NAKUSP RESOURCES LTD.

83-#121-#11122

AIRBORNE MAGNETOMETER AND VLF ELECTROMAGNETOMETER SURVEY

CAM 1, 2 mineral claims; Leases 197, 290 and 389, Tillicum Mt. area, Slocan M.D., N.T.S. 82 K/4W Lat. 50° 04'N Long. 117°48'W, B. C. AUTHOR: Glen E. White, P. Eng. DATE OF WORK: November/82 - March/83

DATE OF REPORT: March 16, 1983



1,122

CONTENTS

PAGE

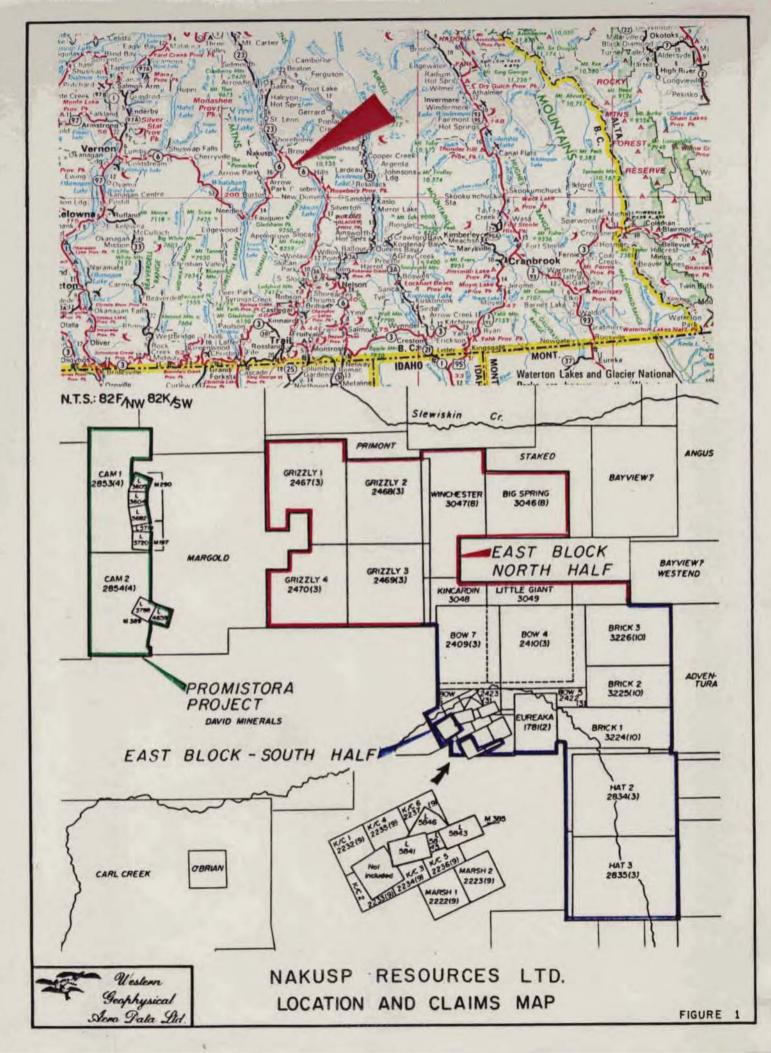
Introduction	1		
Property	1		
Location and Access	1		
General Geology	2	-	3
Airborne Magnetometer and			
VLF Electromagnetometer Surveys	4		
Data Processing	5		
Discussion of Results	6	-	7
Conclusion and Recommendations	8		
Instrument Specifications	9	-	13
Statement of Qualifications	14		
Cost Breakdown	15		

ILLUSTRATIONS

Figure 1 - Location and Claims Map Figure 2 - Magnetic Intensity Figure 3 - VLF-EM, Seattle Figure 4 - VLF-EM, Annapolis Figure 5 - VLF-EM, Difference Plots Figure 6 - Photomosaic

Plate 1 - General Geology

VESTERN GEOPHYSICAL AERO DATA LID.



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 CAM 1 and 2 mineral claims on behalf of Nakusp Resources Ltd. Some 60 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.

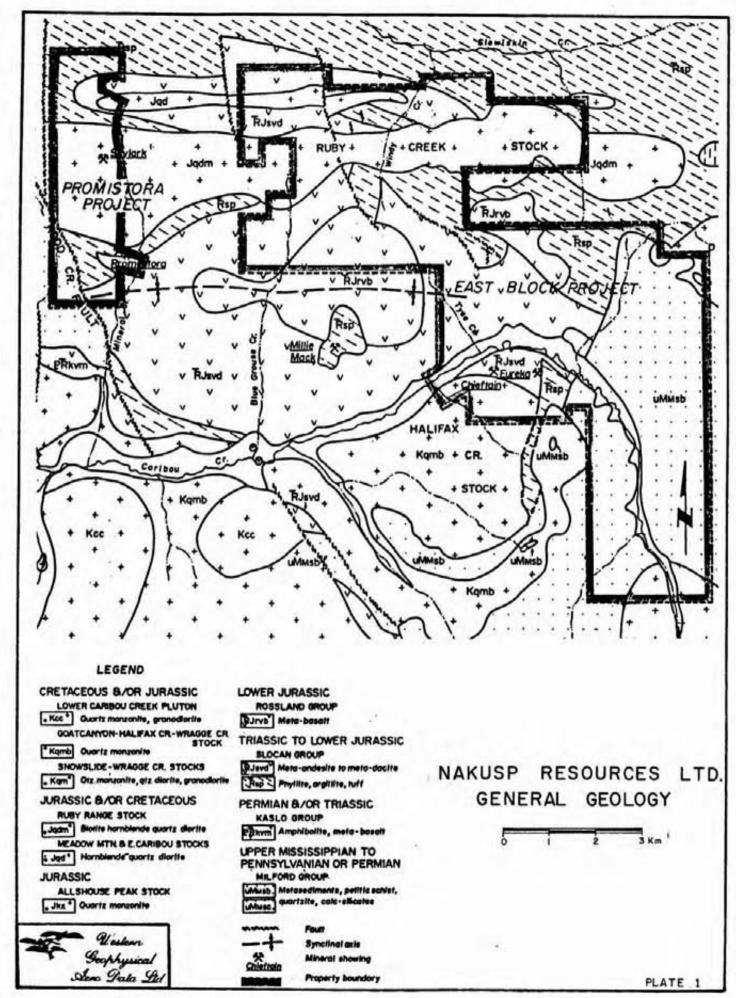
PROPERTY

The property consists of the CAM 1 and 2 mineral claims, Record Numbers 2853 and 2854, and mineral leases 197, 290 and 389. Leases 197 and 290 cover the Skylark gold-silver-lead-zinc zone while lease 389 covers the Promestora gold-silver-lead-zinc vein. The total area covers some 33 units.

LOCATION AND ACCESS

The Promestora group is located some 18 km due south of Nakusp and some 11 km north-northeast of Burton, B. C. on the east side of the Columbia River. Latitude 50⁰04'N, Longitude 117⁰48'W, N.T.S. 82 K/4W, Slocan M.D.

Access is by the Caribou Creek logging road from Burton, B. C. for a distance of some 8 km to the Rodd Creek turnoff and thence some 2.6 km to the branch road which follows the west bank of Mineral Creek to the Promestora adit.



GENERAL GEOLOGY

An excellent description of the properties and general geology is outlined in a Geological Report for Nakusp Resources Ltd. by I. M. Watson, P. Eng., dated January 1983.

In his report he states that "the properties lie on the southern limb of the Slocan synclinorium, which strikes east-south-east through the Valhalla Range, swinging southerly to the east of Slocan Lake. The fold is terminated to the west by the Rodd Creek Fault, a branch of the Columbia River Fault Zone. The north and south limits of the syncline are marked by the Kuskanax Batholith and the Valhalla Dome respectively.

The rocks within the syncline are highly deformed metasediments and metavolcanics of Permian to early Jurassic age intruded by granitic plutons of Jurassic to Cretaceous age. The regional metamorphism predates the intrusions, and the grade of metamorphism is lowest (green schist facies) in the structural troughs, rising to staurolite facies towards the flanks. The bulk of the rocks within the Slocan syncline has been assigned to the Slocan Group (Triassic - Lower Jurassic) and consists of a thick succession of argillites overlain by about 1200 metres of volcanics. The volcanics form the cores of the synclinal folds.

The claims are underlain by the western end of the Ruby Range stock, a foliated biotite-hornblende quartz diorite of reputed Jurassic age. The intrusion is terminated on the west by the Rodd Creek Fault. A branch of this fault appears to displace a wedge of the intrusion a few hundred feet to the north. The stock is flanked to the north and south by Slocan Group metasediments and metavolcanics (Triassic).

VESTERN GEOPHYSICAL AERO DATA LID. -

The Skylark vein, at the north and eastern end of the Promestora Group is hosted by granite rocks of the Ruby Range stock, close to the contact with the northern band of Slocan sediments.

The Promestora vein, at the south-eastern end of the claim group, occurs in the Slocan sediments south of the stock."

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 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.

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.

WESTERN GEOPHYSICAL AERO DATA LTD.

DISCUSSION OF RESULTS

The total field magnetic intensity data is illustrated on Figure 2. Some 60 km of flight line data was flown and processed for this survey. The magnetic intensity map is dominated by a strong magnetic high in the northern portion of the survey block and a pronounced north-south trending magnetic ridge in the south. The magnetic data appears to reflect a number of faults which have been illustrated on the map. The most pronounced interpreted fault zone occurs on the western edge of the claim group. This feature would appear to correlate position wise with the regional geologically mapped Rodd Creek Fault. The magnetic high in the north appears to be relatively undisturbed and may be caused by a chemically active intrusive or an area of higher magnetic susceptibility minerals in volcanic rocks. An eight hundred meter wide magnetic low band separates this magnetic high from the one to the south. This magnetic low may possibly relate to a lithologic unit or structure. Plate 1, which outlines the general geology, shows the northern edge of the low to be close to a contact of argillites to the north and granites to the south. The rise in magnetic intensity on the southern edge of the magnetic low band would suggest that the granite zone is narrower than mapped geologically. Moreover, the magnetic high to the north is not typical of argillites or phyllites and thus the narrow nose of volcanic rocks may be larger than mapped.

The magnetic intensity values to the south of the large magnetic low band are narrow and trend north-south. There is a suggestion that this zone has been offset by faulting as shown by the fault interpretation. South of this magnetic disturbance is another narrow magnetic low band which correlates with a shear zone and argillite rocks on the Promestora leases. The shape of the fault patterns and the magnetic patterns of this central magnetically disturbed block almost suggests a graben-like structure between the two magnetic low bands.

The VLF electromagnetometer data showed several responses, the strongest of which is on line 46 directly coincident with the magnetic ridge. Weaker responses are shown on the line to the south and the two lines to the north; Figure 3 (Seattle) shows the conductor trends. The lines in the north of the survey were flown on a Thursday when Seattle is not transmitting. Figure 4, the Annapolis data shows a response on line 36 which suggests a northwest-southeast striking feature. It lies in the area of the strongest magnetic intensity values recorded by the survey.

STERN GEOPHYSICAL AERO DATA LTD.

CONCLUSION AND RECOMMENDATIONS

The airborne magnetometer and VLF electromagnetometer surveys located a number of areas of interest. These have been illustrated on Figures 2 and 6. The Rodd Creek Fault has been interpreted on the western edge of the claim block. The intersection of several fault zones and the associated magnetic ridge and VLF electromagnetic conductors make up the areas that should be followed up on the ground by normal exploration techniques.

Respectfully submitted, Glen E. Consulting Geophysicist

ESTERN GEOPHYSICAL AERO DATA LTD.

INSTRUMENT SPECIFICATIONS

BARRINGER AIRBORNE MAGNETOMETER

MODEL:	Nimbin M-123
TYPE:	Proton Precession
RANGE:	20,000 to 100,000 gammas
ACCURACY:	+ 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.

WESTERN GEOPHYSICAL AERO DATA LTD.

Instrument Specifications

SABRE AIRBORNE VLF SYSTEM

Source of Primary Fi	eld: 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 18.6 KH
	- 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.

10

WESTERN GEOPHYSICAL AERO DATA LID.

INSTRUMENT SPECIFICATIONS

11

FLIGHT PATH RECOVERY SYSTEM

i) 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: Betamex ½" 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

STERN GEOPHYSICAL AERO DATA LTD.

INSTRUMENT SPECIFICATIONS

DATA RECORDING SYSTEM

i) 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. Separate front mounted slide switches for Controls: 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) Disposable fibre tipped ink cartridge Writing System: (variable colors) Dimensions: 38.6 cm X 16.5 cm X 43.2 cm Weight: 9.3 Kg 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 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 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.

13

: External computer generated commands.

ESTERN GEOPHYSICAL AERO DATA LTD.

STATEMENT OF QUALIFICATIONS

14

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

PROFESSION: Geophysicist

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

PROFESSIONAL ASSOCIATIONS:

S: 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.

Twelve years Consulting Geophysicist.

Active experience in all Geologic provinces of Canada.

VESTERN GEOPHYSIC AL AERO DATA LTD. -

COST BREAKDOWN

SURVEY DATE: November, 1982

Personnel: J. Behenna, Technician M. McDermitt, technician T. Pezzot, Geophysicist

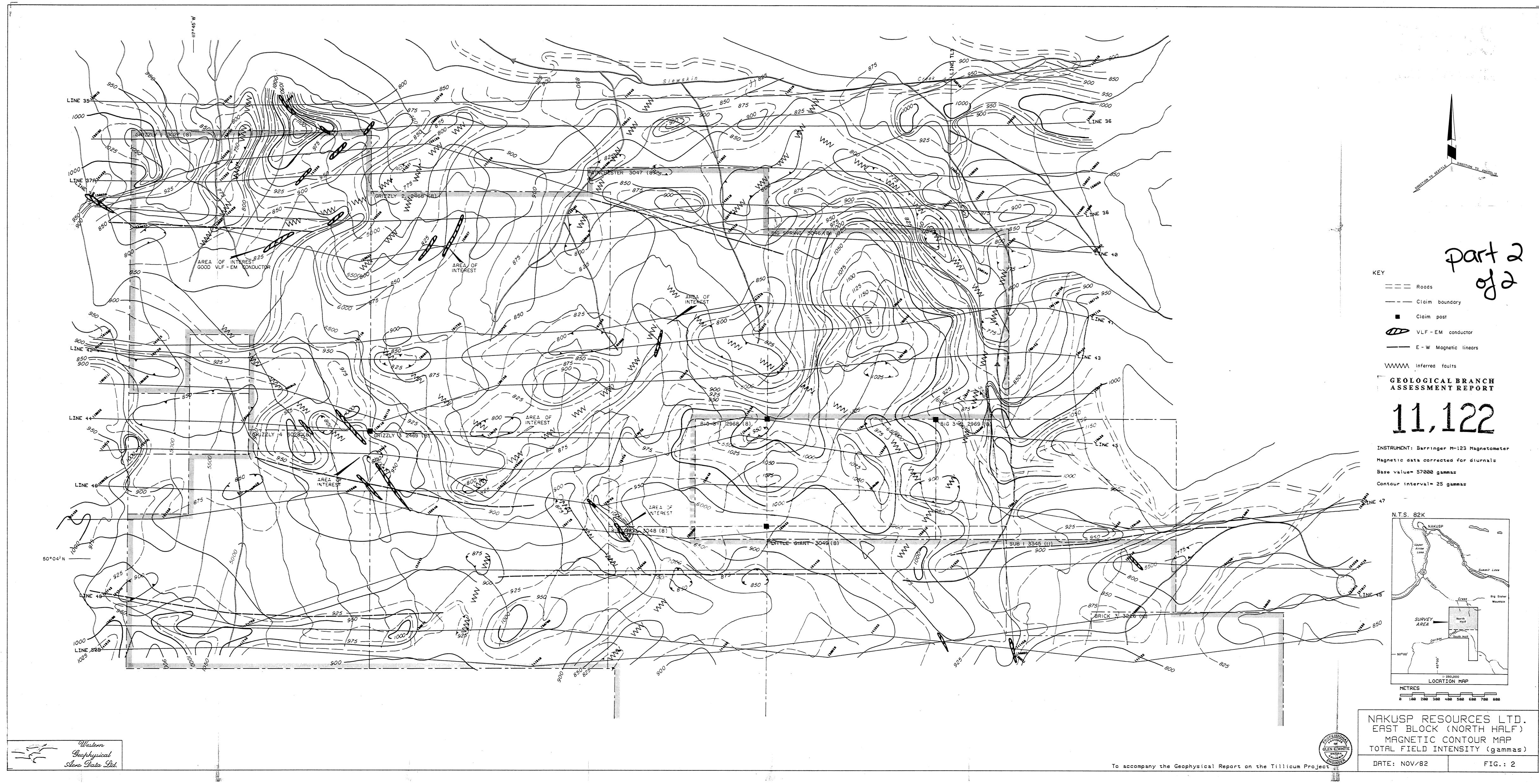
DATA PROCESSING:

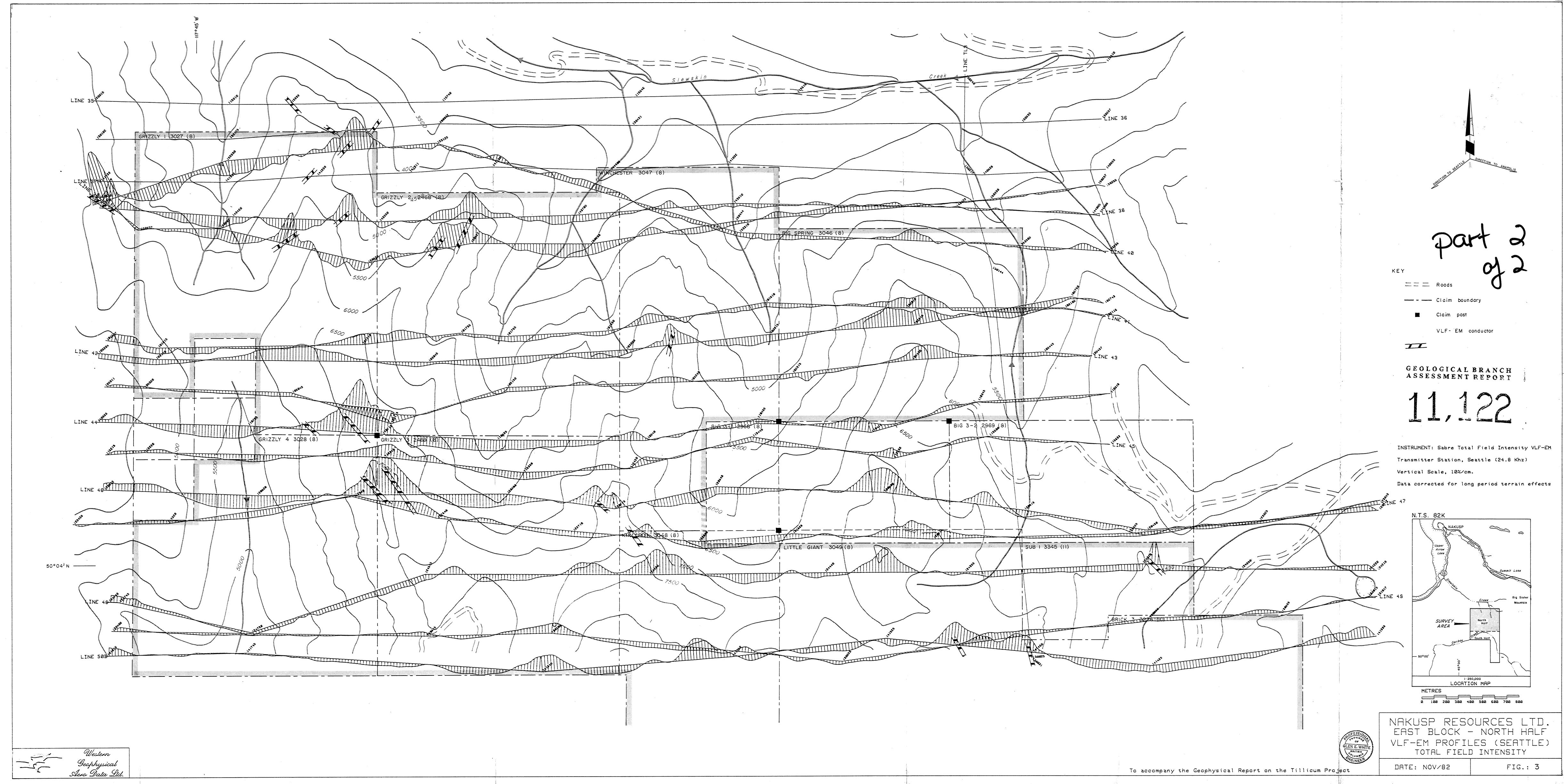
Date: Dec./82, Jan. - March/83
Personnel: J. Behenna
M. McDermitt
T. Pezzot
Interpretation Supervisor Glen E. White, P. Eng.

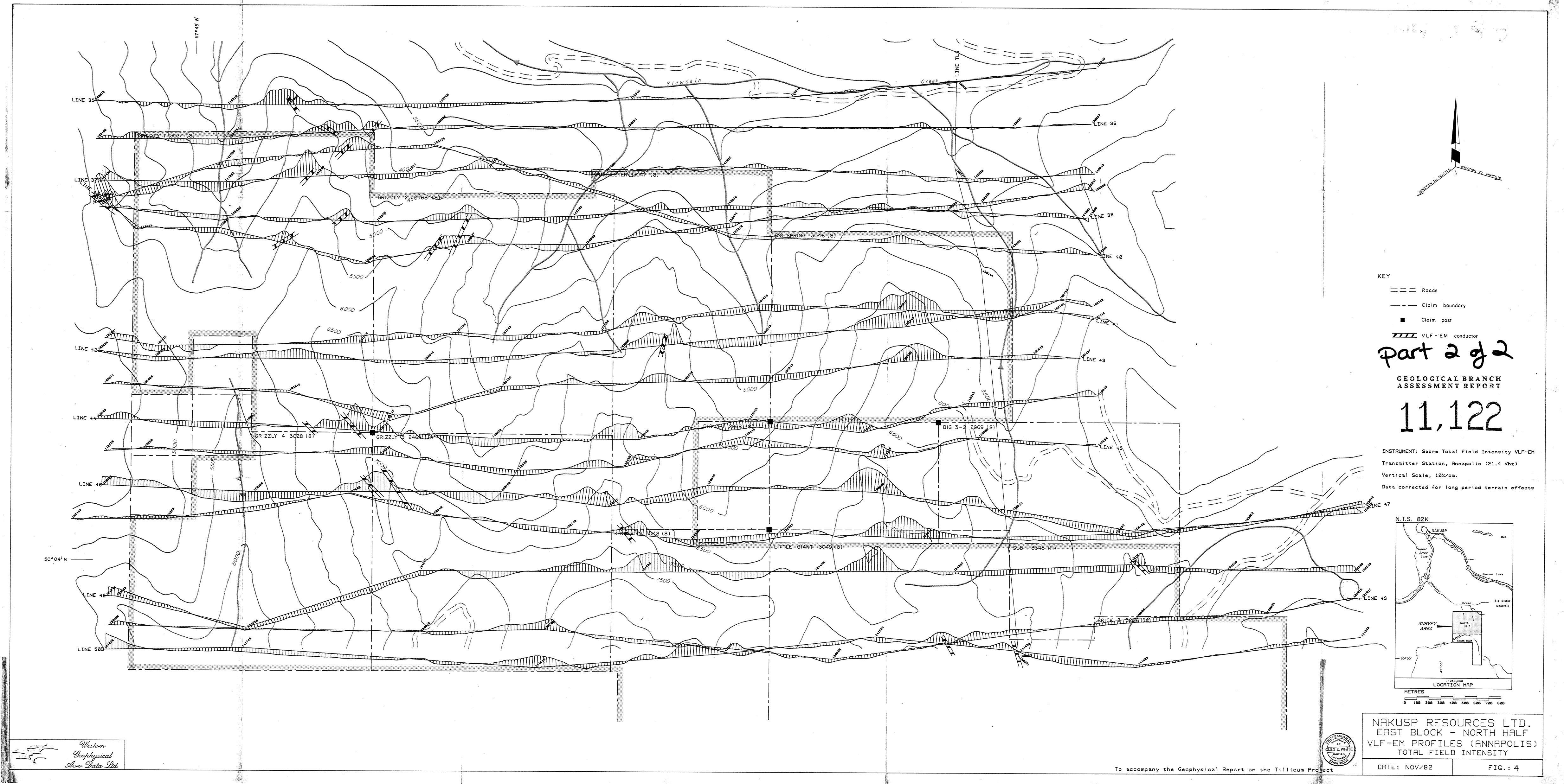
COST:

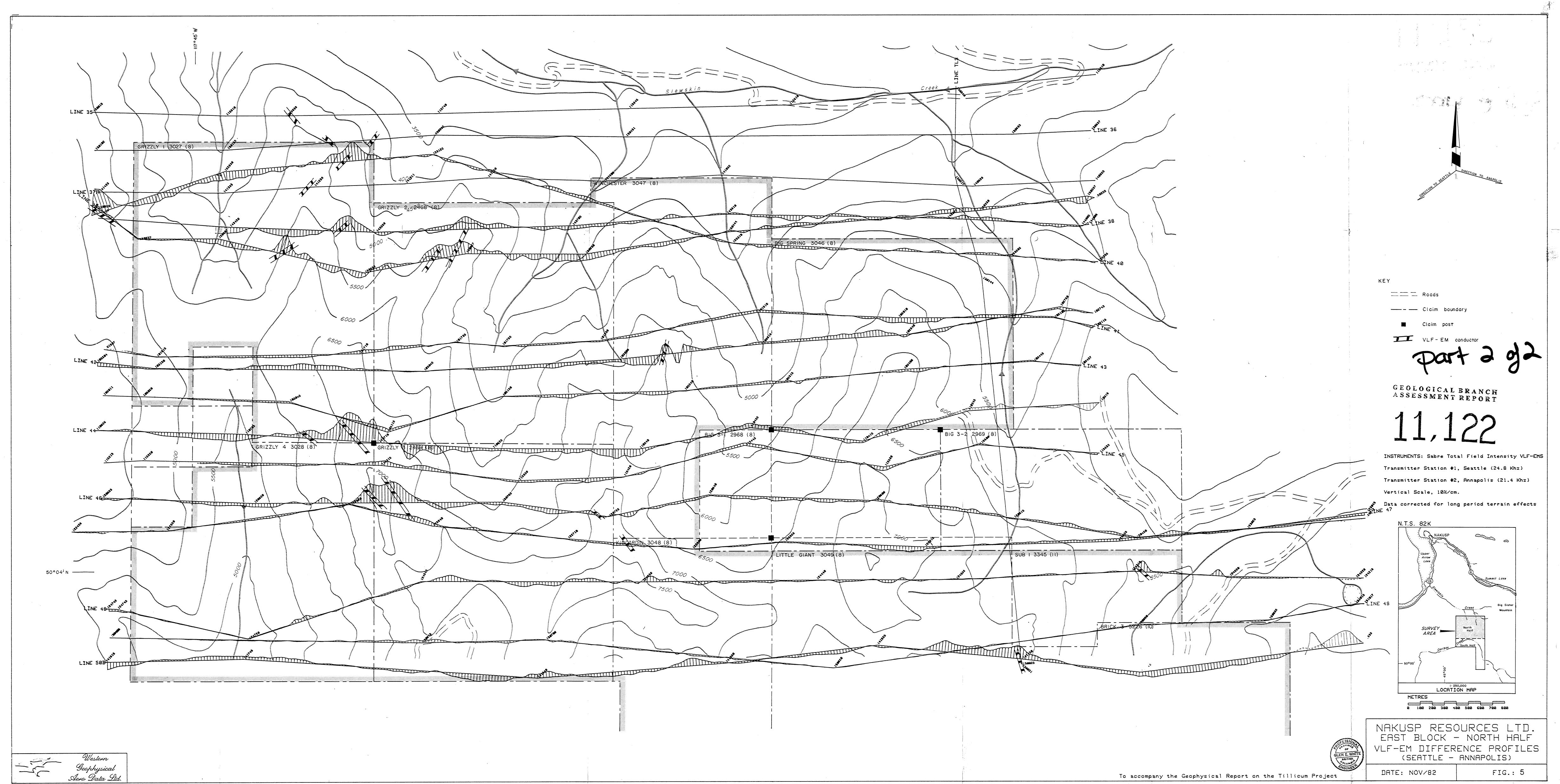
This survey was processed for a fixed fee of \$3600. which covers 60 km of work.

ESTERN GEOPHYSICAL AERO DATA LTD.

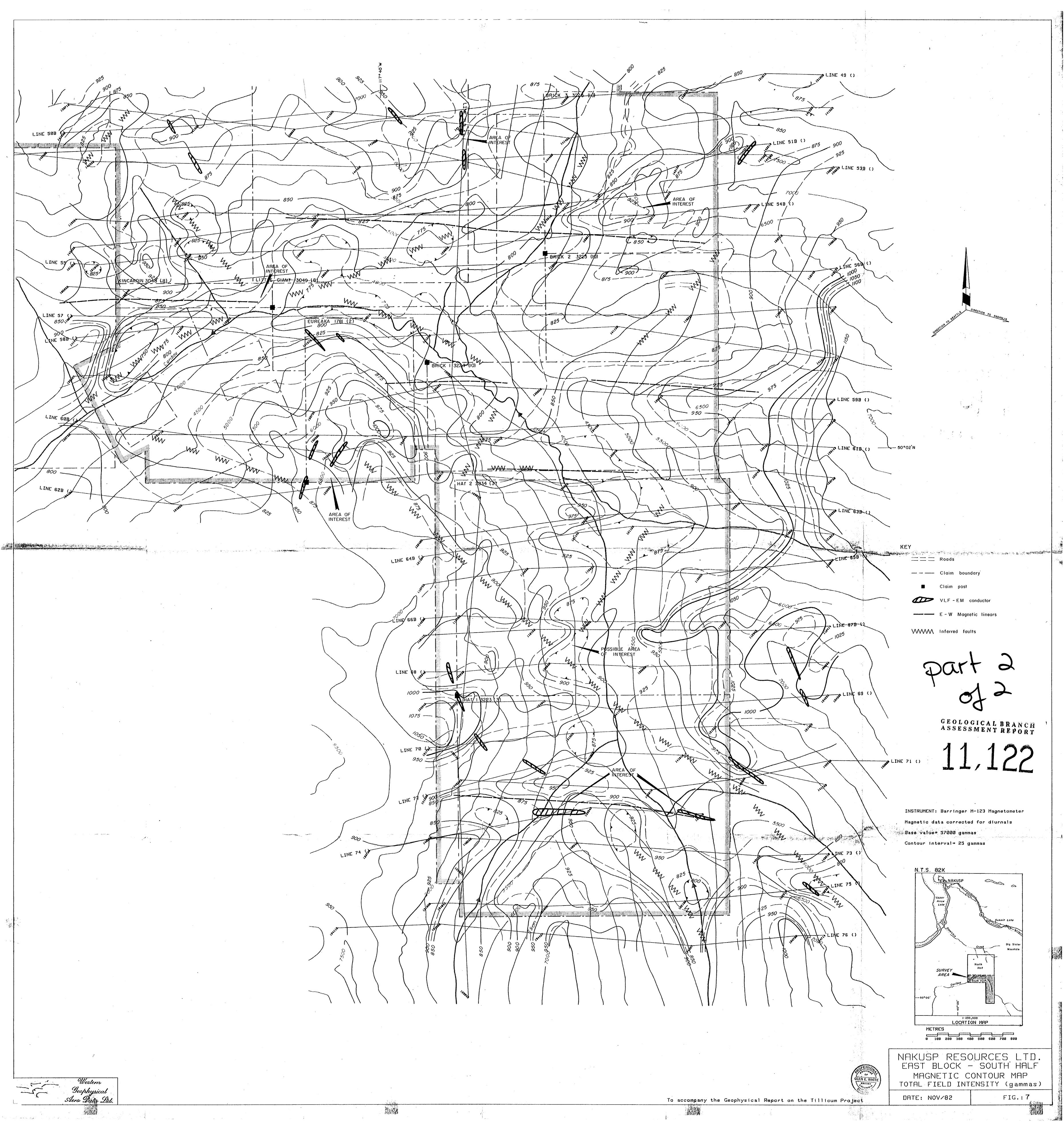


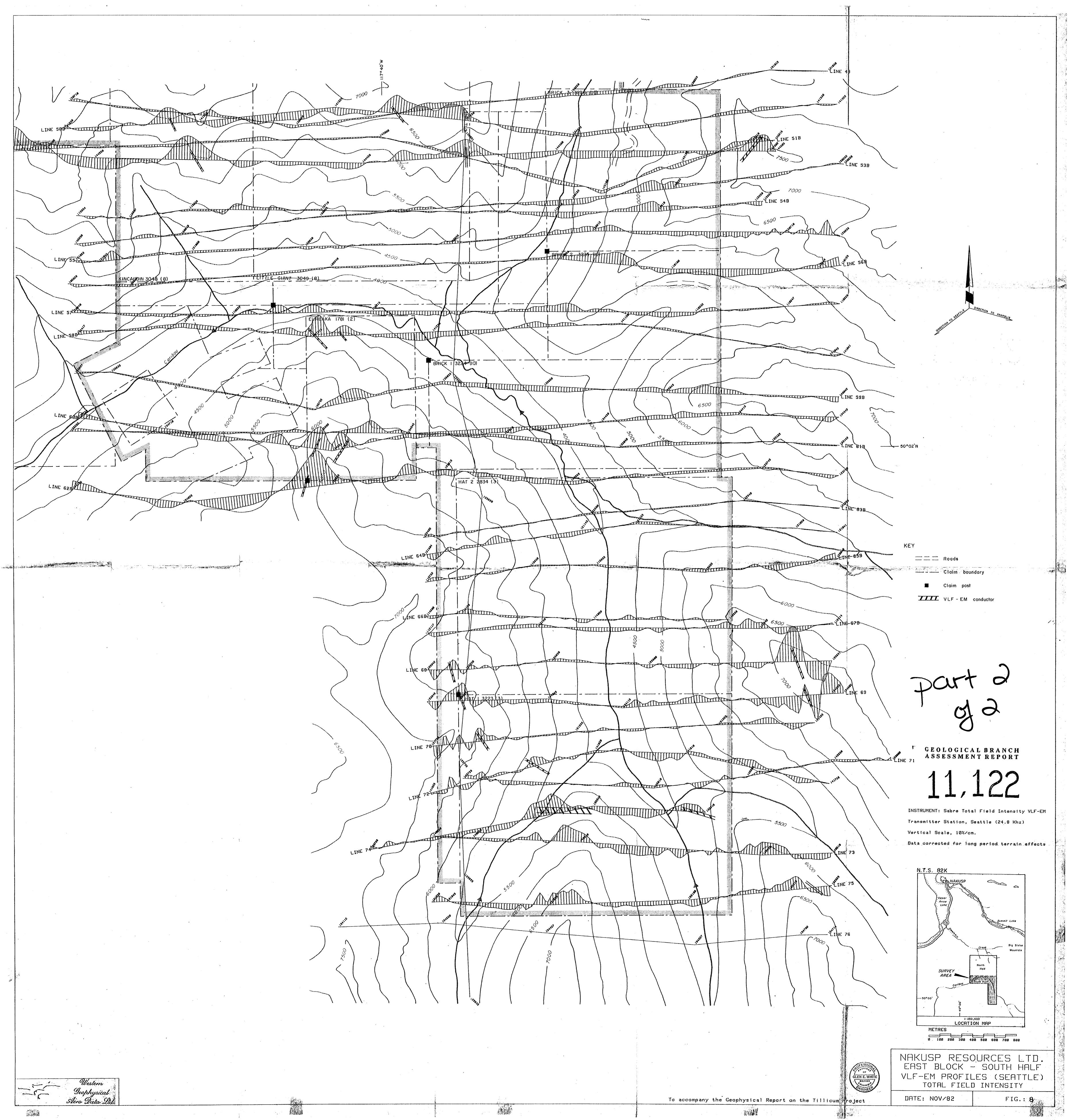


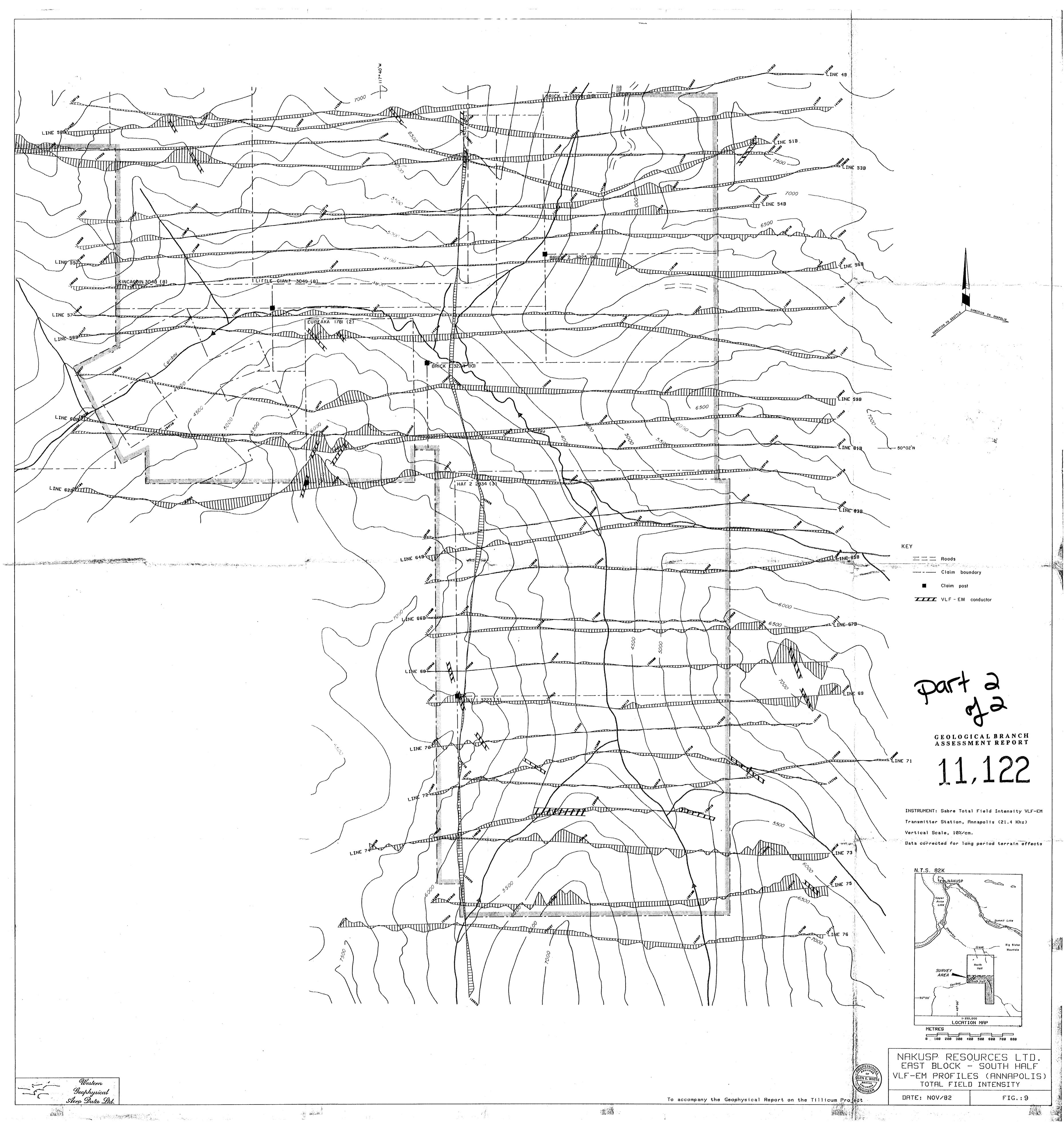


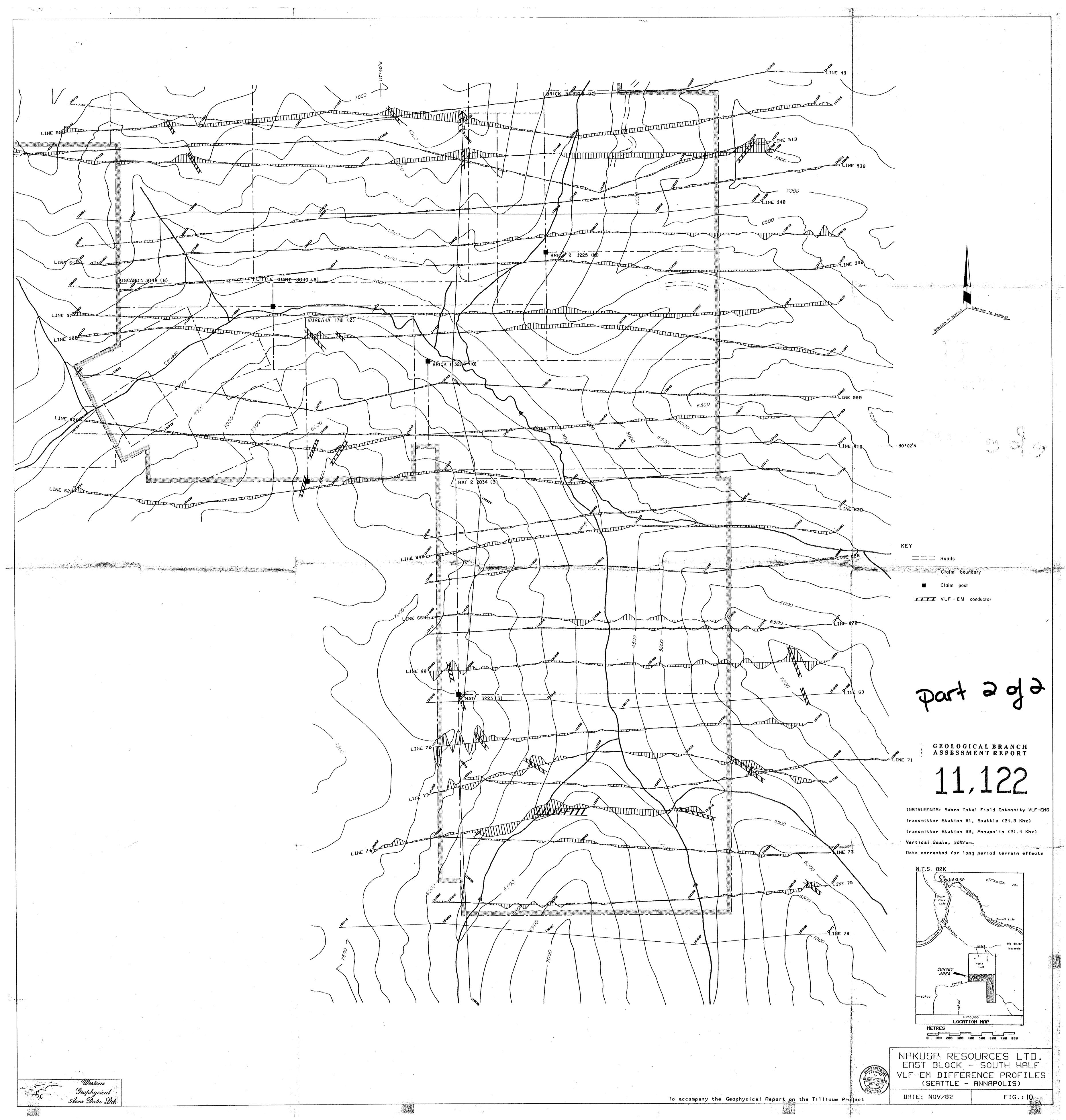














KEY VLF - EM conductor ---- E-W Magnetic linears M Inferred faults , part 2 d2 GEOLOGICAL BRANCH ASSESSMENT REPORT 11,122 N.T.S. 82K a a A NAKUSP Arrow . Loke Summit Lake Big Sister Mountain North Half SURVEY AREA Total Total - 50° 00' LOCATION MAP SCALE APPROXIMATE 200m 100m 0 200m 400m 600m 800m 1 10,000 NAKUSP RESOURCES LTD. EAST BLOCK - SOUTH HALF SLOCAN MINING DIVISION - BRITISH COLUMBIA GEOPHYSICAL INTERPRETATION MAP Interpreted By / G.E.W. Drawn By / FINELINE DRAFTING - Western Geophysical Checked By G E.W. Date | March / 83 Sera Dala Lid. Fig. No 11