87-183-15995

Operator: **TOODOGGONE GOLD INC.**

3/88

GEOPHYSICAL REPORT
ON AN
AIRBORNE VLF-ELECTROMAGNETOMETER
AND MAGNETOMETER SURVEY
GACHO, SUET CLAIMS LIARD MINING DIVISION
LATITUDE: 57°35'N LONGITUDE: 127°24'W
NTS 94E/11W

AUTHORS: E. Trent Pezzot, B.Sc.,
Geophysicist
Vladimir Cukor, P.Eng.,
Geological Engineer

DATE OF WORK: Mar.29, Apr.4,20,21,1986
DATE OF REPORT: Feb.21,1987

Owner: Clive Ashworth

FILMED

SUB-RECORDER
RECEIVED
FEB 2 1 1987
M.R. # $
VANCOUVER, B.C.

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,995

WESTERN GEOPHYSICAL AERO DATA LTD.

TABLE OF CONTENTS **PAGE**

ILLUSTRATIONS

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. **Toodoggone Gold Inc.** commissioned Western Geophysical Aero Data to process and interpret the geophysical data gathered across the **Gacho and Suet** claims.

These claims straddle a tributary of Adoogatcho Creek and are for the most part overlain by glacial till and unmapped geologically. It was the intention of this survey to assist the geological mapping of the area, evaluate the mineral potential and direct ground exploration to any favorably anomalous locations.

PROPERTY

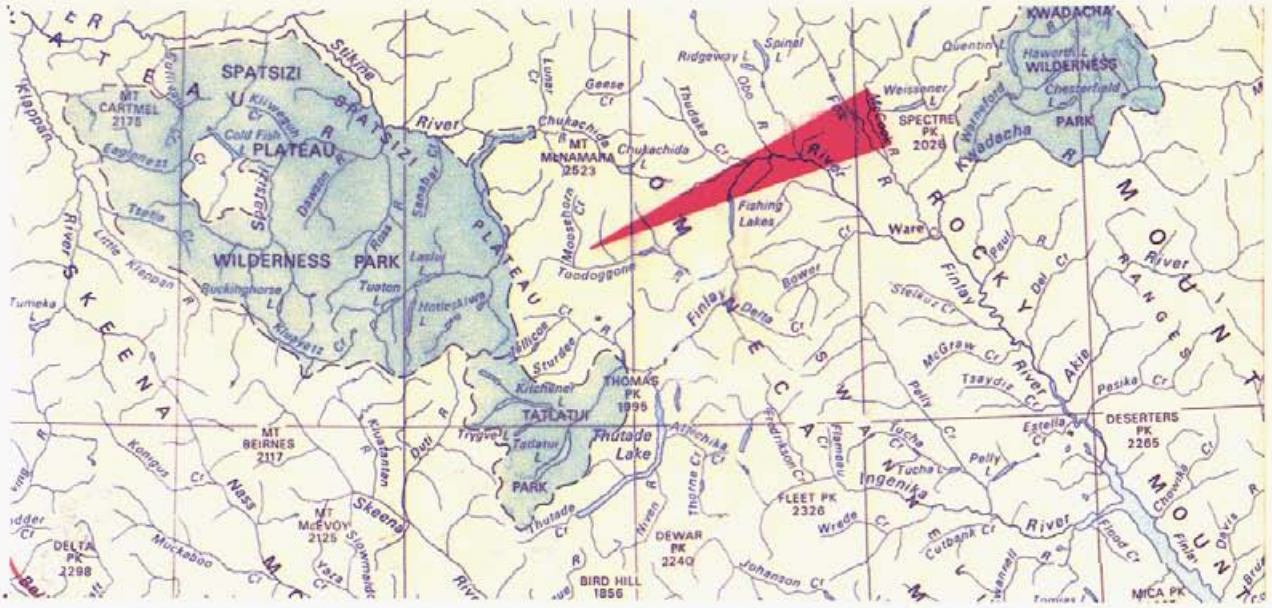
The subject claims are described below and illustrated on Figure 2.

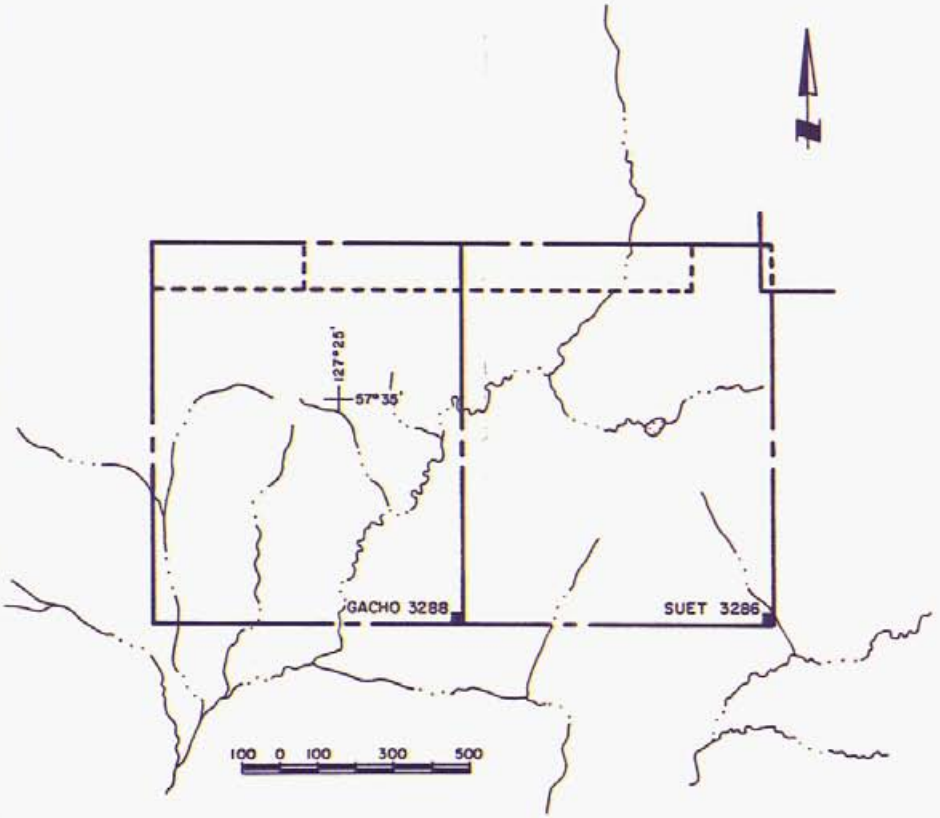
CLAIM NAME	RECORD NO.	UNITS	RECORD DATE
GACHO	3288	20	March 25,1985
SUET	3286	20	March 25,1985

LOCATION AND ACCESS

These claims straddle a tributary of Adoogatcho Creek, approximately 12 km due north of the Thesis gold deposits owned by Energex Minerals Ltd. They lie within the Liard Mining Division and NTS 94E/11W. The approximate geographical coordinates of the centre of the claim group are latitude 57°35'N and longitude 127°24'W.

Access to the area is normally achieved via fixed wing aircraft from Smithers, B.C. to the Sturdee River airstrip.





TOODOGGONE GOLD INC.

GACHO & SUET CLAIMS

LOCATION AND CLAIMS MAP

Western Geophysical Aero Data Ltd.

FIGURE 1

Historically, a number of helicopter companies have established summer bases at the Sturdee River airstrip and have been available for casual charter to nearby areas.

HISTORY AND PREVIOUS WORK

The Toodoggone area was investigated for placer gold in the 1920's and 1930's. A public company, Two Brothers Valley Gold Mines Ltd., undertook considerable test work, including drilling in 1934. Most of this work was directed towards extensive gravel deposits principally near the junction of McClair Creek and the Toodoggone River.

Gold-silver mineralization was discovered on the Chappelle (Baker Mine) property by Kennco Explorations (Western) Ltd. in 1969. DuPont of Canada Exploration Ltd. acquired the property in 1974 and began production at a milling rate of 90 tonnes per day in 1980.

Numerous other gold-silver discoveries were made in the 1970's and 1980's, including the Lawyers deposit which was discovered by Kennco in 1973 and optioned by SEREM Ltd. in 1979. Work on this property to date has included considerable trenching, drilling and underground development and a feasibility study is currently underway.

Within the belt, three properties show ore reserves: Baker Mine (Du Pont of Canada) 52,000 tonnes 1.07 oz/tonne Au, 23,2 oz/tonne Ag, Lawyers (Serem Inc.) 561,000 tonnes 0.21 oz/tonne Au, 7.1 oz/tonne Ag, Al (Energex Minerals Ltd.) 160,000 tonnes 0.37 oz/tonne Au (subsequently, Lawyers reserves were increased to 1,4000,000 tonnes of unknown grade).

The Toodoggone area has been the scene of intense exploration activity during the past four years with

numerous companies exploring over 3,000 mineral claim units. Exploration and development expenditures to 1985 are estimated to be in the order of $33 million.

Geochemical reconnaisance (1985 - Hi-Tec Resources Management Ltd.) consisted of soil sampling along contour lines, just below the outcrop boundaries. Several anomalous gold-silver results were received. No geological mapping or rock sampling was performed on the claims at that time.

REGIONAL GEOLOGY

The general geology of the area is shown on Preliminary Map 61, B.C. Ministry of Energy, Mines and Petroleum Resources by L.J.Diakow, A.Panteleyev and T.G.Schroeder, 1985 and on Open File, Geologic Survey of Canada, by H.Gabrielse, C.J.Dodds, J.L.Mansy and G.H.Eisbacher, 1977.

The Toodoggone River area is set within the Intermontaine Belt. The main geologic units are the Upper Cretaceous Sustut Group, the Lower to Middle Jurassic Toodoggone Volcanics, the Upper Triassic Takla Group and Permian carbonate units thought to belong to the Asitka Group. Several intrusive bodies of quartz monzonitic to grano-dioritic composition, irregular in size and shape (belonging to the Omineca Intrusives) intruded the volcano-sedimentary complex in several localities. Swarms of dykes and small stocks are related to these intrusions.

The Asitka group limestones were deposited in a marine environment. The Takla rocks are the product of a volcanic event that may have been accompanied by an uplift of the whole area (possibly changing the environment from submarine to sub-areal). The result is a complex of interlayered volcanic and sedimentary units. This was followed by a

period of regression and related deformations. These followed a volcanic episode during which the cyclic Toodoggone Volcanic rocks were formed. The event started with a quartzose acidic extrusion, followed by a mafic extrusion, and then by several intermediate extrusions. Much of the volcanics were porphyritic flows but within each cycle there are pyroclastic units and conglomerates, lahars and sandstones (reworked pyroclastics).

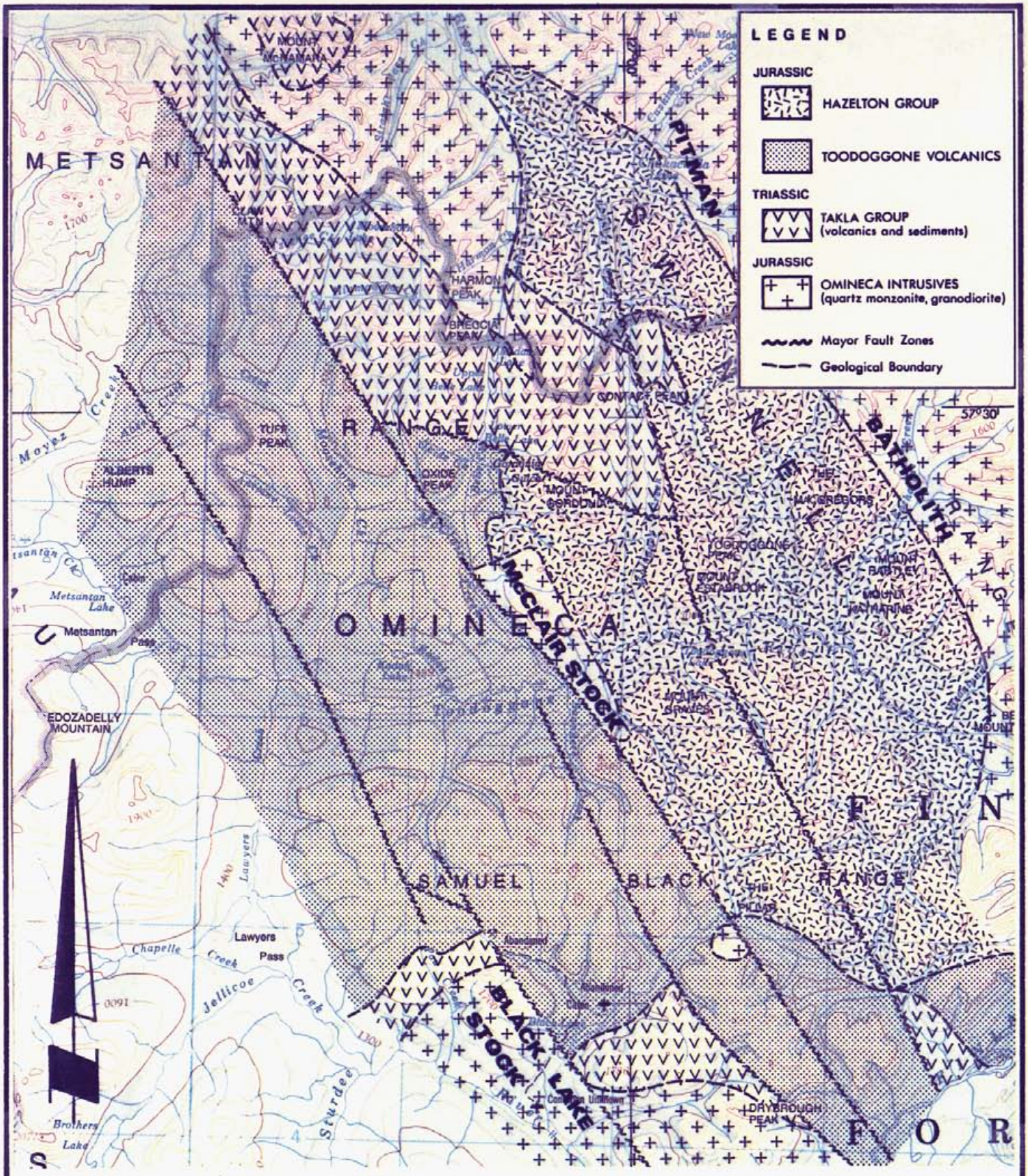
Of the structural elements, the most prominent are three fault zones, trending northwest-southeast, which are intermittently exposed where outcrop is developed and are clearly outlined by the airborne geophysics. They had a major role not only in distribution of geologic units, but also in the emplacement of minerals. The same, northwest-southeast trend is also the general strike of the majority of the lithostratigraphic members.

Local uplifts accompanying intrusions resulted in several domal structures, characterized by a circular distribution of volcano-sedimentary units surrounding an intrusive core.

The Toodoggone River area is an important host of numerous precious metal and base metal prospects. Four main mineral deposit types have been identified:

- porphyry - occurring mainly in Takla Group volcanics and Omineca intrusives.
- skarn - contact of limestones (Asitka, and some in Takla) with intrusive.
- stratabound - occurring in Takla limestones interbedded with cherts.
- epithermal - occurring mainly in Toodoggone Volcanics and in Takla rocks.

Of the four, the epithermal type is the most important, and has been subdivided into two subtypes: fissure vein deposits



Geology after L.J.Diakow, A.Panteleyev and T.G.Schroeter, 1985

GENERALIZED GEOLOGY TOOGGONE RIVER AREA

0 1 5 10 km

PLATE 1a

Western Geophysical Aero Data Ltd.

associated with fracture zones and possibly cauldera formations, and hydrothermally altered and mineralized deposits (associated with major fault zones).

Most common ore minerals in epithermal type deposits are argentite, electrum, native gold and silver. Baker Mine and Lawyers Deposit are the two most prominent deposits of this type in the area. For the generalized geology refer to Plate 1A.

LOCAL GEOLOGY

The claims are located just northeast of Moyez Creek, a short distance east from Newmonts' Golden Lion Prospect. The Preliminary Geology Map by the Ministry of Mines shows the property as being underlain by the Upper Triassic Takla group and the Jurassic Addoogatcho Creek Formation; a sub-division of the Toodoggone Volcanics. Older, Takla rocks are shown to be in thrust fault contact over the younger formation. Most of the claim area is covered by glacial till.

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

LEGEND

QUATERNARY

PLEISTOCENE AND RECENT

UNCONSOLIDATED GLACIAL FLUVIOGLACIAL ALLUVIAL AND COLLUVIAL DEPOSITS

CRETACEOUS

UPPER CRETACEOUS

SUSTUT GROUP *(TANGO CREEK FORMATION)*

K POLYMICTIC CONGLOMERATE SANDSTONE SHALE CARBONACEOUS MUDSTONE

JURASSIC

LOWER AND (?) MIDDLE JURASSIC

"TODDOGGONE VOLCANICS" (?) HAZELTON GROUP

9 UNDIVIDED PREDOMINANTLY GREY GREEN PURPLE AND ORANGE-BROWN HORNBLENDE PLAGIOCLASE AND PLAGIOCLASE PHYRIC ANDESITE PORPHYRY FLOWS TUFFS BRECCIA SOME LAHAR CONGLOMERATE GREYWACKE SILTSTONE RARE RHYOLITE-PERLITE INCLUDES SOME DYKES AND SILLS

LOWER TO MIDDLE JURASSIC

"TODDOGGONE VOLCANICS" (CARTER, 1972)

GREY DACITE

8 DARK TO PALE GREY OR GREEN QUARTZOSE BIOTITE HORNBLENDE PLAGIOCLASE ASH FLOWS OF ANDESITIC AND RARELY DACITIC COMPOSITION VARIABLY WELDED WITH LOCALLY WELL-DEVELOPED COMPACTION LAYERING CONTAINS ABUNDANT GREY DACITE AND RARE GRANITIC CLASTS OUTCROPS ARE COMMONLY BLOCKY AND STRONGLY JOINTED — 182 - 8, 183 - 6 Ma (GSC, HORNBLENDE)

8A POLYMICTIC CONGLOMERATE WITH ABUNDANT TAKLA AND GREY DACITE CLASTS IN A QUARTZOSE SANDSTONE MATRIX

8B GREYWACKE CONGLOMERATE DERIVED ENTIRELY FROM GREY DACITE

TODDOGGONE CRYSTAL ASH TUFFS AND FLOWS

7 RECESSIVE GREY MAUVE PURPLE QUARTZOSE PLAGIOCLASE CRYSTAL TUFF LAPILLI TUFF AND BRECCIA WITH LESSER AGGLOMERATE LAHAR AND EPICLASTIC BEDS INCLUDES SOME WELDED TUFFS AND PYROXENE HORNBLENDE FELDSPAR PORPHYRY FLOWS WHICH ARE LOCALLY DOMINANT SOME MEMBERS CONTAIN NO QUARTZ PINK WEATHERING WHERE LAUMONTITE IS ABUNDANT — 189 - 6 Ma HORNBLENDE

7A *EPICLASTIC RED BEDS* — ARKOSIC SANDSTONE SILTSTONE CONGLOMERATE AND SLIDE DEBRIS CONTAINS SOME CRYSTAL TUFF

TUFF PEAK FORMATION

6 PALE PURPLE GREY AND GREEN BIOTITE AUGITE HORNBLENDE PLAGIOCLASE PORPHYRY FLOWS SOME AUTOBRECCIATED FLOWS MINOR SILLS AND PLUGS SOME CRYSTAL AND LAPILLI TUFF — 197 - 7 Ma BIOTITE, 200 - 7 Ma HORNBLENDE

6A CONGLOMERATE OR LAHAR DERIVED FROM UNITS 6 AND 6B WITH GRADED AND CROSSLAMINATED MUDSTONE AND SANDSTONE INTERBEDS DEBRIS FLOWS LAPILLI AND CRYSTAL TUFFS

6B FLOWS SIMILAR TO UNIT 6 BUT CONTAINING SPARSE ORTHOCLASE MEGACRYSTS

McCLAIR CREEK FORMATION

5 PURPLE LAVENDER GREY RARELY GREY-GREEN CROWDED FINE TO MEDIUM-GRAINED PLAGIOCLASE PORPHYRITIC FLOWS INCLUDES SOME LAPILLI TUFF BRECCIA AND MINOR EPICLASTIC BEDS

5A INTRUSIVE DOME WITH AUTOBRECCIATED CARAPACE AND FLANKING BRECCIA

MAFIC FLOW AND TUFF UNIT

4 *BASALT FLOWS*— THIN BEDDED PURPLE TO DARK GREEN COMMONLY EPIDOTIZED FINE-GRAINED PYROXENE BASALT FLOWS AND TUFFS INCLUDES SOME SILLS AND DYKES

4A PURPLE TO MAUVE MEDIUM-GRAINED PORPHYRITIC BASALT LOCALLY MAUVE TO PINK ZEOLITIZED WITH LAUMONTITE POSSIBLE INTRUSIVE (LACCOLITH)

4B LAPILLI CRYSTAL AND ASH TUFF WELL BEDDED INCLUDES MINOR THINLY BEDDED SANDSTONE AND RARE CALCAREOUS SILTSTONE (MARL) TOTALLY OR IN PART EQUIVALENT TO UNIT 7

4C PYROXENE BIOTITE HORNBLENDE PORPHYRY FLOWS WITH TRACES OF QUARTZ AND K-FELDSPAR INTERBEDDED MINOR BRECCIA AND LAPILLI TUFF TOTALLY OR IN PART EQUIVALENT TO UNIT 6

JURASSIC *(CONTINUED)*

LOWER TO MIDDLE JURASSIC *(CONTINUED)*

"TODDOGGONE VOLCANICS" (CARTER, 1972) *(CONTINUED)*

LAWYERS — METSANTAN QUARTZOSE ANDESITE

3 GREEN TO GREY QUARTZOSE PYROXENE (?) BIOTITE HORNBLENDE PLAGIOCLASE PORPHYRY FLOWS AND TUFFS QUARTZ CONTENT RANGES FROM NEGLIGIBLE TO ABOUT 3 PER CENT IN THE NORTH FLOWS PREDOMINATE WITH LOCAL FLOW BRECCIA LAPILLI TUFF AND RARE WELDED TUFF UNITS TOWARD THE SOUTH ASH FLOWS ARE COMMON INCLUDING RARE SURGE DEPOSITS THE UNIT CONTAINS EXTENSIVE ZONES OF EPIDOTIZED PYRITIC ROCK WITH CHARACTERISTIC SALMON PINK AND ORANGE PLAGIOCLASE CRYSTALS — 168 - 6 Ma HYDROTHERMAL ADULARIA

MOYEZ CREEK VOLCANICLASTICS

2 CONGLOMERATE WITH SOME GRANITIC CLASTS GRADED CROSS-BEDDED GREYWACKE WELL-BEDDED CRYSTAL TUFF EPICLASTIC SEDIMENTS LOCAL LAMINATED CALCAREOUS SILT (MARL) RARE THIN LIMESTONE AND CHERT LOCAL COARSE LANDSLIDE DEBRIS AND LAHAR IN PART OR TOTALLY EQUIVALENT TO UNIT 6A

2A CRYSTAL TUFFS IN THIN WELL LAYERED UNITS SOME EPICLASTIC SANDSTONE AND MUDSTONE RARE PLANT FRAGMENTS IN SOME BEDS MINOR LAPILLI TUFF

ADDOOGATCHO CREEK FORMATION

1 PALE REDDISH GREY TO DARK RED-BROWN QUARTZOSE BIOTITE HORNBLENDE PHYRIC ASH FLOWS THE ROCKS CONTAIN MINOR SANIDINE AND RARE AUGITE WELDING IS WIDESPREAD AND RANGES FROM INCIPIENT TO EUTAXITIC LOCALLY ORANGE TO BROWN VITROPHYRIC CLASTS ARE COMMON INCLUDES LAPILLI TUFF AND BRECCIA UNITS AS WELL AS MINOR LAYERED GROUND SURGE DEPOSITS — 199 - 7, 202 - 7 Ma BIOTITE, 200 - 7 Ma HORNBLENDE, 190 - 7 Ma HYDROTHERMAL ALUNITE (WHOLE ROCK)

1A CRYSTAL ASH TUFF LAPILLI TUFF AND RARE AGGLOMERATE WITH INTERSPERSED EPICLASTIC BEDS TUFFACEOUS SEDIMENTS AND MINOR CONGLOMERATE THAT LOCALLY CONTAINS GRANITIC CLASTS MINOR HORNBLENDE PLAGIOCLASE PHYRIC FLOWS FORMING SINGLE OR THIN COMPOSITE FLOW UNITS — 204 - 7 Ma BIOTITE

1B *QUARTZOSE PLAGIOCLASE PORPHYRY* — JOINTED DOMAL INTRUSION (?) OF HOMOGENOUS-APPEARING GREY TO GREEN CHLORITIZED AND EPIDOTE-ALTERED ROCK CONTAINING ABUNDANT INCLUSIONS OF TAKLA VOLCANICS AND RARE METAMORPHIC ROCK CLASTS

TRIASSIC

UPPER TRIASSIC

TAKLA GROUP

Tr DARK GREEN AUGITE PORPHYRY BASALT FLOWS AND BRECCIAS WITH LESSER *FINE GRAINED ANDESITE TO BASALT FLOWS* AND MINOR INTERBEDDED SILTSTONE TUFFACEOUS SEDIMENTS AND CHERT CONTAINS LIMESTONE LENSES THAT MAY BE PART OF THE ASITKA GROUP

PALEOZOIC

PERMIAN

P **ASITKA GROUP?**

PREDOMINANTLY LIMESTONE (INCLUDING MARBLE AND MINOR SKARN) WITH SOME ARGILLITE BLACK SHALE AND CHERT UNITS COMPOSED OF LIMESTONE CHERT ARGILLITE AND BASALT (Pv c) MAY BE IN PART OR TOTALLY TAKLA GROUP

INTRUSIVE ROCKS

JURASSIC

LOWER JURASSIC (DYKES, SILLS, AND SMALL PLUGS)

A BASALT

B AUGITE HORNBLENDE PORPHYRY — BASALTIC STOCK DOMAL INTRUSION (OR TAKLA INLIER) — 210 - 6 Ma HORNBLENDE

C BIOTITE HORNBLENDE DIORITE GABBRO

D PYROXENE PLAGIOCLASE PORPHYRY

LOWER TO MIDDLE JURASSIC (DYKES AND STOCKS)

E QUARTZ MONZONITE GRANODIORITE—MEGACRYSTIC IN PART MINOR SYENITE OR QUARTZOSE SYENITE ALONG CONTACTS

E1 GRANODIORITE QUARTZ DIORITE — MEDIUM GRAINED PORPHYRITIC FOLIATED IN PART

F FELDSPAR PORPHYRY HORNBLENDE FELDSPAR PORPHYRY — DYKES AND PLUGS RARE QUARTZ FELDSPAR PORPHYRY

SYMBOLS

MINERAL OCCURRENCE (MINERAL INVENTORY FILE NUMBER) — × 43

MINERAL PROSPECT (MINERAL INVENTORY FILE NUMBER) — ⚒ 34

EXPLORATION CAMP

PLACER WORKINGS

PARK BOUNDARY

ROAD

MAIN OUTCROP AREAS

FAULT (OBSERVED, INFERRED)

THRUST OR REVERSE FAULT (OBSERVED, INFERRED)

GEOLOGIC CONTACT (DEFINED, ASSUMED)

BEDDING, LAYERING, FOLIATION (HORIZONTAL, INCLINED, VERTICAL) — + 10

FOLD AXES

FOSSIL LOCALITY (PLANT DEBRIS) — (F)

RADIOMETRIC DATE SAMPLE SITE, AGE IN Ma — (A) 104

VOLCANIC VENT

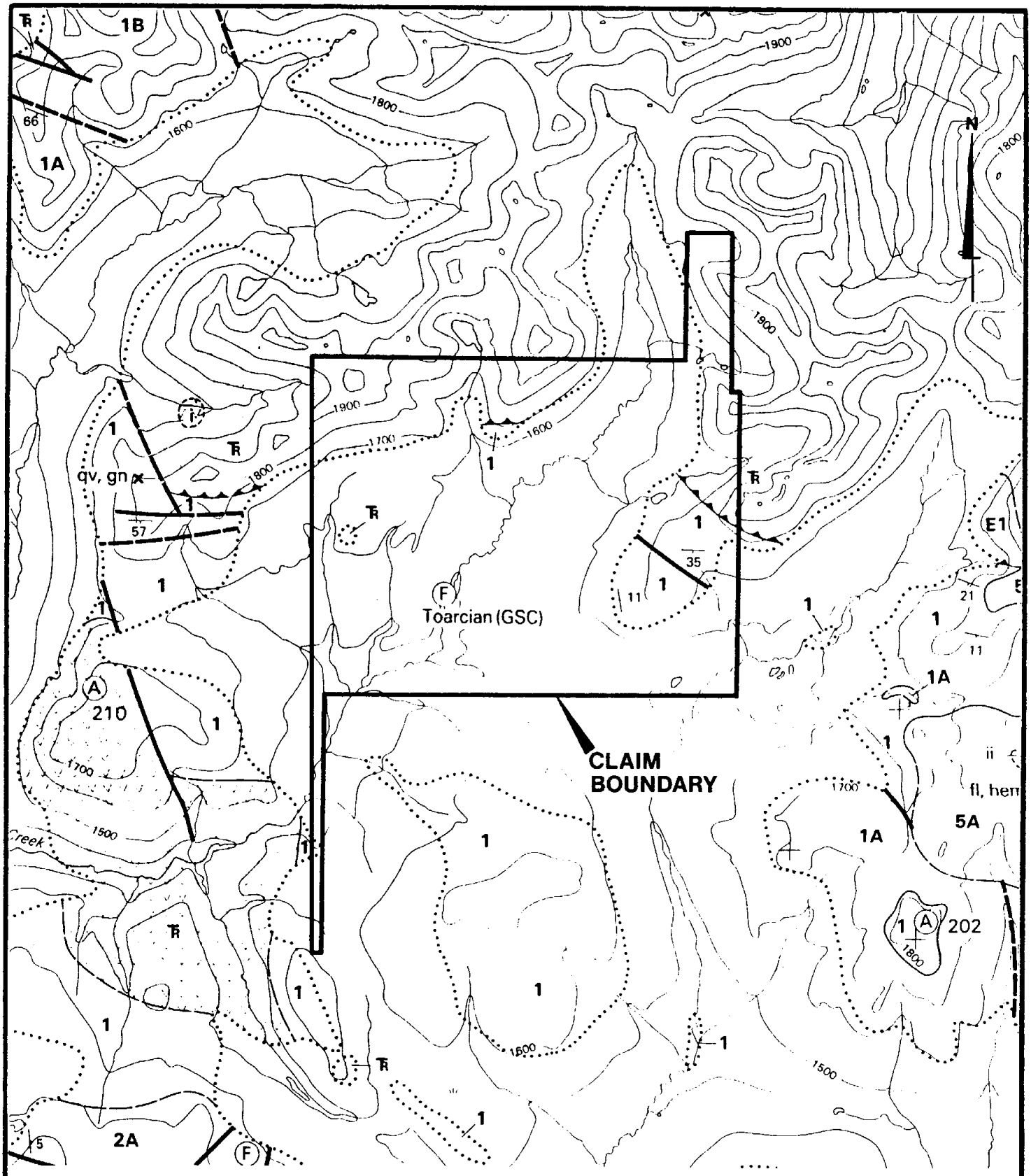
HYDROTHERMAL ALTERATION

FERRICRETE, QUATERNARY FERRUGINOUS BRECCIA — (w)

SILICA, CLAY MINERALS ± ALUNITE, BARITE — (s)

CLAY MINERALS ± ALUNITE, SILICA, HEMATITE — (c)

GOSSAN, LIMONITIC ZONE — (i)



After L.J.Diakow, A.Panteleyev and T.G.Schroeter, 1985

LOCAL GEOLOGY

Western Geophysical Aero Data Ltd.

500 0 500 1000 2000 meters

PLATE 1b

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 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.

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.

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

The **Gaucho and Suet** claims were surveyed on March 29, April 4, 20 and 21, 1986. One hundred seventy-eight line kilometres of data has been recovered to examine in detail these claims and the surrounding area. Survey lines were flown east-west on 200 metre centres with data being digitally recorded at one second intervals, providing an average sample spacing of 25 metres. The sensors were towed beneath the helicopter and maintained a terrain clearance of approximately 60 metres. The magnetic data is presented in contour form on an orthophotomosaic base map of the area as Figure 2. The VLF-EM data is presented in profile format as Figures 3 and 4 representing the Seattle and Annapolis frequency information respectively.

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

The magnetic data is a useful tool for mapping both regional and local geological structures. Many localized magnetic variations are observed which are attributed to lithological changes.

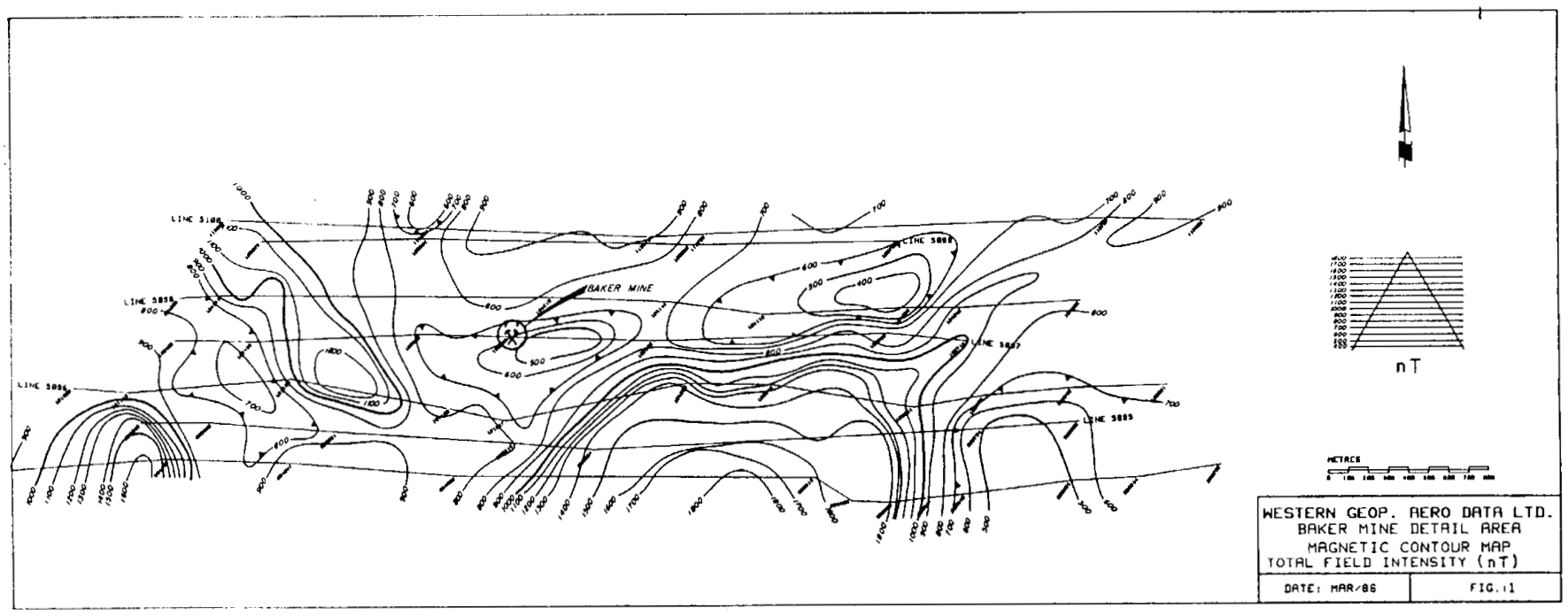
There are two distinctive magnetic signatures observed which appear consistent across the large survey area. Firstly,

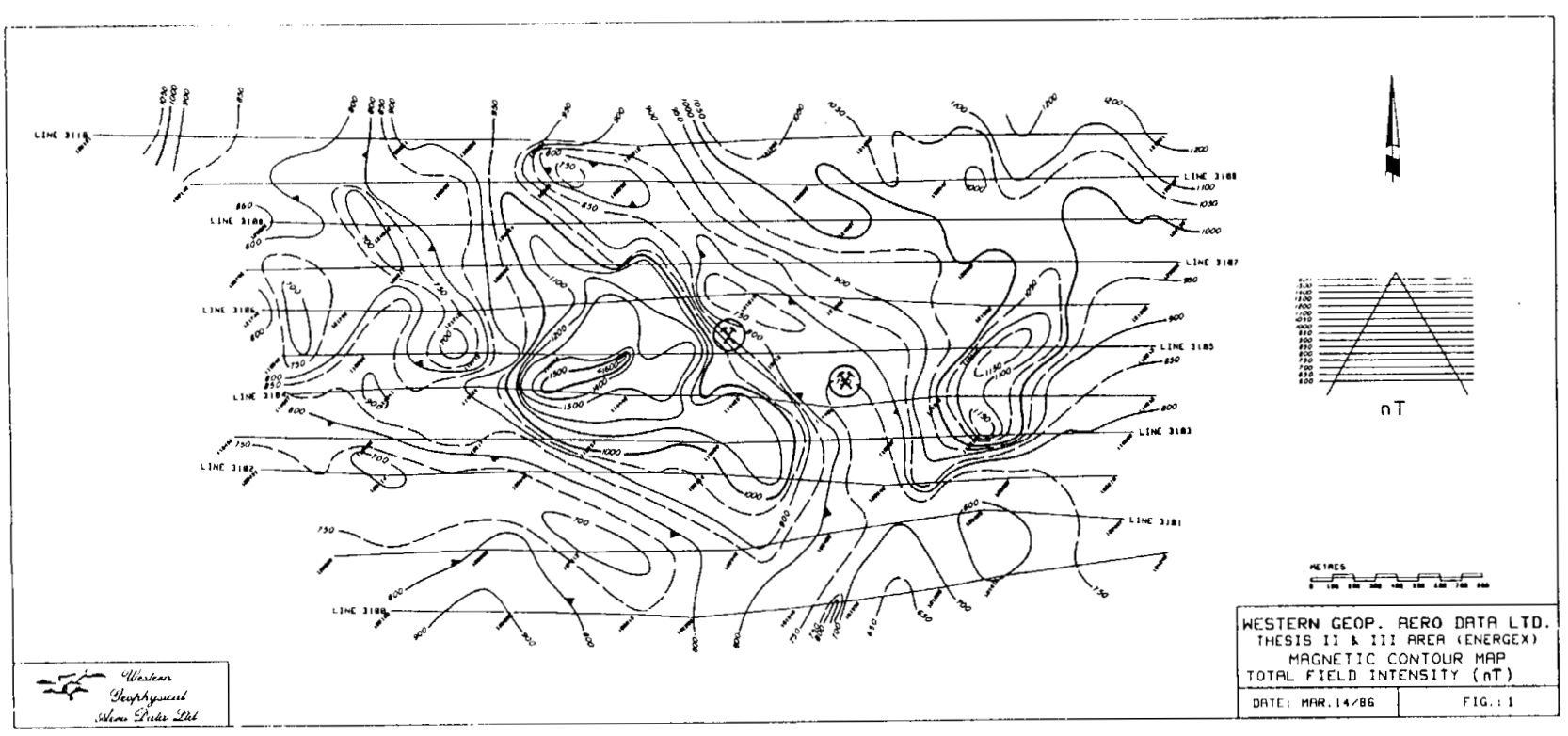
Jurassic intrusions appear as magnetic highs; typically with an intensity of greater than 59,300 nT. Secondly, major fault and shear zones appear as linear magnetic lows, generally with intensities of less than 59,000 nT, and often positioned along the flanks of intrusive bodies. The combination of these two signatures are observed across many of the larger epithermal precious metal deposits in the area. Plate 2 of this report illustrates this effect at the Baker Mine, Lawyers and Thesis deposits. The magnetic response is interpreted as reflecting only the general geological environment of these areas and does not map any mineralization directly.

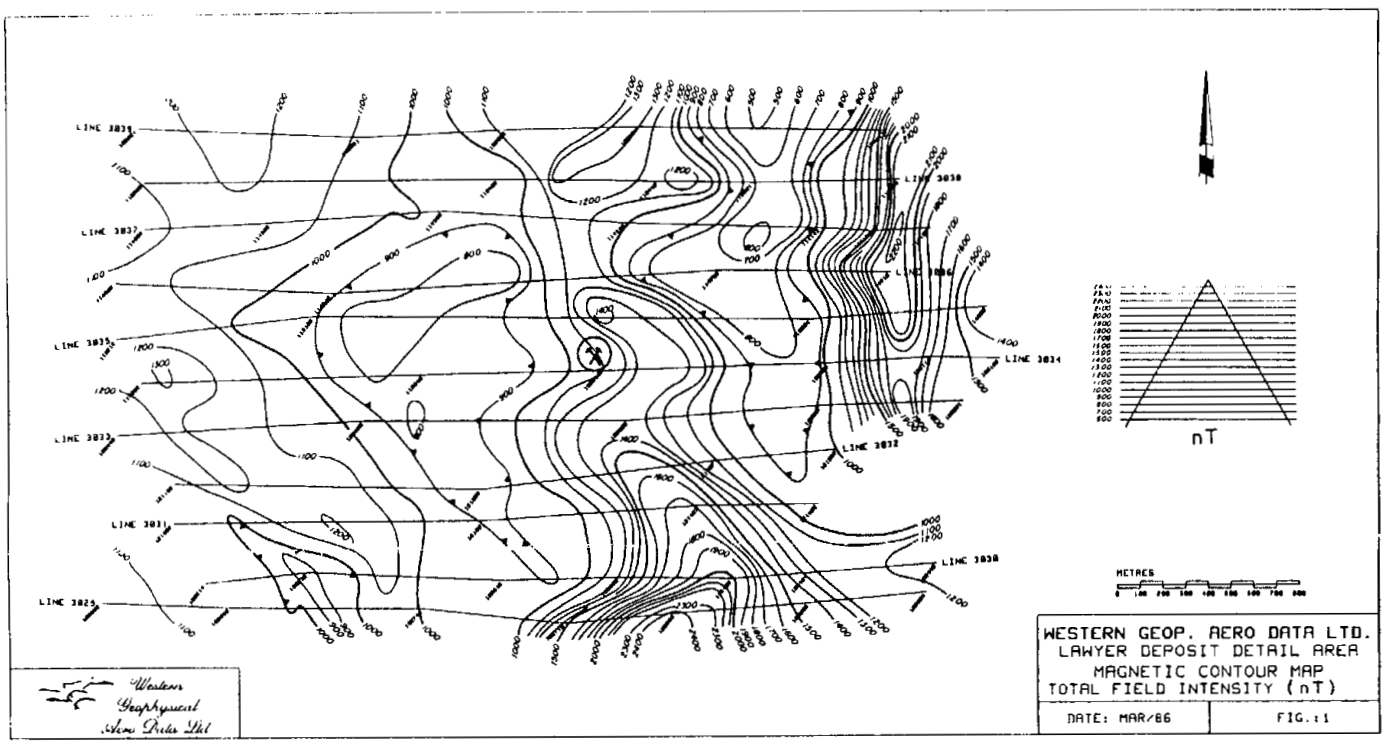
The **Gacho and Suet** claims straddle a tributary of Adoogatcho Creek and is primarily covered by glacial till. The B.C. Department of Mines mapping indicates from very sparce outcrop that the northern portion of the claims are underlain by Triassic Takla group volcanics. Furthermore these are apparently lying in thrust fault contact with Addogatcho Creek Formation ash flows to the south.

The magnetic data, contoured on Figure 1, suggests the southern half of the **Gacho and Suet** claims are underlain by a relatively undisturbed volcanic unit. Contours reflect a west-northwesterly strike to the geology in this area.

The magnetic data across the northern half of these claims reflects a much more complex geological environment, dominated by east-west faulting and late Jurassic intrusive rocks. A large magnetic high located in the northwest corner of the **Gacho** claim and to the west of the claim is interpreted as the reflection of a late Jurassic intrusion. Smaller intrusions are also interpreted, on the basis of the magnetic data, on the eastern border of the **Suet** claim, to the northeast of the **Suet** claim, and straddling the northern borders of both claims.







MAGNETIC RESPONSE EXAMPLES

BASE VALUE 58,000 – nT

GEOLOGICAL BRANCH
ASSESSMENT REPORT

Western Geophysical Aero Data Ltd.

15,995

PLATE 2

Extensive fault activity is observed across the northern portion of the claims as sharp magnetic gradients and abnormally low magnetic intensity lineations. The geologically mapped thrust fault in this area forms an arcuate structure, convex to the north with the apex located in the northeast corner of the **Gacho** claims. The magnetic data mirrors this general trend but also delineates five other faults which radiate out from the apex as illustrated on Figure 2. These faults finger between the above mentioned intrusions.

The VLF-EM data is presented in profile format on Figures 3 and 4 representing the Seattle and Annapolis frequency respectively. Anomalous responses have been flagged on the appropriate map and also transferred to Figure 2 for easy comparison to the magnetic data.

No strong conductivity lineations where observed in either of the Seattle or Annapolis frequency data sets. The anomalous responses flagged all exhibit short strike length and reflect surface or very near surface inhomogenieties. They are essentially confined to the northern portion of the survey area, in the extensively faulted Takla group volcanic rocks. The most common sources of these weak VLF-EM anomalies are overburden variations, topographic highs and lows and surface drainage systems. Small shears and faults are possible sources as well.

SUMMARY AND CONCLUSIONS

The **Gacho and Suet** claims were surveyed as part of a regional program of airborne magnetometer and VLF-electromagnetometer survey conducted across the Toodoggone Gold Belt in early 1986. One hundred seventy-eight kilometres of data has been recovered and analyzed to evaluate these claims. The southern portion of the claims area is

underlain by a relatively undisturbed volcanic unit; probably the Adoogatcho Creek Formation. One northwesterly trending fault enters the **Suet** claim from the south.

The northern portion of the claims appears to be underlain by Takla group volcanics. A northwardly convex thrust fault crosses the claims separating the Takla and Adoogatcho Creek units. Numerous faults radiate northward from the apex of the thrust fault, positioned in the northeast corner of the **Gacho** claim. Anomalous gold and silver geochemical values were mapped in this area.

A number of late Jurassic intrusions are magnetically mapped to the north of the Thrust fault, within the Takla volcanic host environment. The largest of these is located in the northwest corner and to the west of the **Gacho** claim. A distinct correlation between these intrusions and the radiating faults is noted.

A large number of near surface conductivity anomalies are mapped within the Takla group volcanics. These are likely related to either geomorphic features or small shears and faults.

RECOMMENDATIONS

The most important type of economic mineralization identified in the Toodoggone area are epithermal precious and base metal deposits hosted principally by lower and middle units of Toodoggone volcanics. Mineralization occurs principally in fissure veins, quartz stockworks breccia zones and areas of silicification, generally close to major fault systems and associated with intrusive activity.

The **Gacho and Suet** claims warrant continued exploration for this geological model. Efforts should be concentrated in

the northern half of the claim group along the flanks of the intrusive bodies and within the magnetic lows delineating fault and alteration zones. The focal point of the radiating fault pattern is located in the northeast corner of the **Gacho** claim and deserves the highest priority for ground investigation.

Exploration should initially consist of geological prospecting and mapping of the limited outcrop. A systmatic and detailed geochemical survey analyzing for gold, silver and the common sulphide elements is also recommended. Contingent upon encouraging results, exploration for silicified zones may be warranted. Induced polarization, resistivity and certain electromagnetic methods have proven useful in this environment for delineating highly resistive silicified zones. A ground magnetometer survey may also be warranted to precisely delineate the edges of the intrusive bodies prior to diamond drilling and trenching.

Respectfully submitted,

E. Trent Pezzot, B.Sc.,
Geophysicist

Vladimir Curok, P.Eng.,
Geological Engineer

COST BREAKDOWN

This report detailing the results of the airborne magnetometer and VLF-electromagnetometer survey and a compilation of geological information was prepared for an all inclusive fee of $12,710.00. This total is based on a cost structure of $35/km for magnetometer data and $15/km for each VLF-EM frequency data set.

127 km	magnetic, VLF-EM (Seattle) and VLF-EM (Annapolis) @ $65/km	$8,255.00
38 km	magnetic, VLF-EM (Seattle) or VLF-EM (Annapolis) @ $50/km	1,900.00
13 km	magnetic data @ $35/km	455.00
178 km	**TOTAL**	**$10,610.00**
	Geological Compilation	850.00
	Interpretation & Report	1,250.00
	TOTAL	**$12,710.00**

TOTAL ASSESSMENT VALUE OF THIS REPORT $12,710.00

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 air foil.

INSTRUMENT SPECIFICATIONS

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

INSTRUMENT SPECIFICATIONS

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 in housing, mounted on helicopter skid.

ii) Video Recorder:

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.

INSTRUMENT SPECIFICATIONS

DATA RECORDING SYSTEM

i) Chart Recorder

Type:	Esterline Angus Miniservo III Bench AC Ammeter - Voltmeter Power Recorder.
Model:	MS 413B
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 z-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 W).
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 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.

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: 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.

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

STATEMENT OF QUALIFICATIONS

VLADIMIR CUKOR

I, VLADIMIR CUKOR, of 2830 West 37th Avenue in the City of Vancouver, Province of British Columbia, DO HEREBY CERTIFY that:

1. I am a Consulting Geological Engineer with NVC Engineering Ltd., with business address as above;

2. I graduated from the University of Zagreb, Yugoslavia in 1963 as a Graduated Geological Engineer;

3. I am a Registered Professional Engineer in the Geological Section of the Association of Professional Engineers in the Province of British Columbia, Registration No. 7444;

4. I have practiced my profession as a Geological Engineer for the past 24 years in Europe, North America and South America in engineering geology, hydrogeology and exploration for base metals and precious metals;

5. I have compiled geological data for this report from publicated literature and assessment reports.

REFERENCES

BELL, M., 1985; Prospecting and Geochemical Survey on the Gaucho, Suet, Cali, Yeti, Pika, Dall and Paw Mineral Claims Assessment Report (Private File)

BURGOYNE, Alfred A., 1974 Geology, Geochemical Soil Survey and EM-16 survey on Gord 1-40 Mineral Claims, Assessment Report 5194.

CARTER, N.C., 1985 Geological Report on the Joanna I and II Mineral Claims.

DIAKOV, L.J., 1983 Geology between Toodoggone and Chukachida Rivers, Paper 1984-1.

DIAKOV, L.J., PANTELEYEV, A., SCHROETER, T.G. 1985 Geology of the Toodoggone River Area, NTS 94E, British Columbia Department of Mines, Preliminary Map 61.

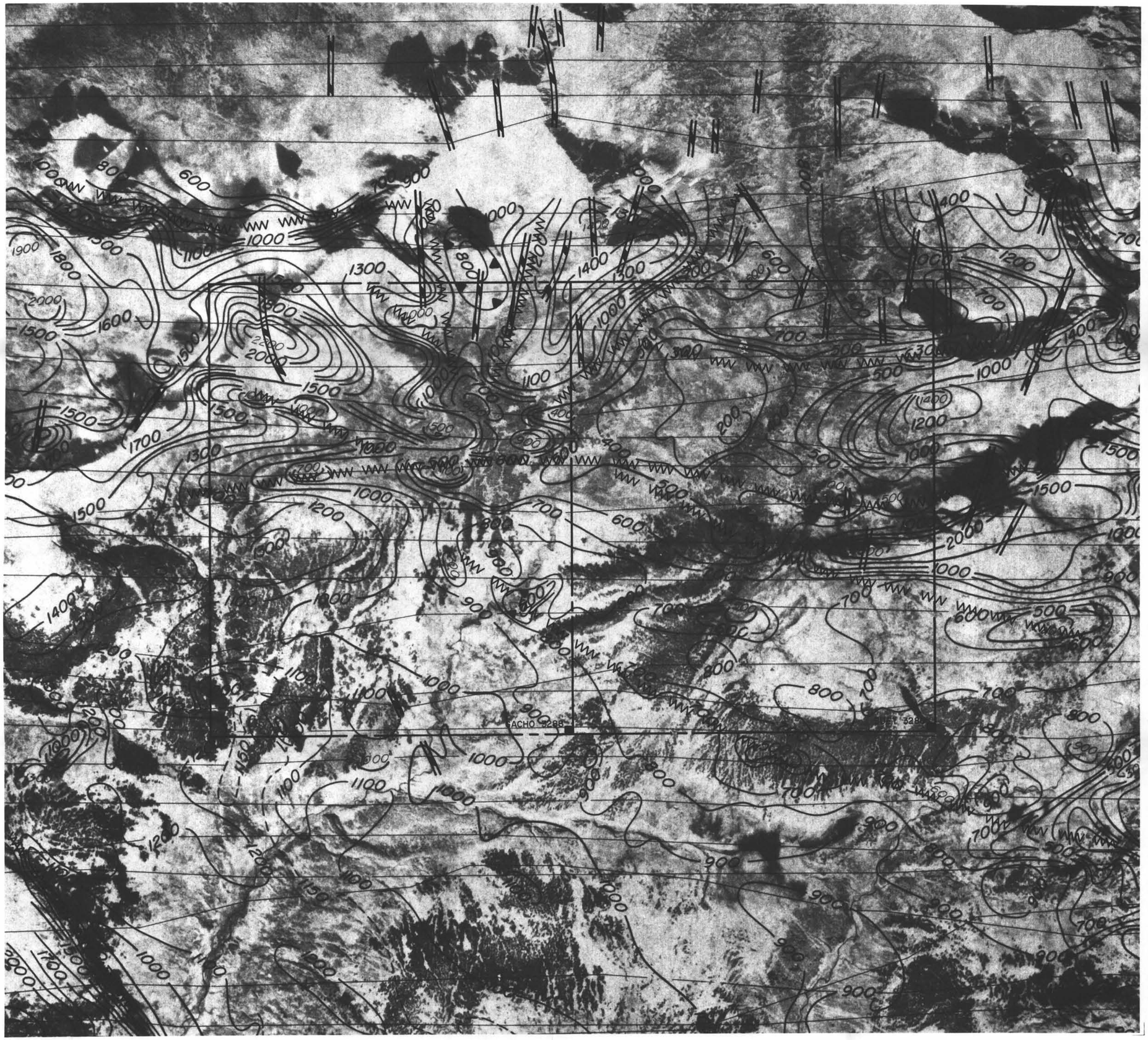
FLOYD, A., MEYER, W., 1973 Geological, Geochemical & Magnetometer survey - Shas claim group, Assessment Report 4570.

GABRIELSE, H., DODDS, C.J., MAUSY, J.L.,1976 Geology of the Toodoggone River (94E) Map Area, GSC Open File 306.

MCLAREN, G., 1984 Report on the 1984 Diamond Drilling Project; Golden Lion, Golden Lion 2-11 claims, Hump, Hump 2 claims Assessment Report 13,324.

PANTELEYEV, A., 1983 Geology between Toodoggone and Sturdee Rivers; Paper 1983-1.

SCHROETER, T.G.,1981 Toodoggone River, Geological Field-work 1980, Paper 1981-1



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

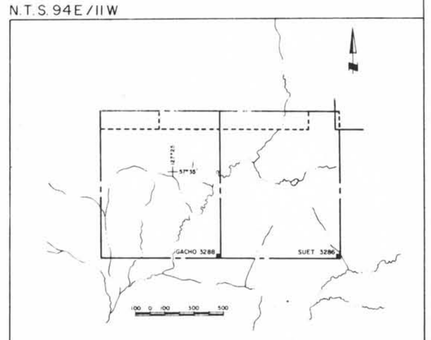
Claim post

Magnetic Low

Inferred Fault

VLF-EM Conductor

N.T.S. 94E/11W



LOCATION MAP

METRES

0 100 200 300 400 500 600 700 800

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,995

Western Geophysical Aero Data Ltd.

To accompany the Geophysical Report on the Gacho & Suet Claims

TOODOGGONE GOLD INC.
GACHO & SUET CLAIMS
MAGNETIC CONTOUR MAP
TOTAL FIELD INTENSITY (nT)

DATE: MAR-APR/86

FIG.: 2

LINE 1067B
LINE 1066
LINE 1064
LINE 1061
LINE 1059
LINE 1057
LINE 1055
LINE 1053
LINE 1051
LINE 1049
LINE 1047
LINE 1045
LINE 1043
LINE 1040B

LINE 1065
LINE 1063
LINE 1062
LINE 1060A
LINE 1058
LINE 1056
LINE 1054
LINE 1052
LINE 1050
LINE 1048
LINE 1046
LINE 1044A
LINE 1042
LINE 1041

GACHO 3288

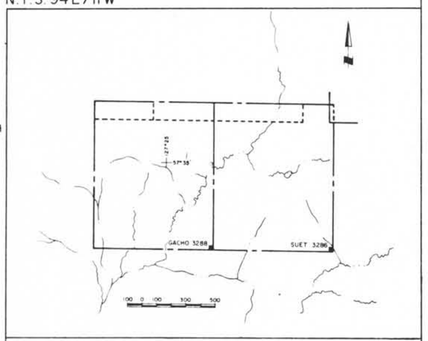
VLF STATION - ANNAPOLIS
VLF STATION - SEATTLE

KEY

INSTRUMENT: Sabre Total Field Intensity VLF-EM
Transmitter Station: Seattle, Wa.(24.8 Khz.)
Vertical Scale: 10%/cm.
Sensor Elevation: 60 metres

Claim boundary
Claim post
Inferred Fault
VLF-EM Conductor Axis

N.T.S. 94E/11W



LOCATION MAP

METRES
0 100 200 300 400 500 600 700 800

GEOLOGICAL BRANCH
ASSESSMENT REPORT

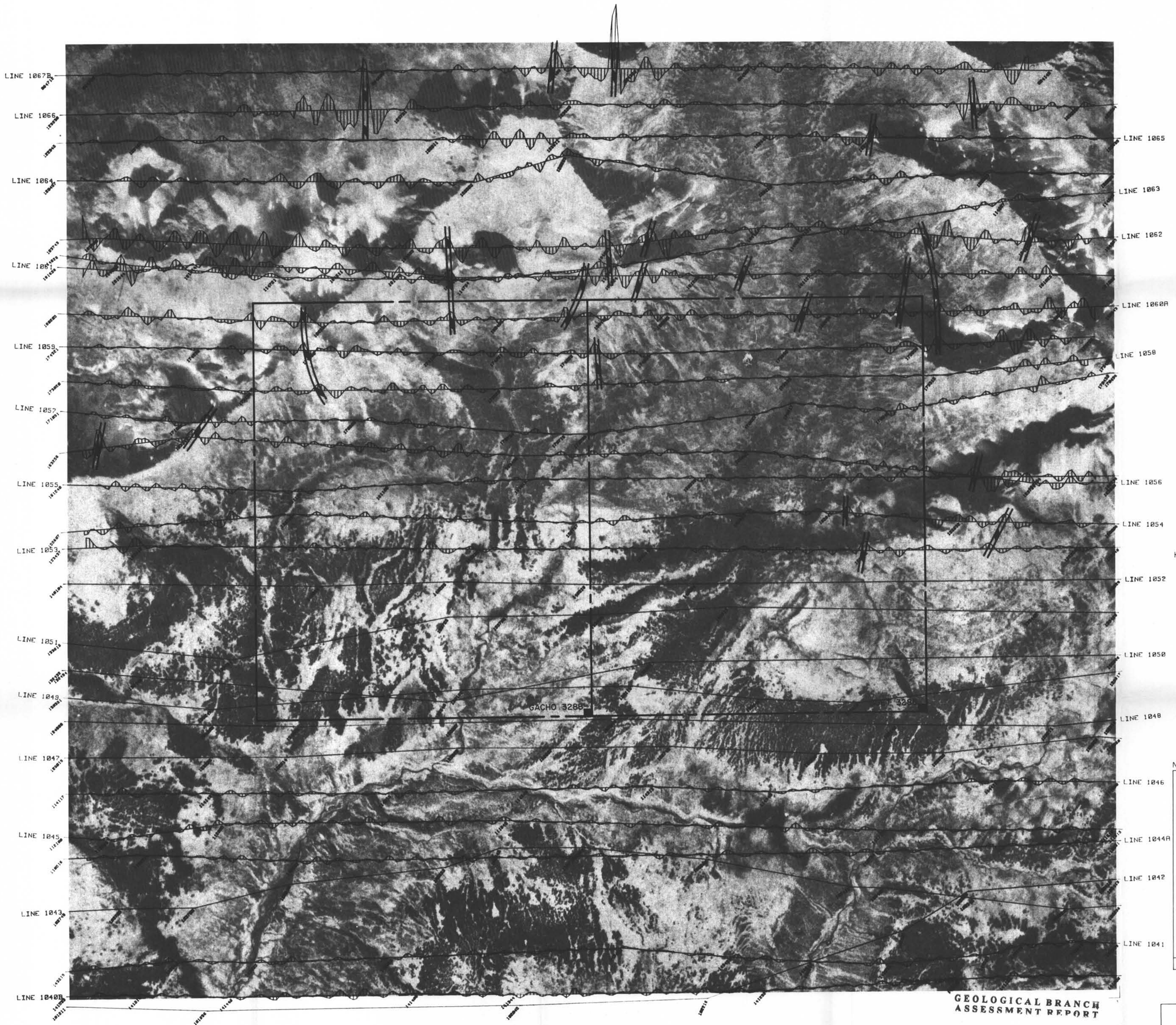
15,995

To accompany the Geophysical Report on the Gacho & Suet Claims

Western Geophysical Aero Data Ltd.

TOODOGGONE GOLD INC.
GACHO & SUET CLAIMS
VLF-EM PROFILE MAP (SEATTLE)
TOTAL HORIZONTAL FIELD INTENSITY (%)

DATE: MAR-APR/86 | FIG.: 3



KEY

INSTRUMENT: Sabre Total Field Intensity VLF-EM

Transmitter Station: Annapolis, Md.(21.4 Khz.)

Vertical Scale: 10%/cm.

Sensor Elevation: 60 metres

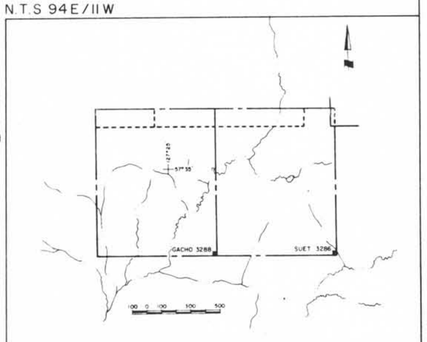
Claim boundary

Claim post

Inferred Fault

VLF-EM Conductor Axis

N.T.S 94E/11W



LOCATION MAP

METRES

0 100 200 300 400 500 600 700 800

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,995

Western Geophysical Aero Data Ltd.

To accompany the Geophysical Report on the Gacho & Suet Claims

TOODOGGONE GOLD INC.

GACHO & SUET CLAIMS

VLF-EM PROFILE MAP (ANNAPOLIS)
TOTAL HORIZONTAL FIELD INTENSITY (%)

DATE: MAR-APR/86

FIG.: 4