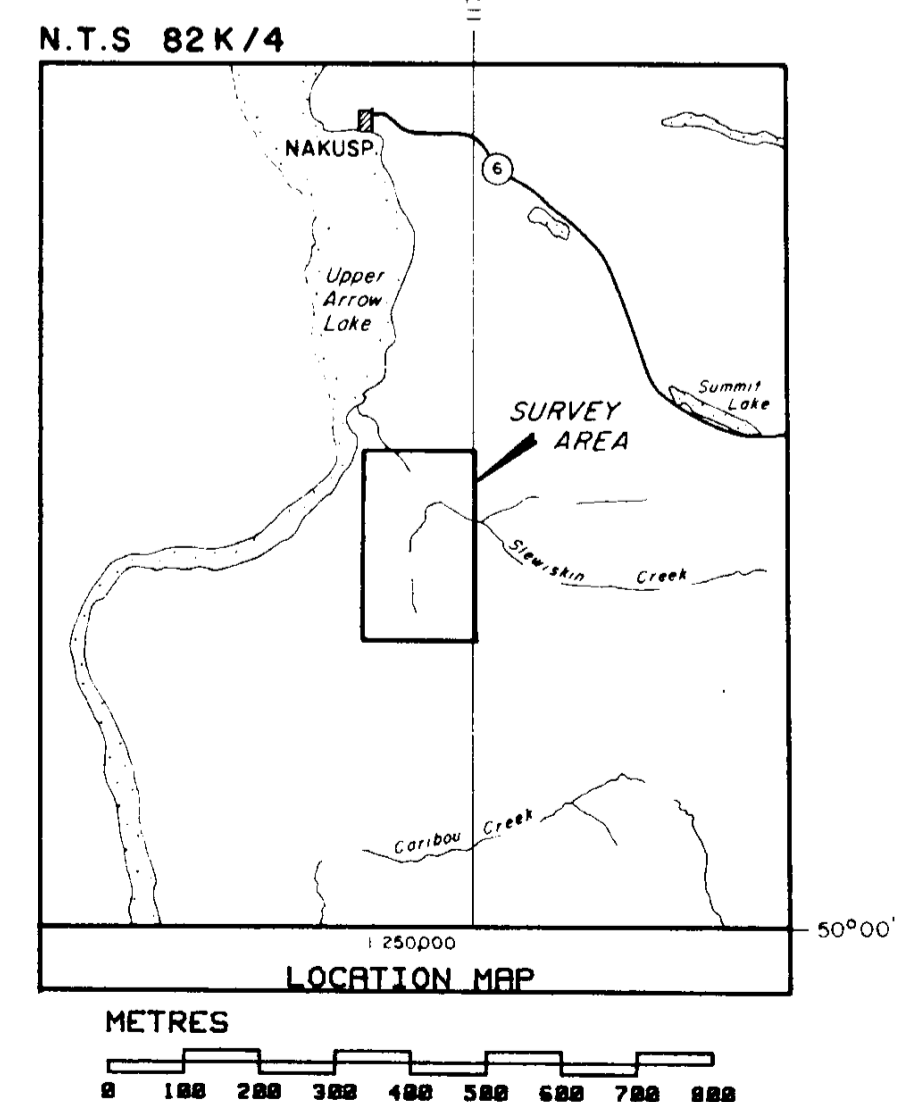
Western  
 Geophysical  
 Services Ltd.



11,869  
part 1 of 2



KEY  
 INSTRUMENT: Sabre Total Field Intensity VLF-EM  
 Transmitter Station, Seattle (24.8 KHz)  
 Vertical Scale, 10%/cm.  
 Data corrected for long period terrain effects  
 ——— Roads  
 - - - Claim boundary  
 ■ Claim post



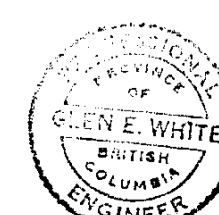
AQUARIUS RESOURCES LTD.  
 GOLD VALLEY GROUP  
 VLF-EM PROFILES (SEATTLE)  
 TOTAL FIELD INTENSITY

DATE: NOV/82

FIG.: 3

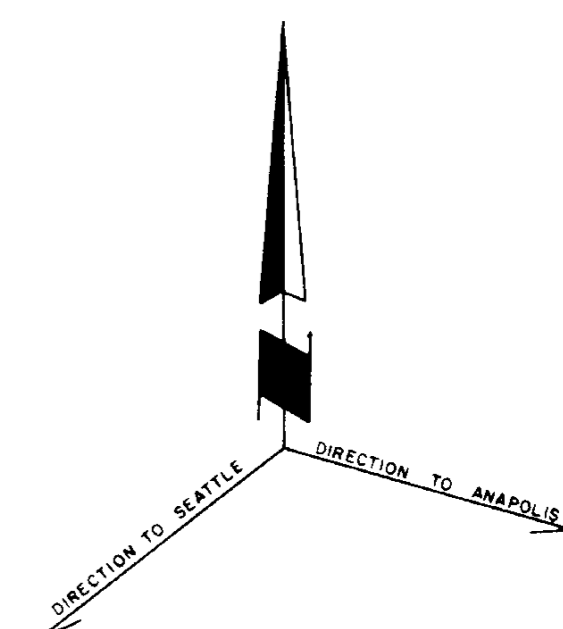
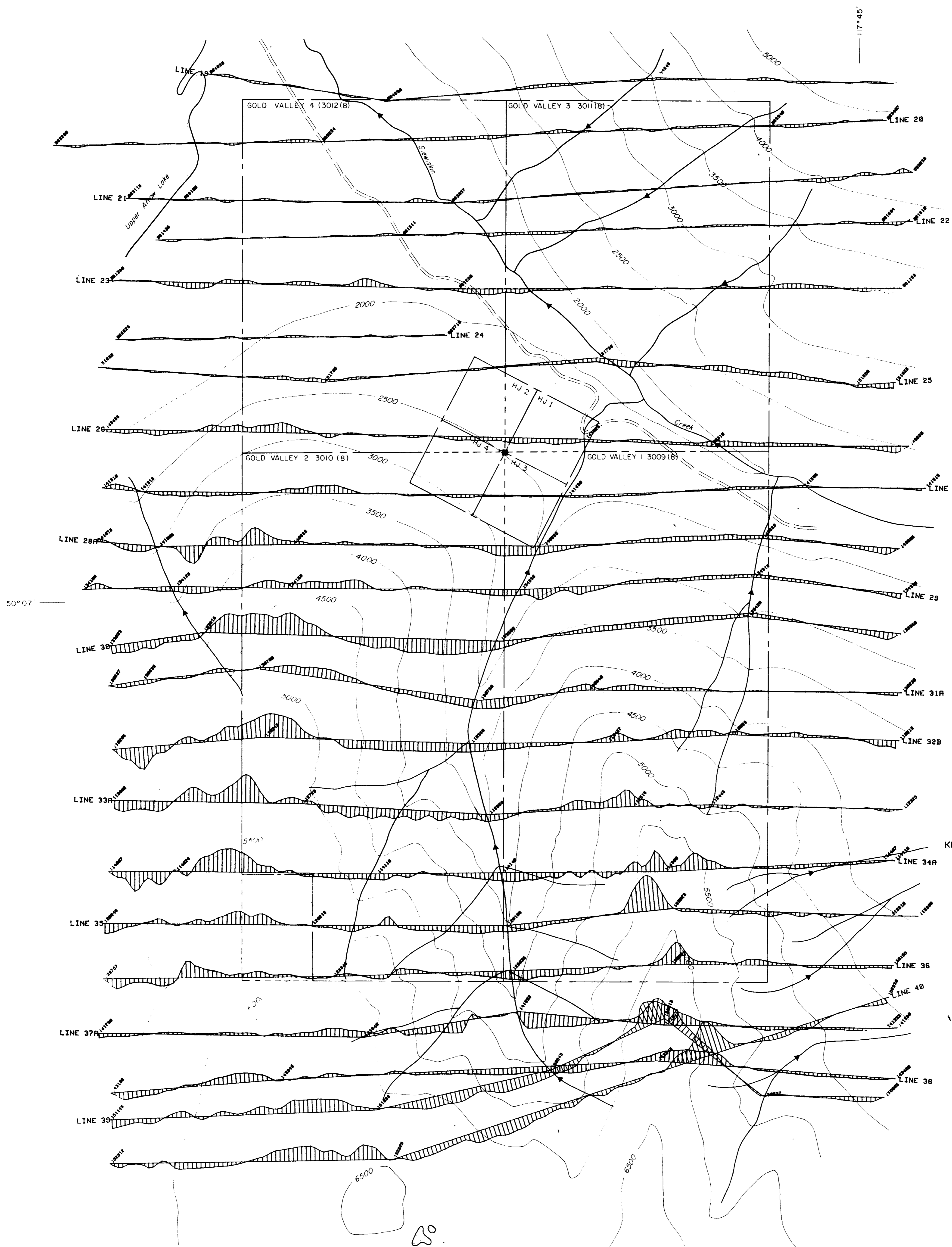
Western  
 Geophysical  
 Services Ltd.

To accompany the Geophysical Report on Gold Valley

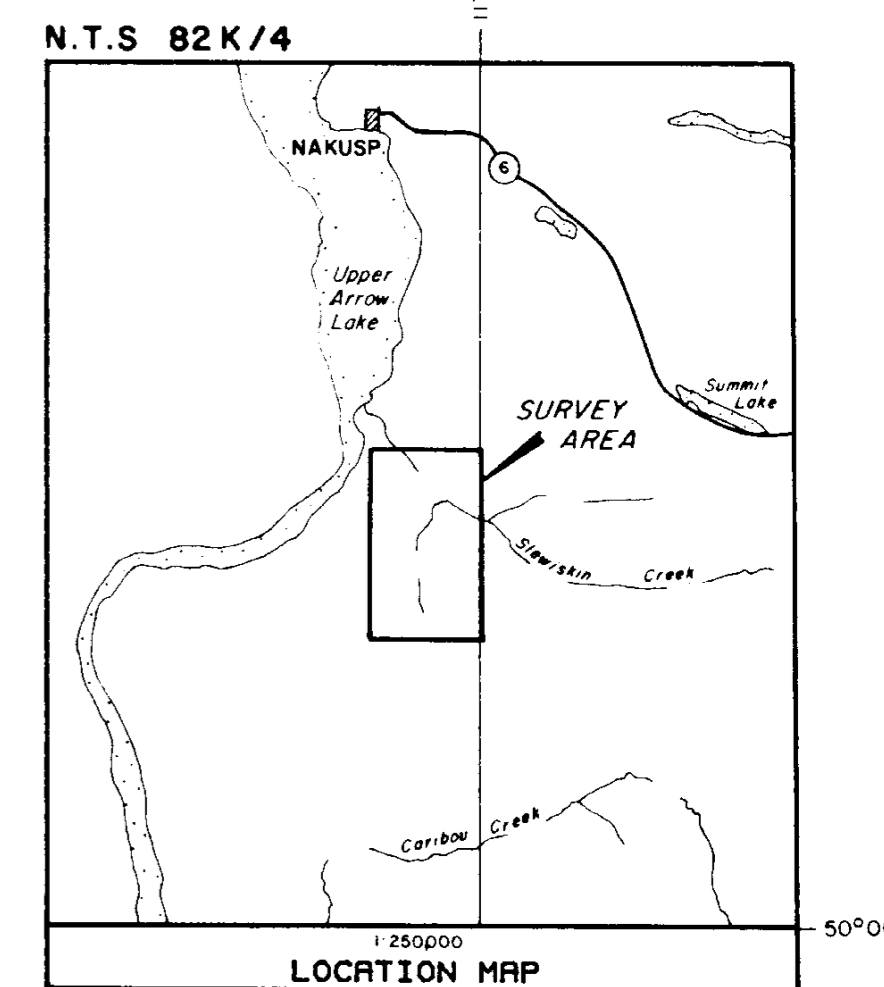


11,869

part 1  
of 2



KEY  
 INSTRUMENT: Sabre Total Field Intensity VLF-EM  
 Transmitter Station, Annapolis (22.4 Khz)  
 Vertical Scale, 10X/cm.  
 Data corrected for long period terrain effects  
 ——— Roads  
 - - - Claim boundary  
 ■ Claim post



AQUARIUS RESOURCES LTD.  
 GOLD VALLEY GROUP  
 VLF-EM PROFILES (ANNAPOLIS)  
 TOTAL FIELD INTENSITY

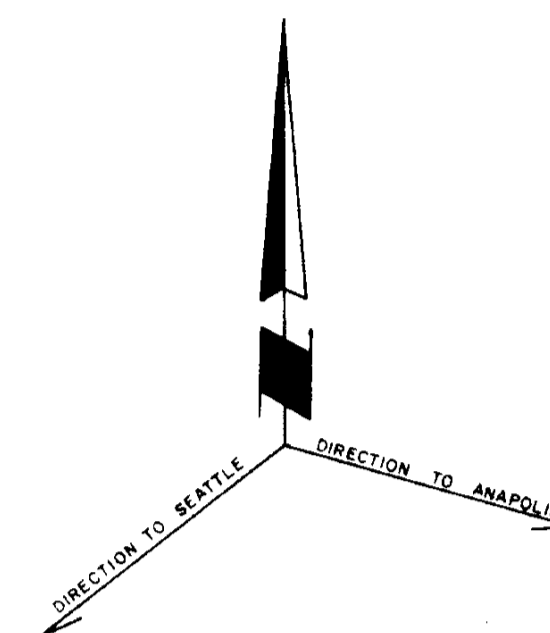
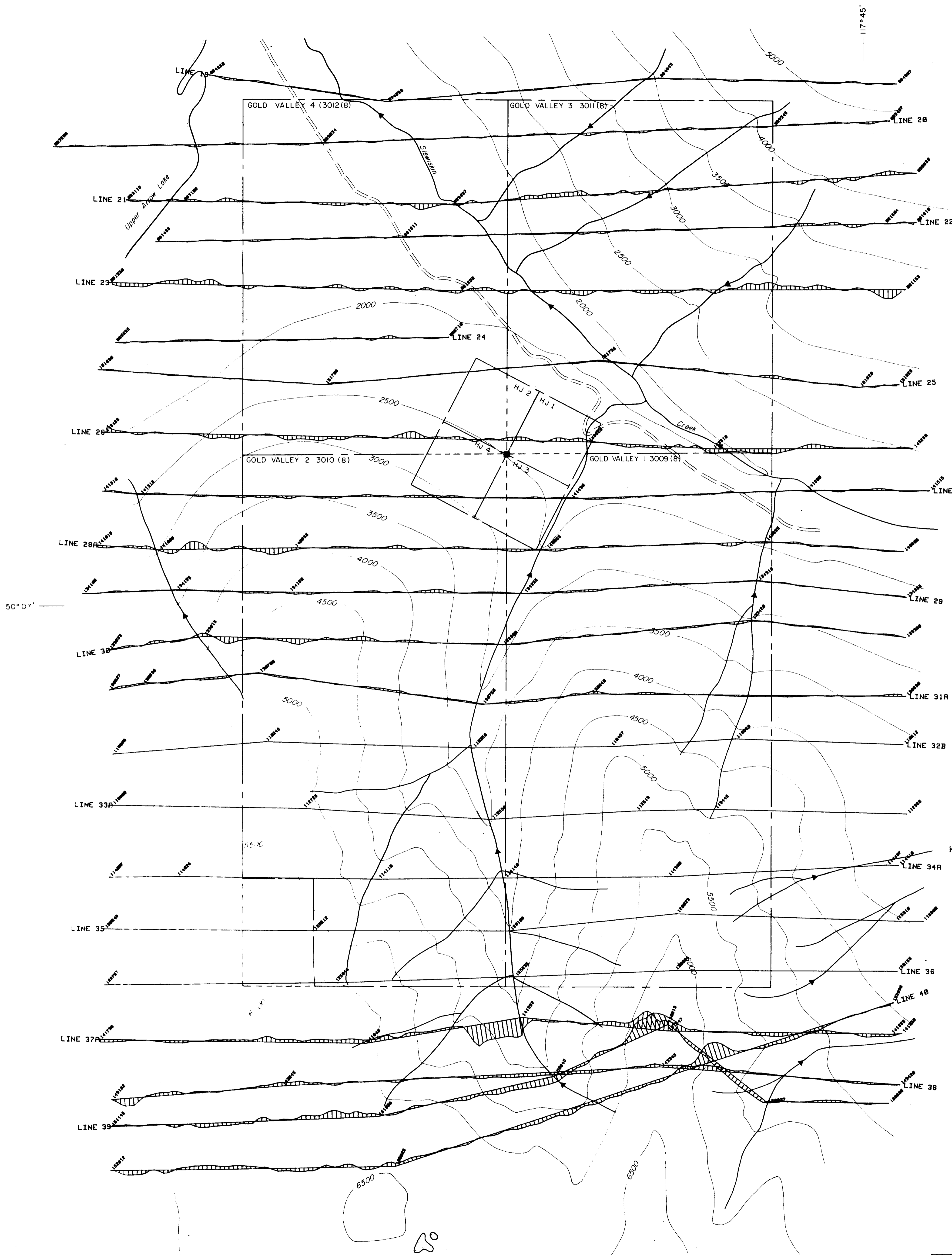
DATE: NOV/82

FIG.: 4

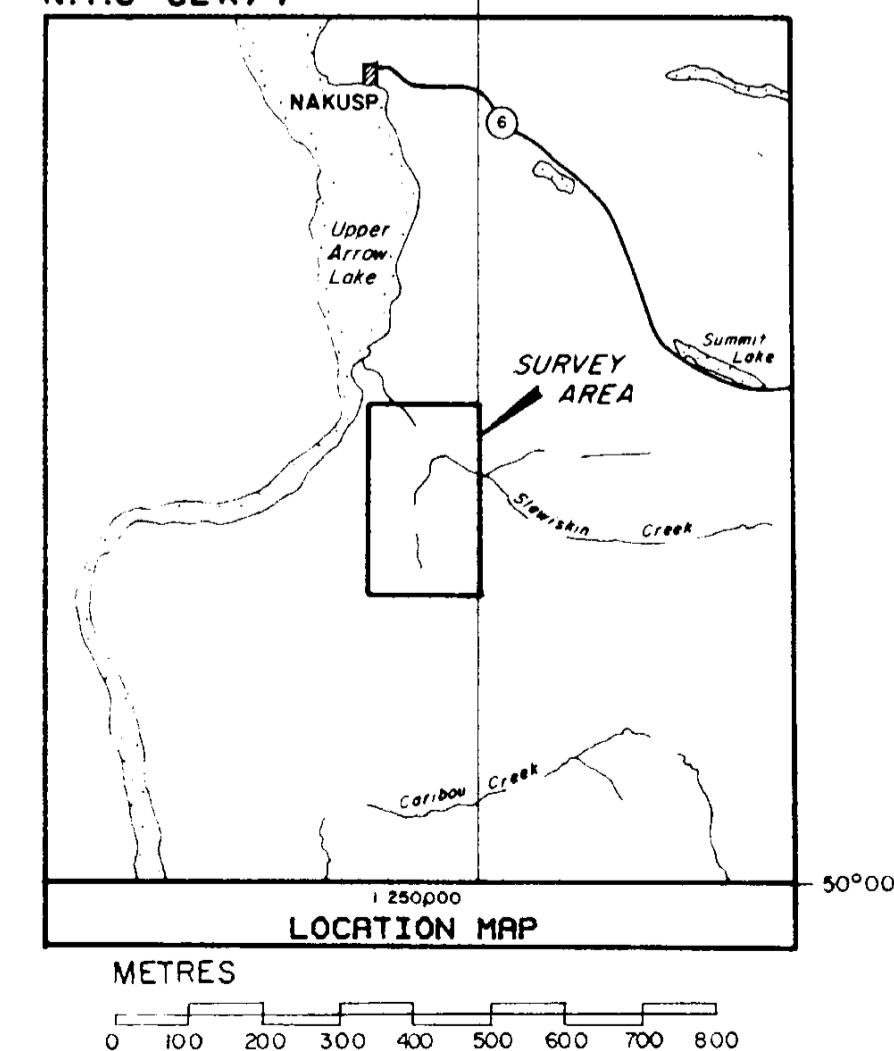


11,869

part 1  
of 2



KEY  
 INSTRUMENTS: Sabre Total Field Intensity VLF-EMS  
 Transmitter Station #1, Seattle (24.8 Khz)  
 Transmitter Station #2, Annapolis (22.4 Khz)  
 Vertical Scale, 18%/cm.  
 Data corrected for long period terrain effects  
 — Roads  
 - - - Claim boundary



AQUARIUS RESOURCES LTD.  
 GOLD VALLEY GROUP  
 VLF-EM DIFFERENCE PROFILES  
 (SEATTLE - ANNAPOLIS)

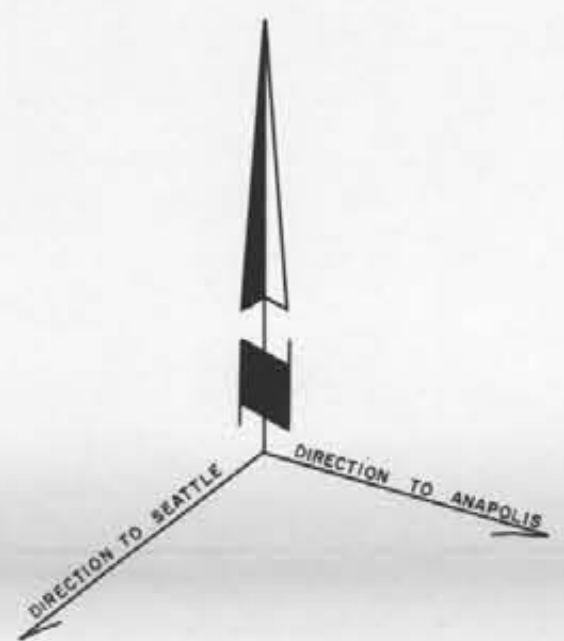
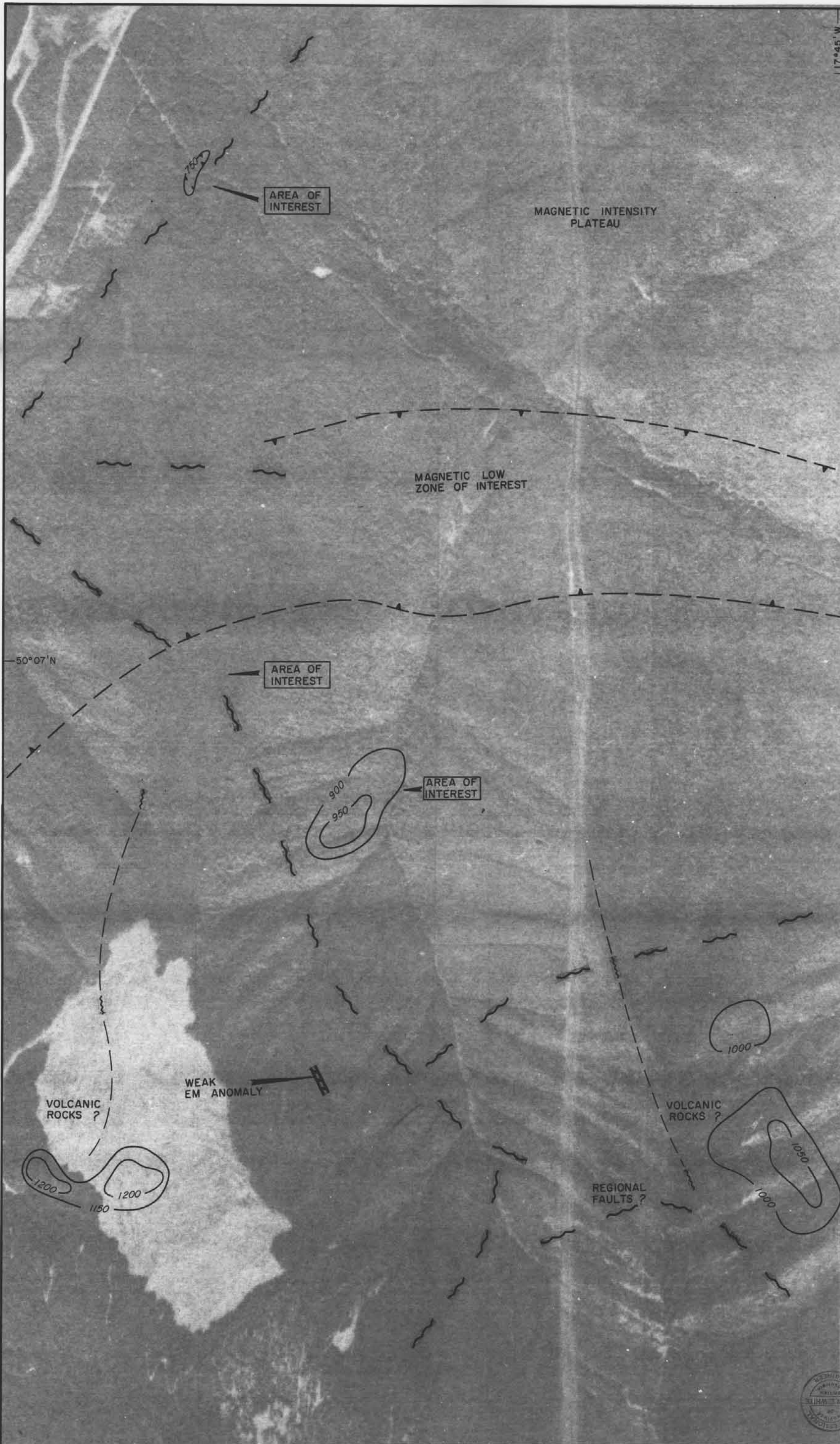
DATE: NOV/82

FIG.: 5

Western  
 Geophysical  
 Aero Data Ltd.

To accompany the Geophysical Report on Gold Valley

049  
 part 1

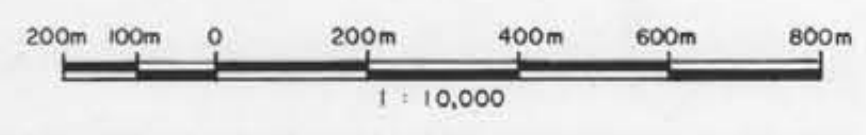
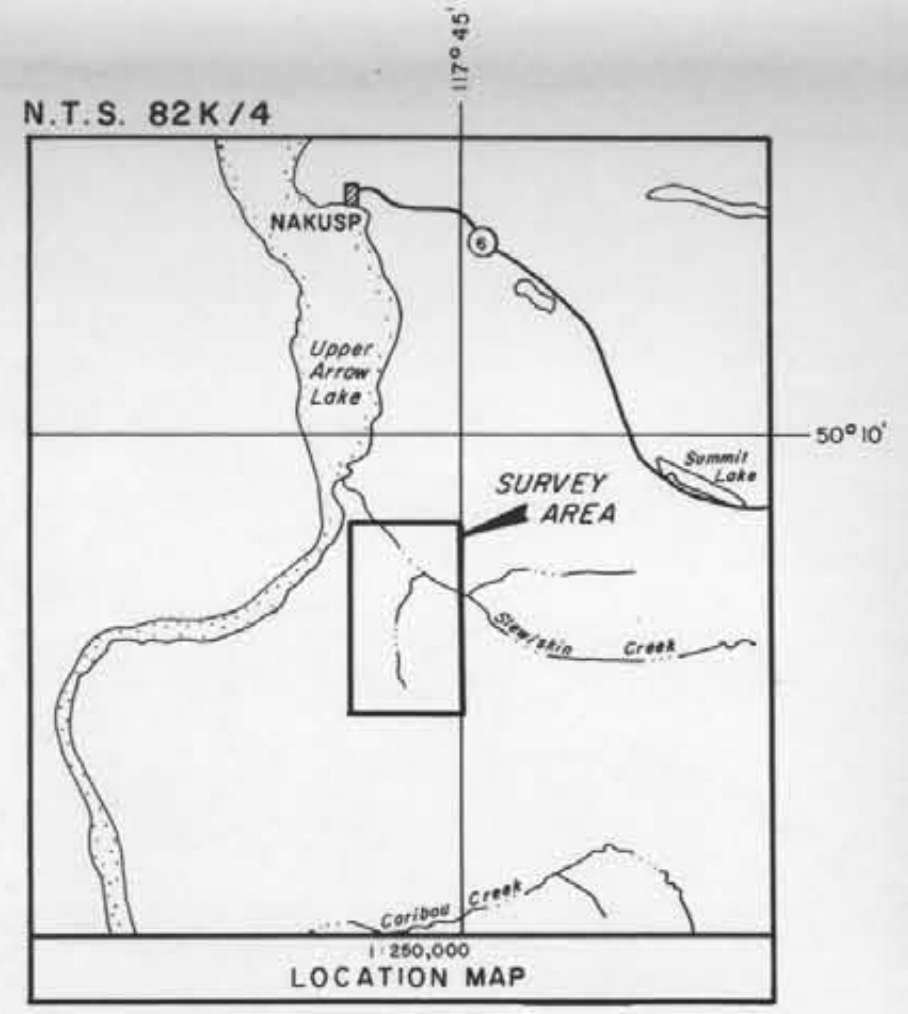


**GEOLOGICAL BRANCH  
 ASSESSMENT REPORT**

11,869  
 part 1  
 of 2

**KEY**

- ▼— Magnetic low zone
- 900- Magnetic contour
- ~~~~~ Magnetic linear
- - - Regional faults
- - - Claim boundary (approx.)
- Claim post



<b>AQUARIUS RESOURCES LTD.</b> <b>GOLD VALLEY GROUP</b> SLOCAN MINING DIVISION — BRITISH COLUMBIA	
<b>GEOPHYSICAL INTERPRETATION MAP</b>	
	Interpreted By: G.E.W. Drawn By: FINELINE DRAFTING Checked By: G.E.W. Date: FEB. / 83 Fig. No. 6

