093732

ASSESSMENT REPORT
ON THE

SUN 1-109 CLAIMS (YB83713-YB83821)

Grass Lakes area

NTS 105 G-7
Lat. 61° 24' N, Long. 130° 45' W
Watson Lake Mining District

For: SUNSTATE RESOURCES LTD
609-475 Howe Street
Vancouver, B.C.
V6C 2B3

RECEIVED
AUG 12 1997
MINING RECORDER
WATSON LAKE, Y.T.
I.N.A.C.

By: G.S. Davidson, P. Geol.
August 4, 1997

This report has been examined by the Geological Evaluation Unit under Section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 43,600.00.

M. B[illegible]

for Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

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SUMMARY

The SUN property consists of 109 claims (2,207 hectares) located 200 kilometers northwest of Watson Lake and 10 kilometers southwest of the Kudz Ze Kayah deposit of Cominco. Access is by helicopter from the Campbell Highway located 35 kilometers to the northwest. Grass Lakes lie 2 kilometers west of the claim block.

The property is within the Yukon Tanana Terrane in a series of quartz-mica schists and carbonates underlain by orthogneiss and intruded by ultramafic sills and granitic bodies. The Tintina Fault is located southwest of the property marking the contact between the Cassiar Platform and the Yukon Tanana Terrane. The area is being explored for massive sulphide deposits formed in Paleozoic and Mesozoic metavolcanic rocks. Since 1993, over 15,000 claims have been staked in the region, centered around Wolverine Lake and North Lakes. The Kudz Ze Kayah deposit has mineable reserves of 11 million tonnes at 0.9 % Cu, 1.5 % Pb, 5.9 % Zn, 130 g/t Ag and 1.3 g/t Au.

The SUN claims were staked for Sunstate on a belt of metamorphic rocks which host massive sulphide deposits. The target models are the Cominco volcanogenic massive sulphide body hosted in Devono-Mississippian metamorphic rocks and the Wolverine Lake deposit, a strataform Pb-Zn-Cu massive sulphide occurring at the base of a metamorphosed felsic volcanic sequence. The model consists of massive to broken sulphides occurring in a carbonaceous metasedimentary to felsic metavolcanic and volcanoclastic horizon overlain by massive subvolcanic domes or sills of mafic to felsic volcanic rock. The sulphide mineralization is in fairly narrow elongated lenses.

In late August and September, 1996 a reconnaissance soil sample survey was performed by a crew based at the Ketza Group camp on Grass Lakes. A total of 208 soil samples were collected. Two areas of weakly elevated zinc and copper geochemical values were identified, generally following an east-west trend. The strongest soil geochemical values were; copper (99 ppm), lead (79 ppm) and zinc (485 ppm). The anomalies were outlined at 100 meter sample intervals along the claim lines, approximately 900 meters apart.

The writer mapped the claim geology between August 31 and Sept. 4, 1996. The mapping identified a thick metavolcanic sequence of quartz muscovite and quartz biotite schist intruded by orthogneiss. Interbedded quartz-carbonate and argillaceous horizons were present in the schists and rusty weathering horizons of quartz sericite schist form gossans on cliff faces and talus slopes. Quartz carbonate veins and silicified layers of sericite schist host minor pyrrhotite, galena and sphalerite veining. Several weakly to moderately elevated copper, lead and zinc soil anomalies correlate with the sericite schist layers. Prospector JP Loiselle traversed the claims with a Beeb Mat electromagnetic device and collected 25 rock samples. He found minor galena, sphalerite and pyrrhotite mineralization in quartz veins and carbonate lenses.

An airborne geophysical survey was flown by Aerodat Inc. between May 17-21, 1997 consisting of 185 line kilometers. Magnetic survey results show a fairly uniform response indicative of an area underlain by orthogneiss and quartz mica schist. The EM survey yielded seven weak conductors of which three (conductors 2, 6 and 7) warrant follow-up evaluation. The EM responses are somewhat coincidental with the soil geochemical anomalies and an east-west trending thrust fault which crosses the northern section of the claim block.

The initial work program on the SUN claims has outlined some weak strength geochemical and geophysical anomalies associated with thrust and normal faults. The geology is similar to that found at Kudz Ze Kayah and there is potential for finding massive sulphide mineralization on the SUN claims. Four areas identified as conductors 2, 4, 6 and 7 warrant further evaluation. Also, geochemical anomaly X should be targeted for further sampling and prospecting. An exploration program of grid soil sampling, geophysical surveys and geological mapping at a budget of $48,400 is recommended for the SUN claims.

INTRODUCTION

The SUN property consists of 109 claims located in the central Yukon near Grass Lakes in the Pelly Mountains and the Watson Lake Mining District, Yukon Territory (NTS 105 G-7). The claims cover several high mountain ridges and peaks separated by deep stream gullies. An exploration program of soil geochemistry and geological mapping performed in the summer of 1996 was supervised by B. Macdonald of the Ketza Group. An airborne geophysical survey performed in May, 1997 was supervised by Stuart Aires of Equity Engineering Ltd. This report reviews data and documents provided by B. Macdonald and Aerodat Inc., and information collected by the writer. The report is prepared for filing assessment on the claims.

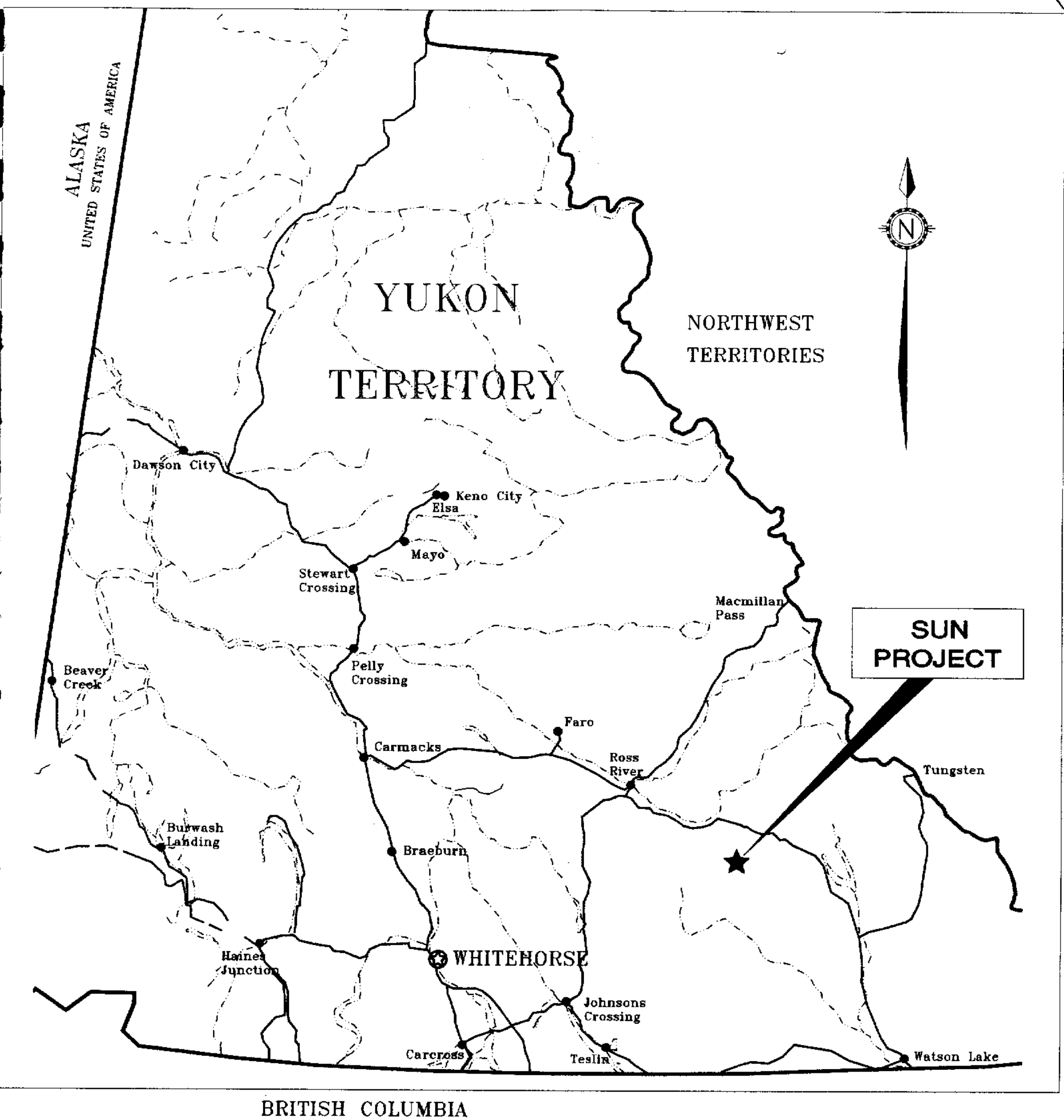
LOCATION AND ACCESS

The SUN property is located 2 kilometers east of Grass Lakes, and 200 kilometers northwest of Watson Lake on NTS Map Sheet 105 G-7 at geographical co-ordinates 61° 20' N and 130° 45' W. The property was accessed by Trans North Air helicopter from the Ketza Group base camp on Grass Lakes. Access to the camp was by charter float planes provided by Black Sheep Aviation of Whitehorse. Figures 1 and 2 show the property locations. Logistically, Whitehorse, Ross River and Watson Lake provide supplies, accommodations and government services for the district and there is a government maintained airstrip near Finlayson Lake.

PHYSIOGRAPHY

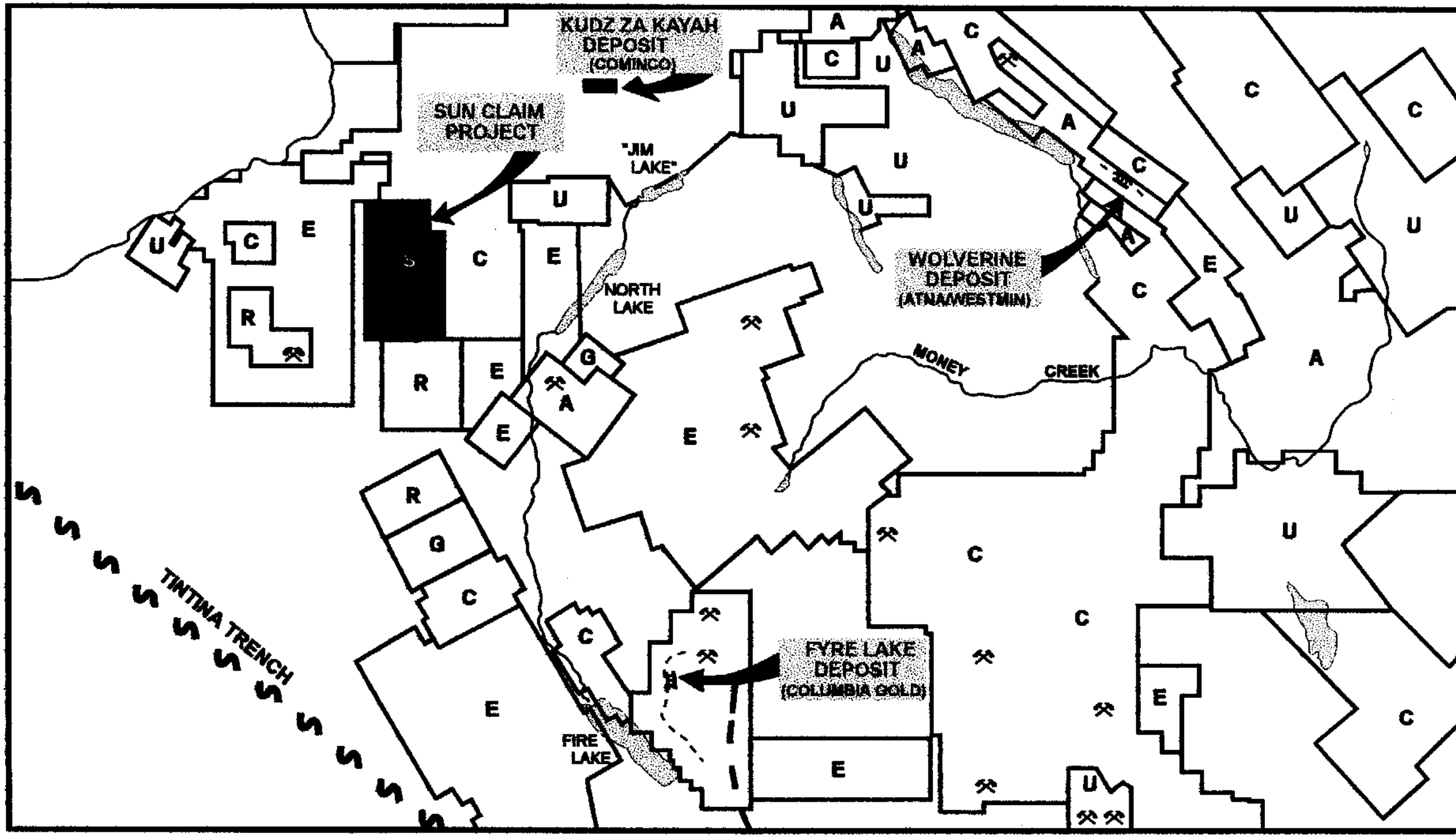
The SUN claims cover a high series of ridges and mountain peaks along the east side of the Grass River valley. The terrain is alpine featuring rocky cirques, tarns and steep ridges divided by steep sided creek gullies. Talus slopes flank the highest peaks and rocky moraines clog the base of the cirques. Elevations range from 1,300 meters in the Grass River valley to 2,100 meters. Outcrop is widespread at higher elevations while overburden on south and westerly facing slopes averages 5 meters. On north facing slopes there is more permafrost and overburden averages 10 meters.

Vegetation is limited to sparse spruce forest in the creek gullies bellow 1,500 meters of elevation. The district has a northern interior climate marked by long cold winters and low annual precipitation. Exploration on the properties can be performed from June until September.



SCALE: 1:10000

COMPANY:	SUNSTATE RESOURCES LTD.		
DRAWING TITLE:	SUN PROJECT LOCATION MAP		
LOCATION:	Grass Lakes, Yukon Territory		
DATE:	February 1997	SCALE:	1 : 10,000
DRAWN:	TerraCAD 96208	GEOLOGIST:	Graham Davidson
DATA:	NTS 105/G7	FIGURE:	1



KEY TO CLAIM OWNERSHIP

- R - ARCTURUS RESOURCES
- G - CONSOLIDATED SHOSHONI GOLD
- C - COMINCO
- A - ATNA/WESTMIN J.V.
- E - EXPATRIATE RESOURCES
- U - UNKNOWN OWNERSHIP
- S - SUNSTATE RESOURCES LTD.

SCALE
0 2 4 6 8 10km

N

SUNSTATE RESOURCES LTD.

SUN CLAIM PROJECT

Grass Lakes, Yukon Territory

SCALE: AS SHOWN			DATE: February 1997
NTS: NTS 105/G7	DRAWN: TerraCAD 96055a4		FIGURE 2

PROPERTY

The SUN property consists of 109 mineral claims, as shown in Figure 3 and listed in Table 1.

TABLE 1
Claim Data

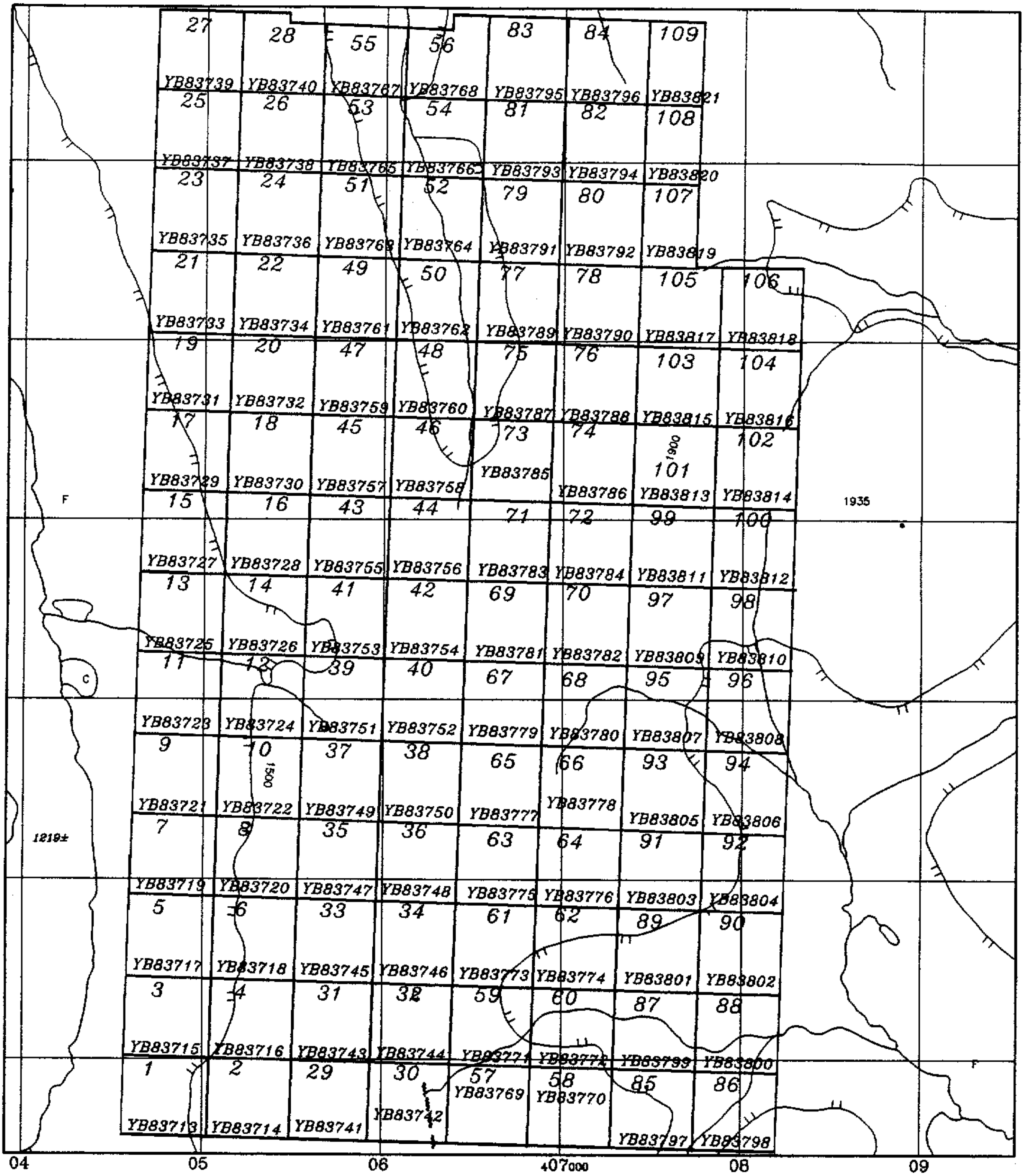
Claim Name	Grant Number	Expiry Date (* applied for)
SUN 1-109	YB83713-YB83821	*May 21, 2001

The SUN 1-109 claims were staked in May, 1995 and recorded in the office of the district mining recorder in Watson Lake on May 21, 1995. The claim group is registered to Sunstate Resources Ltd.

REGIONAL GEOLOGY

The rocks underlying the Finlayson area are mainly metamorphic and include various types of metasediments of the upper Proterozoic to Mississippian Selwyn Basin and Paleozoic metasedimetary and metavolcanic rocks of the Slide Mountain and Yukon-Tanana Terranes. Conformable lenses and sills of greenstone, probably Triassic in age, occur in profusion in places in the metasediments and a few narrow lamprophyre and quartz-porphyry sills, probably Jurassic or younger, are present locally. Granitic bodies cut the metasediments and greenstones at several places. Near the granitic intrusions, characteristic skarn zones are developed in calcareous rocks. In the late Mesozoic extensive thrust faulting accompanied the emplacement of Carboniferous and Permian dark green aphanitic basalt, dunite, peroxinite, peridotite, serpentinized equivalents and quartz carbonate rock.

The claims lie north of the Tintina Fault, a large transcurrent Late Cretaceous to Tertiary fault system that caused at least 450 km of displacement. During the Eocene volcanism and sedimentation deposited sequences of basalt, rhyolite, felsic tuff and conglomerate in the Tintina depression. Late Tertiary uplift and faulting preserved Eocene volcanoclastic rocks in structurally complex grabens. Epithermal style gold and silver mineralization occurs at fault intersections in these grabens.



N

0 200 400 800 1200 1600 2000

SCALE: 1: 31,680

COMPANY: **SUNSTATE RESOURCES LTD.**	
DRAWING TITLE: **SUN CLAIM LOCATION**	
LOCATION: **Grass Lakes, Yukon Territory**	
DATE: April 1997	***SCALE:*** 1 : 31,680
DRAWN: TerraCAD 97022	***GEOLOGIST:*** Graham Davidson
DATA: NTS 105/G7	***FIGURE:***

The Grass Lakes area is underlain by Devonian to Mississippian metamorphic rocks of the Yukon-Tanana Terrane. Layered metavolcanic and metasedimentary rocks mainly quartz biotite and quartz muscovite schist overlie metaplutonic rocks primarily the Grass Lakes orthogneiss. A few ultramafic sills outcrop along thrust faults and several bodies of biotite-muscovite granite intrude the metamorphic units.

Geological mapping in the Grass Lakes area in 1996 by DIAND covered the SUN claim block (Open File 1997-1). Figure 4 shows the area geology and the Table of Formations is presented in Table II.

TABLE II - TABLE OF FORMATIONS
(adapted from Hunt, J.A., 1997)

Quaternary
Q-Undifferentiated, unconsolidated gravels, sands and clays

Cretaceous
Kg-Buff to grey dykes, sills and small plugs of aplite and granite; locally quartz, feldspar and/or biotite phyric; minor arsenopyrite

Kl-Fine-to coarse-grained, light grey, biotite lamprophyre dykes, locally feldspathic

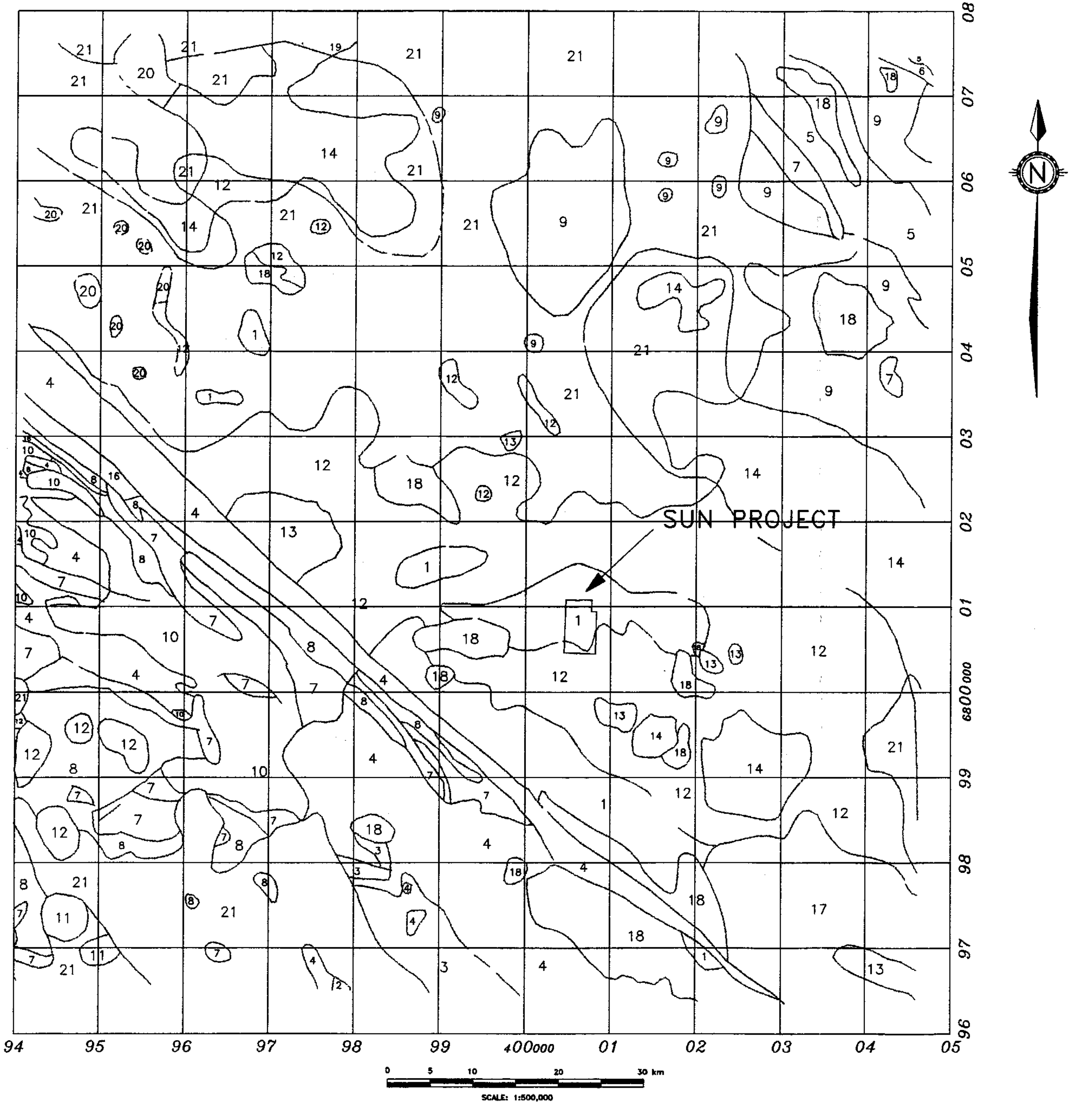
Triassic
Trd-Fine- to medium-grained greenstone (meta-diorite, meta-gabbro)

Carboniferous & Permian
CPav-Anvil Allocthan, amphibolite, greenstone, basalt, gabbro
CPas-Serpentinite

Mid Permian
PPK-Klondike schist, quartz muscovite and quartz biotite schist and gneissic equivalents.

Devonian-Mississippian
Mcg-Grass Lakes Orthogneiss, potassium feldspar porphyroclasts in quartz-plagioclase-mica matrix

Nasina Assemblage; Unit 4-biotite-plagioclase schist (4M), psammite-carbonaceous quartzite and phyllite-grit-quartzite (4S)
Unit 3-felsic metavolcanic rocks, quartz muscovite schist
Unit 2-mafic metavolcanic rocks, biotite-chlorite-plagioclase schist (2M), carbonaceous phyllite-psammite-grit (2S)
Unit 1-, quartz-mica schist, psammite and grit (1S), marble (1L), garnet schist



QUARTERNARY

PLEISTOCENE AND RECENT

21	Qs	64*	Glacial and surficial deposits

TERTIARY

PLIOCENE

20	Pv	62	Basalt

CRETACEOUS

19	Kqdp	52	Granodioritic and monzonitic porphyry
18	Kqm	52	Quartz monzonite, granodiorite; Cassiar quartz monzonite, alaskite

TRIASSIC

17	Tgdn	42	Foliated hornblende granodiorite, quartz
16	Tcy	42	Polymictic conglomerate

PENNSYLVANIAN AND PERMIAN

15	PPst	35	Chert

CARBONIFEROUS AND PERMIAN

14	CPAV	35	ANVIL RANGE GROUP: andesite, basalt, slate, chert, limestone
13	CPub	35	Serpentinite, diorite, pyrozenite, peridotite
12	CPsn	35	Schist, gneiss; includes BIG SALMON METAMORPHIC COMPLEX
11	CPv	35	Andesite, basalt, chert, tuff

MISSISSIPPIAN

10	Mvp	31	Black slate, chert, acidic volcanics

DEVONIAN AND MISSISSIPPIAN

9	DME	29	EARN GROUP: undivided; shale, chert arenite, conglomerate
8	DMS	29	SYLVESTER GROUP: shale, chert arenite, basic volcanic rocks

SILURIAN AND DEVONIAN

7	SDcq	24	Dolomite, quarzite, argillite

ORDOVICIAN, SILURIAN AND LOWER DEVONIAN

6	OSDR	19	ROAD RIVER: black graptolitic shale, chert

CAMBRIAN AND ORDOVICIAN

5	COp	14	Shale, limestone
4	COK	14	KECHIKA GROUP: phyllite, limestone

LOWER CAMBRIAN

3	lCAq	11	ATAN GROUP: quartzite, shale, phyllite
2	lCq	11	Quartzite, shale

HADRYNIAN

1	Hsn	07	Schist, gneiss, quartzite

*A mnemonic code assigned to rock types and recorded as part of field observations.

Geological Boundary....................................

Fault..

No analytical results....................................

Field duplicate sample sites.............................

Geology base and legend are derived from:

Cabrielse, H., Tempelman-Kluit, D.J., Blusson, S.L. and Campbell, R.B. (1980) Map 1398A, MacMillan River, Yukon – District of Mackenzie – Alaska, NTS Sheet 105, Geological Survey of Canada, Energy, Mines and Resources Canada. 1:1,000,000 Scale.

COMPANY:

SUNSTATE RESOURCES LTD.

DRAWING TITLE: DWG 1

SUN CLAIMS REGIONAL GEOLOGY

093732

LOCATION: **East - Central Yukon**

DATE:	February 1997	SCALE:	1 : 500,000
DRAWN:	TerraCAD 97017	GEOLOGIST:	Graham Davidson
DATA:	NTS 105/G	FIGURE:	4

HISTORY

The Finlayson area was first explored by Robert Campbell of the Hudsons Bay Company in 1840. A post was established by the HBC at Francis Lake in the 1850's. Prospectors entered the country via the Liard River system around 1880 looking for placer gold deposits. Minor amounts were found along bars in the Finlayson and Liard Rivers. Lode prospecting began in the 1950's and intensified in the 1960's with the discovery of the Anvil Pb-Zn deposit.

The potential for massive sulphide deposits led to several staking rushes in the Finlayson and Pelly River areas. A few narrow zones of sulphide mineralization were discovered on claims around Wolverine Lake and at the Pelly Banks. In the 1980's the potential for gold mineralization along the Tintina Fault sparked a staking rush spearheaded by companies of the Pezim group. The Grew Creek and Canamax gold deposits formed by Tertiary epithermal activity were found near Ross River.

In 1993 Cominco discovered massive sulphide float in a valley bottom near the North Lakes. Follow-up geochemistry and geophysics identified a promising anomaly that was drilled in 1994 and 1995 delineating the Kudz Ze Kayah massive sulphide deposit. Cominco has staked about 10,000 claims in the district since the discovery of mineralization. Westmin Resources Ltd. entered the picture by optioning Atna Resources Ltd. properties around Wolverine Lake in Jan. 1995. Westmin continued with an aggressive program of claim staking through the district and now holds about 3,000 claims. Westmin announced a massive sulphide discovery at the south end of Wolverine Lake in the summer of 1995. Other major parties in the area are Expatriate Resources exploring about 3,000 claims including the Ice showing and Columbia Gold investigating the Fire Lake deposit.

No mineral occurrences are known in the area of the SUN claims. Around the Grass Lakes a few narrow galena bearing quartz-carbonate veins were discovered during regional exploration programs for base metal deposits in the 1970's. No detailed work was performed on these occurrences.

1996-1997 EXPLORATION PROGRAM

INTRODUCTION

A reconnaissance soil geochemical survey was performed on the claims between Aug. 30 and Sept. 15, 1996. The samples were collected along the claim lines at 100 meter intervals from a poorly developed B horizon or C horizon soil layer. A total of 208 samples were collected on the claims. Talus slopes, snow patches and cliff areas were not soil sampled leaving some gaps in the coverage.

Prospector JP Loiselle spent eight days traversing the claim area with a Beep Mat instrument and collected 35 rock samples. The writer was accompanied by Mr. Loiselle while mapping the claims and has examined his samples. Mr. G. Macdonald also examined some of the samples.

The airborne geophysical survey was flown from May 17-21, 1997. Irregularities in the data caused Aerodat to refly several of the lines which was completed by June 9, 1997.

Personnel and contractors who worked on the SUN claims are:

Soil geochemistry:
Brandon Macdonald; G. Adamson; M. Jackson, Monty, P. Atkinson

Supervision. geological mapping and prospecting:
Blake Macdonald, supervisor; G. Davidson, geologist; G. Macdonald, geologist;
JP Loiselle, prospector

<u>Airborne Geophysical Survey</u>
Project Supervisor
Stuart Aires (Equity Engineering Ltd.)
Field Supervisor
Ken Robertson

Aerodat Personnel
J. Douglas (Operator)
D. Rokosh (Pilot)
D. McGill & G. McDonald (Processing)
R.W. Woolham (Report)

PROPERTY GEOLOGY

The rocks exposed on the SUN are Devonion to Mississippian metamorphic rocks intruded by orthogneiss. The most common rock types are quartz muscovite and quartz biotite schist which outcrop along the ridges as massive grey to brown weathering units and meta-plutonic rock, mainly the Early Mississippian Grass Lakes orthogneiss which is a coarse grained granitic to monzonitic unit containing feldspar porphyroclasts in a quartz-feldspar-biotite matrix. Horizons of marble and quartz pebble grit are interbedded in the schists.

Younger intrusive rocks were not mapped on the property but are found to the southeast near the North Lakes. Figure 5 shows the property geology and the following units were identified (after Murphy et al, 1997);

Dacite dyke (Dv): fine grained green dyke, hematite staining, quartz carbonate veining

<u>Cretaceous</u>
Granodiorite (Kg): medium grained grey biotite- muscovite granodiorite

Ultramafic rocks (UMs), serpentinized pyroxenite and dunite

<u>Devono-Mississippian</u>
Grass Lakes Orthogneiss (Mcg)-coarse grained, potassium feldspar augen in quartz biotite matrix

Undifferentiated mafic schist (Unit 4), muscovite-biotite-chlorite-actinolite-plagioclase schist (Unit 4m), carbonaceous phyllite and quartzite, grit (Unit 4s). Generally appears as dark grey to black mica schist containing minor disseminated pyrite and pyrrohtite, graphitic fracture faces, locally brecciated with minor white quartz and carbonate veining, weak to heavy limonite staining.

Undifferentiated felsic schist (Unit 3), quartz-muscovite-feldspar schist (Unit 3f), carbonaceous phyllite and quartzite (Unit 3s), massive cream-colored meta-rhyolite (Unit 3r). Generally occurs as bedded, rusty weathering, light grey schist containing minor pyrite and pyrrhotite on fractures and minor galena and sphalerite in quartz and calcite bands.

Undifferentiated mafic schist (Unit 2), biotite-chlorite-actinolite-plagioclase schist, quartz carbonate layers containing minor galena.

Psammite, quartz-pebble grit, metapilitic schist (Unit 1s), and sandy marble and calcsilicate rock (Unit 1L).

MINERALIZATION

Detailed prospecting of the claims found only small occurrences of galena and sphalerite. Of the samples collected by JP none contained galena or sphalerite. Most of the samples were quartz bands in schist containing pyrrhotite and pyrite, or barren white bull quartz. The writer examined a zone of pyrrhotite-quartz veining at the south end of the SUN claims. The mineralization consisted of narrow pyrrhotite veins in several quartz mica schist layers near the contact with orthogneiss. The layer was rusty weathering containing veins and small nodules of massive pyrrhotite. Gossan zones occur along areas underlain by quartz sericite schist.

GEOCHEMISTRY

Copper, lead and zinc geochemical results for the SUN claims are shown in figures 6, 7 & 8 (see Appendix I). The geochemistry outlined a few weak zinc and copper anomalies but generally the geochemical response was fairly poor.

Two areas of anomalous zinc geochemistry were outlined, labeled X and Y. The anomaly X response for zinc reaches 485 ppm and for anomaly Y peaks at 156 ppm. Lead and copper are not responsive in this area. Anomaly X features a 200 meter wide weak to moderate strength zone crossing the claims in an east-west direction. This area overlies a fault zone in the orthogneiss and mafic schist. Anomaly Y is a weak response possibly associated with a mafic schist unit. Copper values reach a peak of 99 ppm in a minor anomaly labeled Anomaly Z.

AIRBORNE GEOPHYSICS-SUMMARY

(from R.W. Woolham, 1997)

Magnetic Results and Conclusions-"The magnetic background is interpreted to be approximately 58,105 nT. Amplitudes range from about 25 nT below background to 70 nT above background. These low amplitude ranges indicate mostly felsic and/or sedimentary rocks underlie the area. On the Interpretation Map (Fig. 1-2) the magnetic trends are indicated with solid lines. These trends probably reflect intermediate intrusive and extrusive rocks related to volcanic activity. The anomaly patterns are very erratic and contorted with a general east-west grain. A few north-northwest faults and a northeast to north-south fault structure are positioned to explain some of the anomaly discontinuities. Below background non-magnetic zones are outlined with thick dashed lines and depression symbols. Such zones usually map felsic or sedimentary rocks. Local smaller negative zones can also indicate possible alteration effects, felsic intrusives or diatremes. A few non-magnetic zones occur in the south third of the survey block.

Electromagnetic Survey Results and Conclusions-"Conductive flat lying to gently dipping material is contributing to the electromagnetic response in various degrees throughout the survey block. There is a definite correlation between low resistivity and topographically low areas along drainage gullies and on the flanks of hills. This implies slightly conductive surficial material such as talus and clay is the main source of the conductive effects. In fact, the area is very resistive relative to other areas in the Finlayson Lake camp where graphitic argillaceous sediments are quite conductive and often ubiquitous.

There are only a few HEM intercepts and all have very poor conductivity and are questionable bedrock sources. Two or more intercepts that are on adjacent lines are outlined and designated with a number. In all, seven anomalies are indicated. Of these, numbers 1, 3, 4 and 5 are related to drainage gullies and are suspicious as valid bedrock responses. Numbers 2, 6 and 7 fall on the flanks of hills but 2 and 6 cross local magnetic trends furthering their questionable nature as bedrock responses. Anomaly 7 is slightly more interesting as it is centered on a local below background non-magnetic zone which may indicate alteration or the presence of felsic intrusive plug-like body.

DISCUSSION AND RECOMMENDATIONS

Geophysical anomalies 2, 6 and 7 are recommended for further investigation in the Aerodat report. Soil geochemical values are very weakly elevated in the areas of conductors 6 and 7. No geochemical sampling was undertaken in the area of conductor 2 which overlies an east-west trending thrust fault. Geochemical anomalies X and Y lie in the general area of conductors 4 and 5, also along this thrust fault. Geochemical anomaly X is coincident with an airborne magnetic trend. The low range in variation of magnetic readings is consistent with the orthogneiss and quartz biotite schist units that occur on most of the claim block.

Although the geochemical and geophysical results are fairly weak there is potential for finding sulphide mineralization in this package of rocks. The targets for follow-up exploration are geophysical conductors 2, 4, 6 and 7, and geochemical anomaly X. An evaluation by grid development, detailed geochemistry and initial geophysical surveys is recommended for the SUN claims at a proposed budget of $48,400. Grid orientation of east-west baselines with crosslines at 100 meter centers is suggested over areas of interest. Soil samples at 50 meter intervals and VLF-EM and magnetometer surveys are recommended on the grids.

PROPOSED EXPLORATION PROGRAM

Geological mapping, soil geochemistry and geophysical surveys over targets defined by the reconnaissance geochemistry and airborne geophysical survey.

Geology and supervision	**3,500**
Grid development, 15 km.	**3,750**
Soil geochemistry, 300 samples	**7,500**
Geophysical surveys, 15 km.	**4,500**
Camp and support	**5,250**
Transportation, helicopter, 12 hours	**9,600**
floatplane	**4,400**
Assays	**1,000**
Report	**4,500**
Contingency, 10%	**4,400**
TOTAL	**$48,400**

CERTIFICATE

I, GRAHAM DAVIDSON, of the City of Whitehorse in the Yukon Territory, HEREBY CERTIFY:

1. That I am a consulting geologist and that I participated in the work program reviewed in this report.

2. That I am a graduate of the University of Western Ontario (H. BSc., Geology, 1981).

3. That I am registered as a Professional Geologist by the Association of Professional Engineers, Geologists and Geophysicists of Alberta (No.42038).

4. That I have been engaged in mineral exploration for fourteen years in the Yukon, the Northwest Territories and British Columbia.

SIGNED at Whitehorse, Yukon, this 4th day of August, 1997.

G.S. DAVIDSON, P. Geol.

REFERENCES

Johnston S. & Mortenson J. (1994), Regional setting of porphyry Cu-Mo deposits, volcanogenic massive sulphide deposits, and mesothermal gold deposits in the Yukon-Tanana terrane, Yukon

Murphy D.C. and Timmerman R.M. (1997), Preliminary geological map of part of the Grass Lakes area, Open File 1997-1

Murphy D.C. and Timmerman R.M. (1997), Preliminary Geology of the Northeast Third of Grass Lakes Map Area, (105 G-7), Yukon Exploration and Geology 1996, pg 62-73.

Temple Man Kluit D. (1975), Open File 486

Yukon Minfile, DIAND, 1995

SUN-STATEMENT OF COSTS

Period: August 30-September 15, 1996

Personnel:	
Project Supervisor	
Blake Macdonald, 4.5 days @ $350/day	2,875.00
Geologists	
Glen Macdonald, senior geologist, 0.5 day @ $400/day	200.00
Graham Davidson, geological mapping, 0.5 day @ 300/day	150.00
Prospector	
J.P. Loiselle, 8 days @ $250/day	2,000.00
Linecutters & soil samplers	
Brandon Macdonald, 2 day @ $180/day	360.00
Greg Adamson, 2 day @ $150/day	300.00
Matt Jackson, 8 days @ $150/day	1,200.00
Monty, 3 days @ $150/day	450.00
Phil Atkinson, 2 days @ $220/day	440.00
Cook	
Carol Matsen, 8 days @ $190/day	1,520.00
Total Wages	**$9,495.00**
Transportation: Float planes, Black Sheep Aviation Ltd.	2,039.74
Helicopter, Trans North Air Ltd.	6,965.70
Truck and Fuel	423.74
Total Transport	**$9,429.18**
Supplies and expediting:	840.27
Camp mob and demob:	1,250.90
Camp costs:	1,443.80
Communications:	441.38
Total Camp	**$1,998.17**
Analytical services: Camtech Labs Inc.	1,561.69
Report and drafting:	1,250.00
SUB TOTAL	$23,734.04
10% Management Fee + GST	2,373.40
COSTS	**$26,107.44**

Period: May 1-21, 1997 Airborne Geophysical Survey

Aerodat Inc.		$19,110.00
Equity Engineering Ltd.		2,293.00
Ken Robertson (Field Supervisor)		844.00
	Total	**$22,247.00**

Personnel:

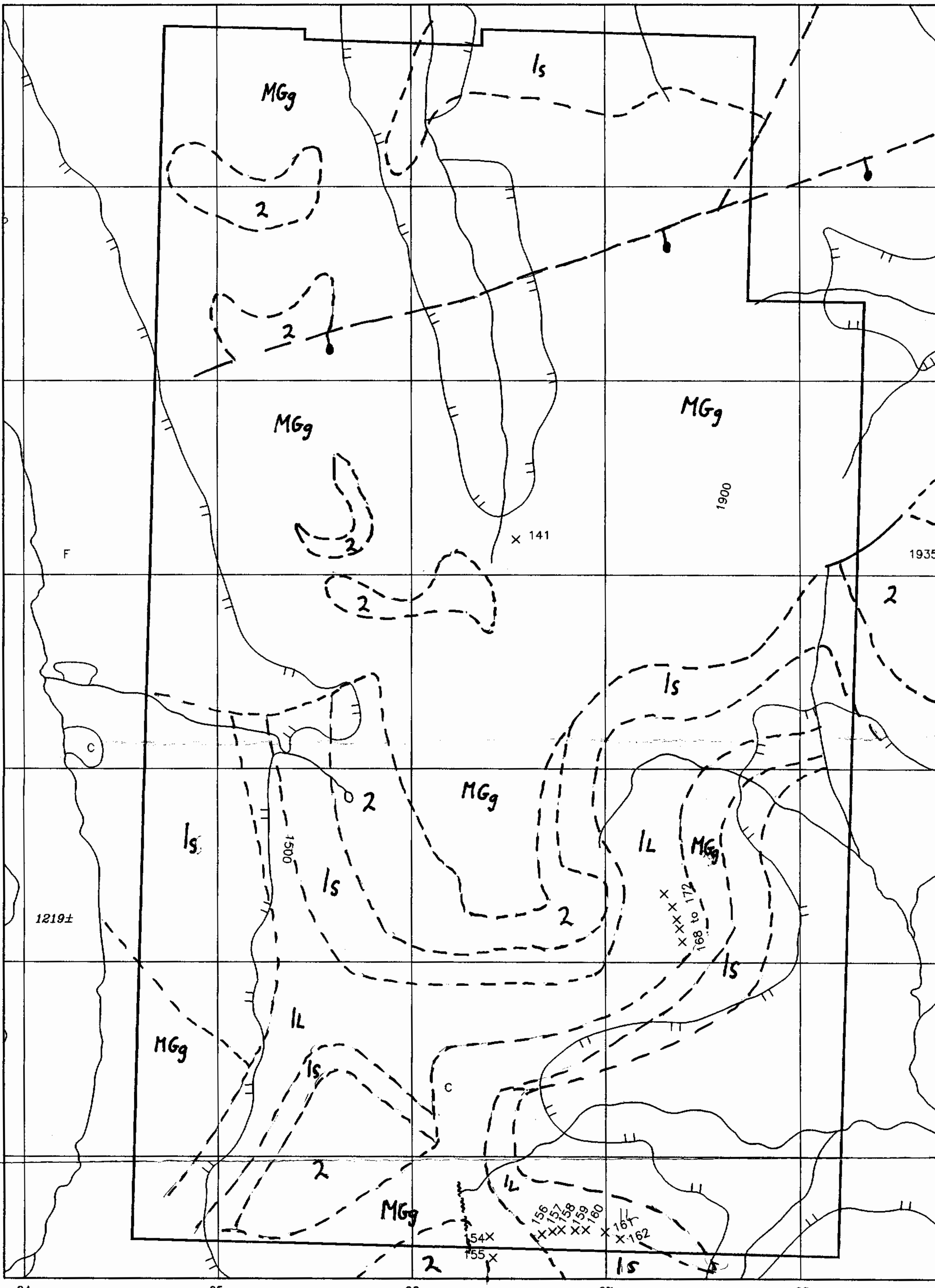
Project Supervisor
Stuart Aires (Equity Engineering Ltd.)

Field Supervisor
Ken Robertson

Aerodat Personnel
J. Douglas (Operator)
D. Rokosh (Pilot)
D. McGill & G. McDonald (Processing)
R.W. Woolham (Report)

TOTAL COSTS	**$48,354.44**

APPENDIX I-FIGURES 5-11



Geological Contact

Thrust Fault

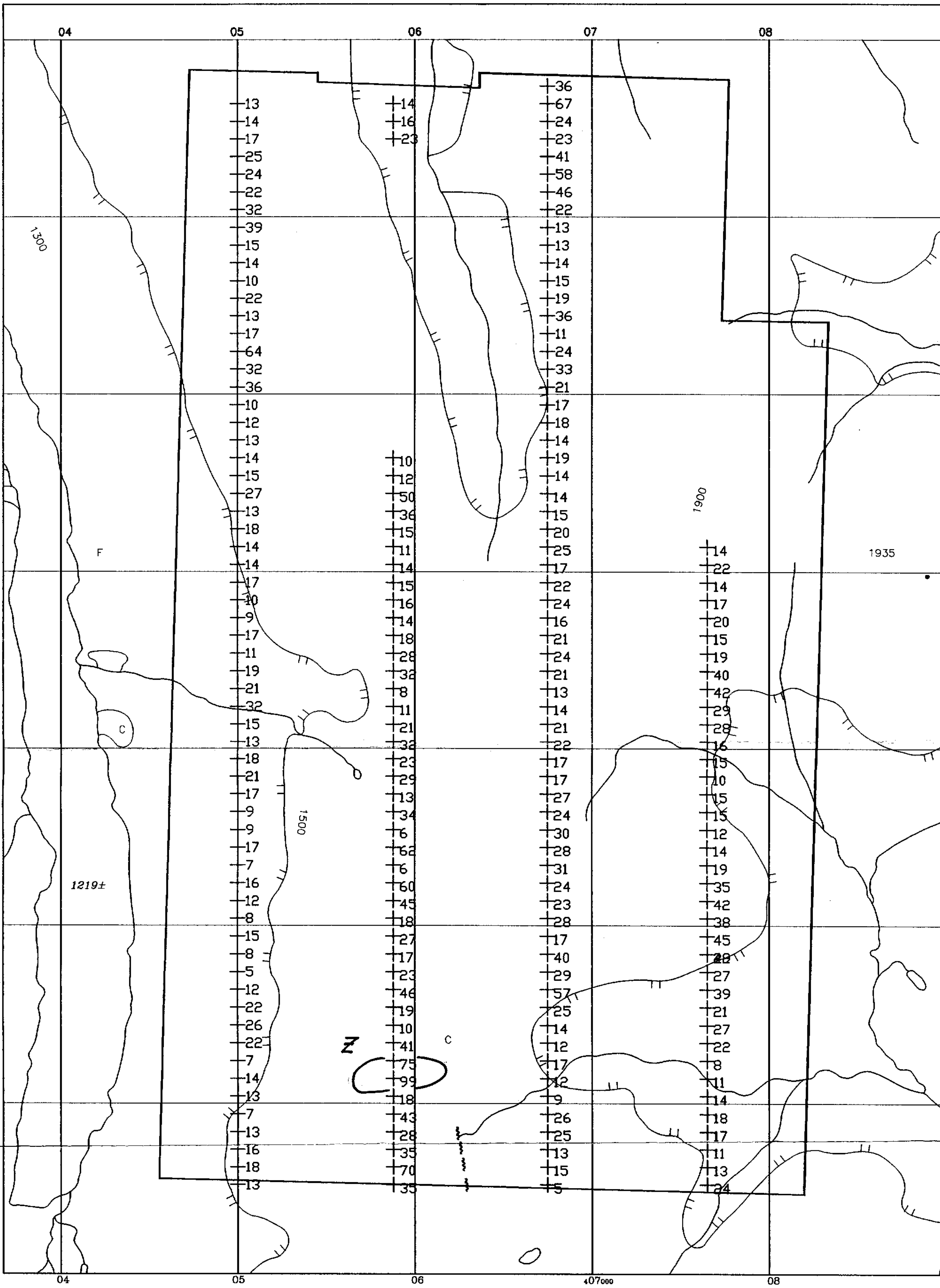
0 100 200 400 600 800 1000

SCALE: 1: 20,000

FOR LEGEND see TABLE 2-TABLE OF FORMATIONS

COMPANY:	SUNSTATE RESOURCES LTD.
DRAWING TITLE:	SUN GEOLOGY AND SAMPLE LOCATIONS
LOCATION:	Grass Lakes, Yukon Territory

DATE:	April 1997	SCALE:	1 : 20,000
DRAWN:	TerraCAD 97022	GEOLOGIST:	Graham Davidson
DATA:	NTS 105/G7	FIGURE:	5



0 100 200 400 600 800 1000

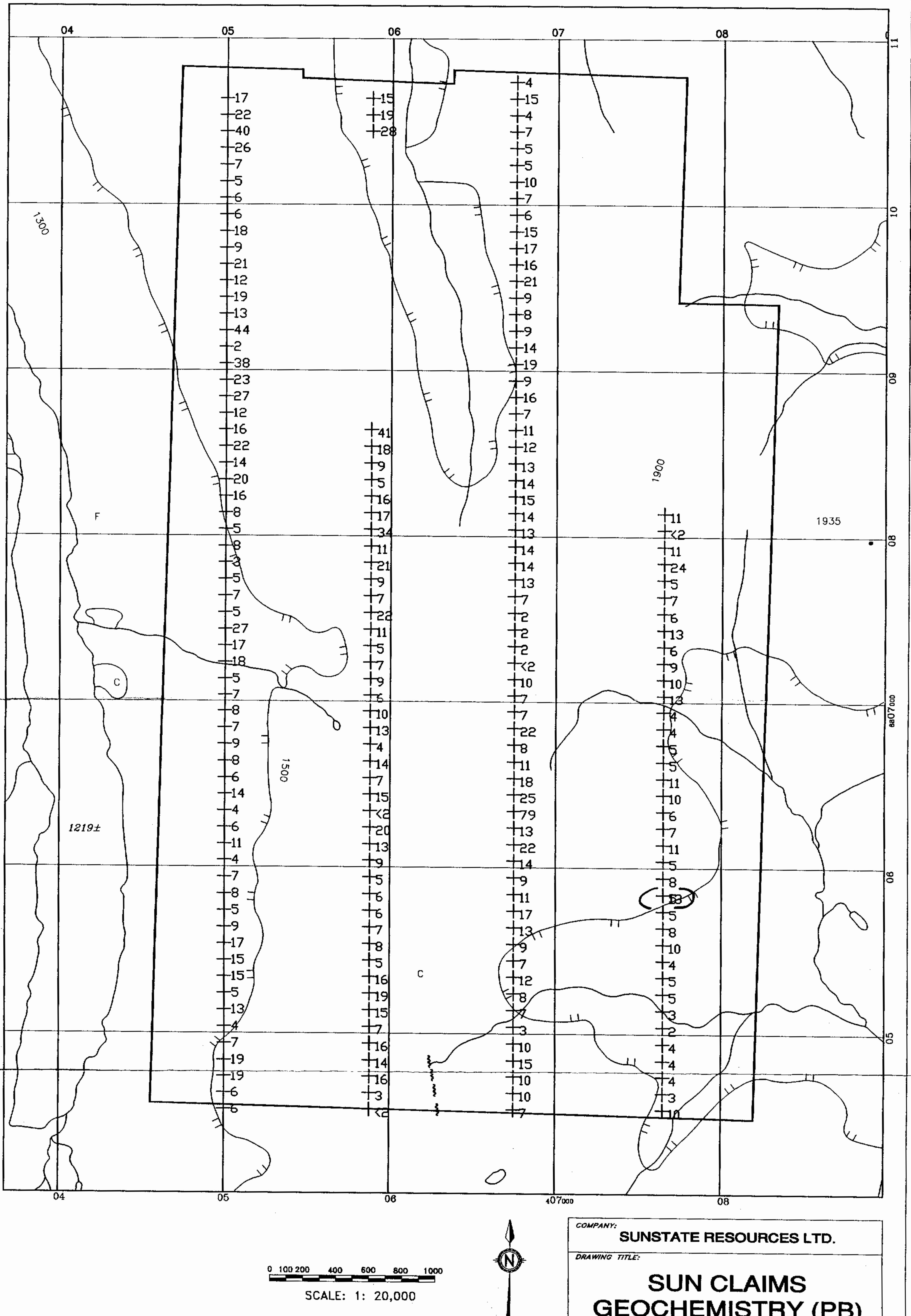
SCALE: 1: 20,000

CU Contours at 75ppm

N

COMPANY:	SUNSTATE RESOURCES LTD.
DRAWING TITLE:	SUN CLAIMS GEOCHEMISTRY (CU) — Units in ppm
LOCATION:	Grass Lakes, Yukon Territory
DATE: April 1997	SCALE: 1 : 20,000
DRAWN: TerraCAD 97022	GEOLOGIST: Graham Davidson
DATA: NTS 105/G7	FIGURE: 6

093732 DWG ②



PB Contours at 50ppm

COMPANY: **SUNSTATE RESOURCES LTD.**

DRAWING TITLE:

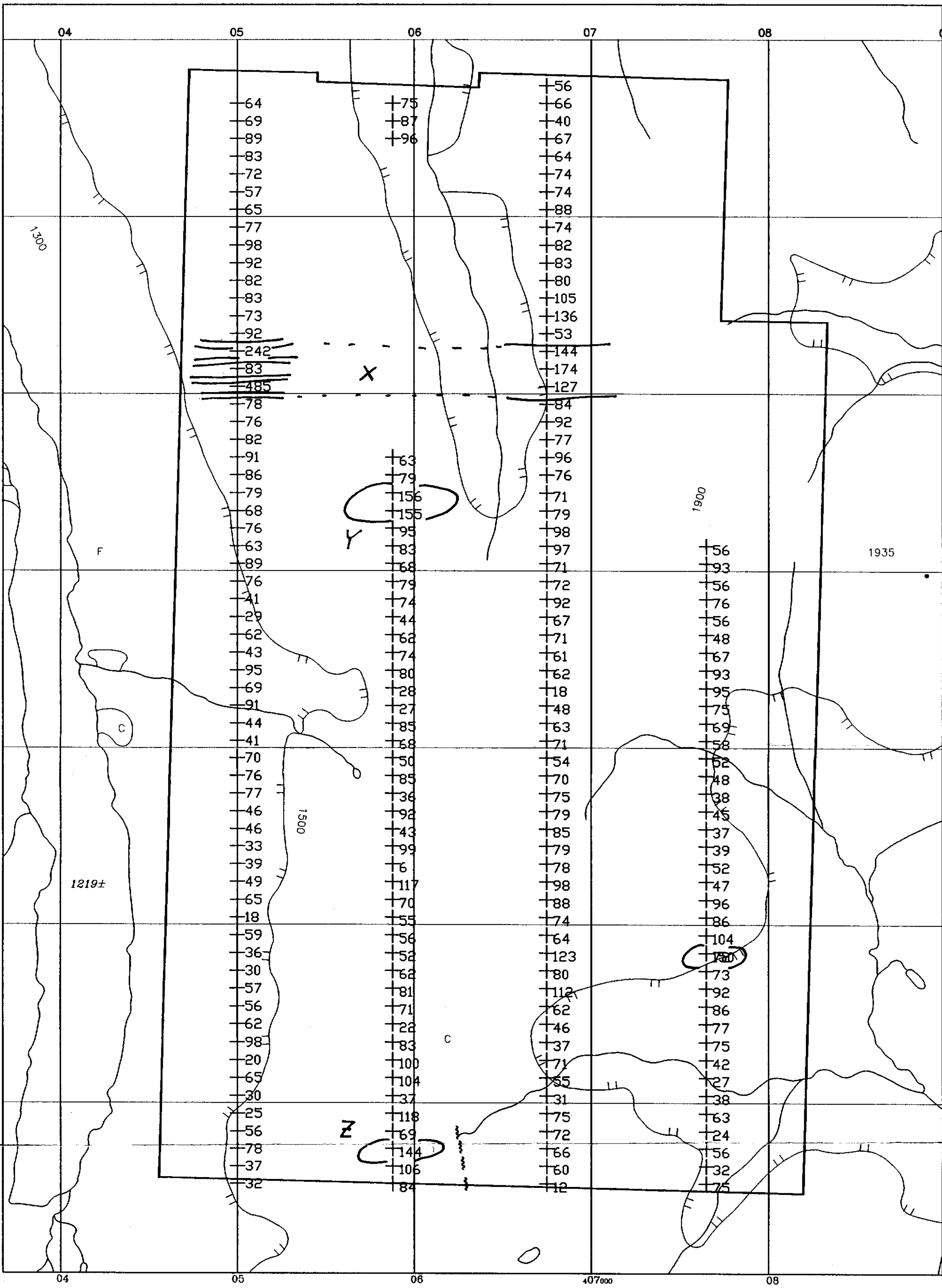
SUN CLAIMS GEOCHEMISTRY (PB)

Units in ppm

LOCATION: **Grass Lakes, Yukon Territory**

DATE:	April 1997	SCALE:	1 : 20,000
DRAWN:	TerraCAD 97022	GEOLOGIST:	Graham Davidson
DATA:	NTS 105/G7	FIGURE:	7

093732 DWG 3



ZN Contours at 125ppm, 200ppm

COMPANY:	SUNSTATE RESOURCES LTD.
DRAWING TITLE:	SUN CLAIMS GEOCHEMISTRY (ZN) Units in ppm
LOCATION:	Grass Lakes, Yukon Territory
DATE: April 1997	SCALE: 1 : 20,000
DRAWN: TerraCAD 97022	GEOLOGIST: Graham Davidson
DATA: NTS 105/G7	FIGURE: 8

093732 DWG(3)

APPENDIX II

Airborne Geophysical Report

REPORT

ON A
COMBINED HELICOPTER-BORNE
ELECTROMAGNETIC AND MAGNETIC SURVEY
SUN BLOCK
FINLAYSON LAKE AREA
YUKON
NTS 105 G/7

FOR

EQUITY ENGINEERING LIMITED
SUITE 207, 675 WEST HASTINGS STREET
VANCOUVER, BRITISH COLUMBIA
CANADA V6B 1N2

BY

AERODAT INC.
6300 NORTHWEST DRIVE
MISSISSAUGA, ONTARIO
CANADA L4V 1J7
PHONE: 905-671-2446

July 17, 1997

R. W. Woolham, P. Eng.
Consulting Geophysicist
J9755

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REPORT ON A
COMBINED HELICOPTER-BORNE
ELECTROMAGNETIC AND MAGNETIC SURVEY
SUN BLOCK
FINLAYSON LAKE AREA
YUKON

1. INTRODUCTION

This is a report on an airborne geophysical survey carried out for Equity Engineering Ltd. by Aerodat Inc. under a contract dated May 2, 1997. Principal geophysical sensors included a five frequency electromagnetic system, a high sensitivity cesium vapour magnetometer and a two frequency VLF-EM system. Ancillary equipment included a colour video tracking camera, Global Positioning System (GPS) navigation instrumentation, a radar altimeter, a power line monitor and a base station magnetometer.

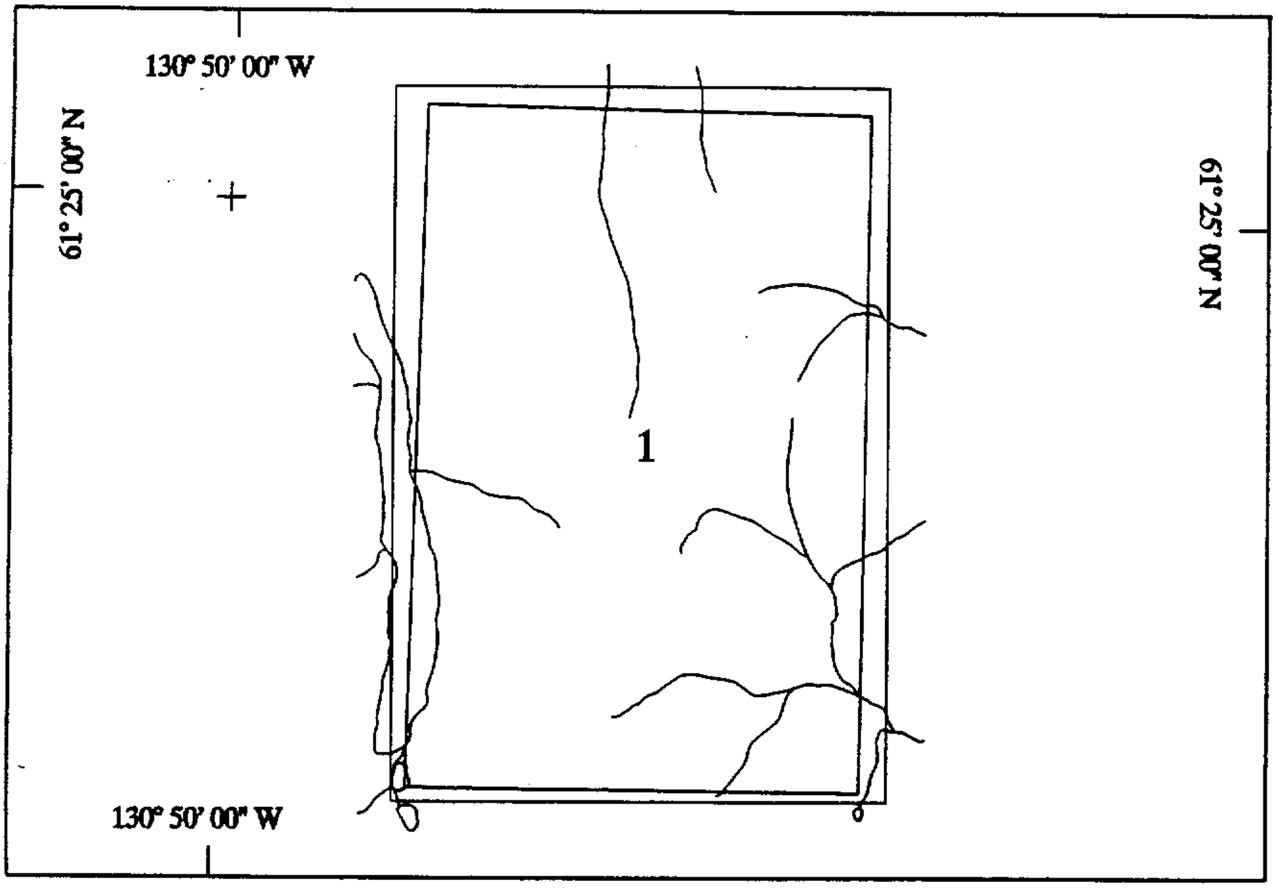
The survey covered an area of about 35 square kilometres located 110 km southeast of Ross River. Total survey coverage is approximately 185 line kilometres including 10 kilometres of tie lines. The Aerodat Job Number is J9755.

This report describes the survey, the data processing, data presentation and interpretation of the geophysical results. Identified electromagnetic anomalies appear on selected map products as anomaly symbols with interpreted source characteristics. The interpretation map indicates conductive areas of possible interest. It also shows prominent structural features interpreted from the magnetic results. Significant structural, conductive and/or magnetic associations are the basis for the selection of specific geophysical anomalies for further investigation.

2. SURVEY AREA

The area is about 430 km. south of the Robert Campbell Highway where the highway passes Finlayson Lake. Topography is shown on the 1:50,000 scale NTS map sheets 105 G/7. Local relief is very rugged. Elevations range from 1200 m to over 1900 m above mean sea level. The survey area is shown in the attached index map that includes local topography and latitude - longitude coordinates. This index map also appears on all map products. The flight line direction is north-south. Line spacing is 200 metres.

INDEX MAP



3. AIRCRAFT AND SURVEY EQUIPMENT

3.1 Aircraft

The survey aircraft was an Aerospatialle AS 315B helicopter (C-FJJW), piloted by D. Rokosh, owned and operated by Turbowest Helicopters Ltd. J. Douglas of Aerodat acted as navigator and equipment operator. Aerodat performed the installation of the geophysical and ancillary equipment. The survey aircraft is flown at a mean terrain clearance of 60 metres and speed of 60 knots.

3.2 Electromagnetic System

The Helicopter ElectroMagnetic system (HEM) is an Aerodat multi-frequency configuration. Two vertical coaxial coil pairs operate at frequency ranges of 900 Hz and 4,500 Hz and two or three horizontal coplanar coil pairs at frequency ranges of 900, 4,500 Hz and 33 kHz. The actual frequencies used depend on the particular bird configuration. At the present time Aerodat has ten bird systems.

This survey utilized the Harrier bird with frequencies of 913 Hz and 4,427 Hz for the coaxial coil pairs and 858 Hz, 4,830 Hz and 32,550 Hz for the coplanar coil pairs. The transmitter-receiver separation is 6.4 metres. Inphase and quadrature signals are measured simultaneously for the five frequencies with a time constant of 0.1 seconds. The HEM bird is towed 30 metres below the helicopter.

3.3 VLF-EM System

The VLF-EM System is a Herz Totem 2A. This instrument measures the total field and vertical quadrature components of two selected frequencies. The sensor is towed in a bird 10 metres below the helicopter.

VLF transmitters are designated "Line" and "Ortho". The line station is in a direction from the survey area, ideally, normal to the flight line direction. This is the VLF station most often used because of optimal coupling with near vertical conductors running perpendicular to the flight line direction. The ortho station is ideally 90 degrees in azimuth away from the line station.

The transmitters used for this survey are:

NAA, Cutler, Maine broadcasting at 24.0 kHz. (line)

NLK, Jim Creek, Washington broadcasting at 24.8 kHz. (ortho)

NSS, Annapolis, Maryland broadcasting at 21.4 kHz. (line)

Unfortunately, after processing the data the results proved to be extremely noisy. The signals from the line stations were too weak to provide reliable data and the results are not presented. It has been noted over the years since the VLF method was first utilized that this very high frequency type of survey, utilizing fixed government communication transmitter stations, tends to detect long strike length and/or surficial poor conductivity sources such as swamps, creeks and rivers. Conductors that are optimum coupled with the primary field will usually predominate over those with other strike directions. In some instances anomalies will be produced by variations in topographic relief. In most survey areas the VLF method provides little bedrock information. The HEM system provides much better conductor resolution and diagnostic information on the conductive responses.

3.4 Magnetometer

A Scintrex H8 cesium, optically pumped magnetometer sensor, measures the earth's magnetic field. The sensitivity of this instrument is 0.001 nanoTesla at a sampling rate of 0.2 second. The sensor is towed in a bird 15 metres below the helicopter 45 metres above the ground.

3.5 Ancillary Systems

Base Station Magnetometer

A Gem Systems, Inc. GSM19 magnetometer, or similar unit, is set up at the base of operations to record diurnal variations of the earth's magnetic field. Synchronization of the clock of the base station with that of the airborne system is checked each day to insure diurnal corrections will be accurate. Recording resolution is 1 nT with an update rate of four seconds. Magnetic field variation data are plotted on a 3" wide gridded paper chart analog recorder. Each division of the grid (0.25") is equivalent to one minute (chart speed) or five nT (vertical sensitivity). The date, time and current total field magnetic value are automatically recorded every 10 minutes. The data is also saved to digital tape.

Radar Altimeter

A King KRA-10 radar altimeter records terrain clearance. The output from the instrument is a linear function of altitude. The radar altimeter is pre-calibrated by the manufacturer and is checked after installation using an internal calibration procedure.

Tracking Camera

A Panasonic colour video camera records the flight path on VHS video tape. The camera operates in continuous mode. The video tape also shows the flight number, 24 hour clock time (to .01 second), and manual fiducial number.

Global Positioning System (GPS)

Global Positioning Systems utilize at present 25 active satellites orbiting the earth. The orbital period for each satellite is approximately 12 hours with an altitude of approximately 12,600 miles (~ 20,000 km). Each satellite contains a very accurate cesium clock which is synchronized to a common clock by the ground control stations (operated by the U.S. Air Force).

The satellites radiate individually coded radio signals which are received by the user's GPS receiver. Along with timing information, each satellite transmits ephemeris (astronomical almanac or table) information which enables the receiver to compute the satellite's precise spatial position. The receiver decodes the timing signals from the satellites in view (4 or more for a three dimensional fix) and, knowing their respective locations from the ephemeris information, computes a latitude, longitude, and altitude for the user. This position fix process is continuous and can be updated once per second.

Differential GPS is employed to eliminate the problem of selective availability where the US Defence Department corrupts the satellite's timing signal. Differential GPS utilizes a GPS reference receiver which must be established within a few hundred miles from the survey aircraft. The GPS System computes differential corrections as a post-processing operation to achieve accuracies in the 2 to 5 metre range.

A Magnavox 9212 (12 channel) GPS receiver is used in the aircraft. Nortech differential GPS processing software is used to compute the differentially corrected GPS positions on a daily flight basis. The navigational unit in the aircraft supplies continuous information to the pilot and allows multiple way point entry.

The Picodas PNAV 2001 survey navigation system is utilized on the aircraft to provide a left/right indicator for the pilot. The single point GPS positions are logged onto the PICODAS or RMS digital acquisition systems along with the magnetometer data. The single point GPS accuracy is much better than 25 metres. The GPS positions are converted to NAD27 format for inclusion in the technical report and in the digital archive data.

Analog Recorder

An RMS dot matrix recorder displays the data during the survey. Record contents are as follows:

LABEL	PARAMETER	CHART SCALE
MAGF	Total Field Magnetics, Fine	2.5 nT/mm
MAGC	Total Field Magnetics, Coarse	25 nT/mm
VLT	VLF-EM, Total Field, Line Station	2.5% / mm
VLQ	VLF-EM, Vert. Quadrature, Line Station	2.5% / mm
VOT	VLF-EM, Total Field, Ortho Station	2.5% / mm
VOQ	VLF-EM, Vert. Quadrature, Ortho Station	2.5% / mm
L9XI	900 Hz, Coaxial, Inphase	2.5 ppm/mm
L9XQ	900 Hz,Coaxial,Quadrature	2.5 ppm/mm
M4XI	4,500 Hz, Coaxial, Inphase	2.5 ppm/mm
M4XQ	4,500 Hz, Coaxial, Quadrature	2.5 ppm/mm
L8PI	900 Hz, Coplanar, Inphase	10 ppm/mm
L8PQ	900 Hz, Coplanar, Quadrature	10 ppm/mm
M4PI	4,500 Hz, Coplanar, Inphase	10 ppm/mm
M4PQ	4,500 Hz, Coplanar, Quadrature	10 ppm/mm
H3PI	33,000 Hz, Coplanar, Inphase	20 ppm/mm
H3PQ	33,000 Hz, Coplanar, Quadrature	20 ppm/mm
BALT	Barometer	50 ft/mm
RALT	Radar Altimeter	10 ft/mm
PWRL	50/60 Hz Power Line Monitor	-

Data is recorded with positive - up, negative - down. The analog zero of the radar altimeter is 5 cm from the top of the analog record. A helicopter terrain clearance of 60 m should therefore be seen some 3 cm from the top of the analog record.

Chart speed is 2 mm/second. The 24-hour clock time is printed every 20 seconds. The total magnetic field value is printed every 30 seconds. The ranges from the radar navigation system are printed every minute.

Vertical lines crossing the record are manual fiducial markers activated by the operator. The start of any survey line is identified by two closely spaced manual fiducials. The end of any survey line is identified by three closely spaced manual fiducials. Manual fiducials are numbered in order. Every tenth manual fiducial is indicated by its number, printed at the bottom of the record.

Calibration sequences are located at the start and end of each flight and at intermediate times where needed.

Digital Recorder

A DGR-33 data system records the digital survey data on magnetic media. Contents and update rates are as follows:

DATA TYPE	RECORDING INTERVAL	RECORDING RESOLUTION
Magnetometer	0.1 second	0.001 nT
VLF-EM (4 Channels)	0.2 second	0.03%
HEM, (8 or 10 Channels)	0.1 second	
HEM, coaxial- 900 Hz/4,500 Hz		0.03 ppm
HEM, coplanar- 900 Hz/4,500 Hz		0.06 ppm
HEM, coplanar- 33,000 Hz		0.125 ppm
Position (2 Channels)	0.2 second	0.1 m
Altimeter	0.2 second	0.05 m
Power Line Monitor	0.2 second	
Manual Fiducial		
Clock Time		

4. SURVEY LOGISTICS AND CALIBRATION

4.1 Survey

The survey was completed in the period May 17 to June 9, 1997. Principal personnel are listed in Appendix I. A total of 7 survey flights was required to complete the project. Aircraft ground speed is maintained at approximately 60 knots (30 metres per second) and mean terrain clearance of 60 metres consistent with the safety of the aircraft and crew.

4.2 Navigation

A global positioning system (GPS) consisting of a Magnavox MX 9212, or similar system, operated in differential mode guides aircraft navigation and flight line control. Field processing of the differential GPS data in the field utilizes a PC using software supplied by the manufacturer. One system is installed in the survey helicopter. This involves mounting the receiver antenna on the casing ("bird") containing the magnetometer sensor. A second system acts as the base station.

The published NTS maps provide the Universal Transverse Mercator (UTM) coordinates of the survey area comers. These coordinates program the navigation system. A test flight confirms if area coverage is correct. Thereafter the navigation system guides the pilot along the survey traverse lines marked on the topographic map. The operator also enters manual fiducials over prominent topographic features. Survey lines showing excessive deviation are re-flown.

The operator calibrates the geophysical systems at the start, middle (if required) and end of every survey flight. During calibration the aircraft is flown away from ground effects to record electromagnetic zero levels.

4.3 Calibration and Data Verification

The operator calibrates the geophysical systems including the barometric altimeter at the start, middle (if required) and end of every survey flight. Immediately after takeoff and before landing the altimeter values are compared with the 30 m separation between the helicopter and EM sensor. The geophysical systems are calibrated and monitored as follows:

Electromagnetics

The system is nulled and phased according to Aerodat's standard procedures. Any discrepancies from previous surveys require an extemal Q coil calibration. The Extemal Calibration Procedure is done at the start of every survey and every week thereafter until the survey has been completed. There are four parts to the Extemal Calibration

Procedure. After system has warmed up, they are:

1.) Null each frequency
2.) Phase each frequency
3.) Set the gain for each frequency
4.) Note the response of the internal Cal-coil

The phasing is done with a ferrite bar. The gain calibration is done using a calibration coil which is mounted at a pre-set location off the end of the bird.

The phasing and calibration is checked with the internal Q coil. The internal Q coil is activated prior to and at the end of each flight with the system flying out of ground effect (250 m or higher) to assure correct EM calibration. Analog trace locations are corrected for all channels when the system is out of ground effect. If excessive drift is present on the EM system the preceding procedures are repeated as required.

Magnetics

The airborne magnetic data is monitored in the aircraft by means of a 4th difference of the data which is calculated and presented on the airborne analog recorder. Should the 4th difference exceed the allowable specification, the portion of the flight line thereby affected is reflown.

The fourth difference is defined as:

$$FD_i = X_{i+2} - 4x_{i+1} + 6x_i - 4x_{i-1} + X_{i-2}$$

where X_i is the i^{th} total field sample. The fourth difference in this form has units of nT. High frequency noise should be such that the fourth differences divided by 16 are generally less than ± 0.1 nT The fourth difference is displayed on analog at scales of 0.20 nT/cm.

Altimeters

The radar altimeter test is carried out before and after the survey and if any of the altitude equipment is changed. The radar altimeter reading is determined when flying at barometric altitudes of 60, 120, 180 and 240 meters above the base airstrip. Also, the barometric altimeter is calibrated pre-flight and post-flight using the radar altimeter to determine the drift and this drift is applied to the data in the subsequent data processing.
Video Flight Path Verification

The record from the video camera is monitored continuously in flight. The video tape is reviewed immediately after each flight to ensure that the quality is acceptable. Selective flight path verification is performed as necessary.

Lag Tests

Before survey production commences and when any major survey equipment modification or replacement occurs, a lag test is performed to determine the time difference between the magnetometer reading, the electronic navigation reading and the operation of the positioning equipment. These tests are flown at the survey flight altitude in two (2) directions across a distinct magnetic anomaly and a recognizable feature whose exact location is known.

5. DATA PROCESSING AND PRESENTATION

5.1 Base Map

The base map is taken from a photographic enlargement of the NTS topographic maps. A UTM reference grid (grid lines usually every kilometre) and the survey area boundaries are added. After registration of the flight path to the topographic base map, some topographic detail and the survey boundary are added digitally. This digital image forms the base for the colour and shadow maps.

5.2 Flight Path Map

Global Positioning System

The GPS receiver takes in coded data from satellites in view and there after calculates the range to each satellite. The coded data must therefore include the instantaneous position of the satellite relative to some agreed earth-fixed coordinate system.

A further calculation using ranges to several satellites gives the position of the receiver in that coordinate system (eg. UTM, lat/long.). The elevation of the receiver is given with respect to a model ellipsoidal earth.

Normally the receiver must see four satellites for a full positional determination (three space coordinates and time). If the elevation is known in advance, only three satellites are needed. These are termed 3D and 2D solutions.

The position of the receiver is updated every tenth of a second. The accuracy of any one position determination is described by the Circular Error Probability (CEP). Ninety-five percent of all position determinations will fall within a circle of a certain radius. If the horizontal position accuracy is 25 m CEP, for example, 95% of all trials will fall within a circle of 25 m radius centred on the mean. The system may be degraded for civilian use and the autonomous accuracy is then 100 m CEP. This situation is called selective availability (SA). Much of this error (due principally to satellite position/time errors and atmospheric delays) can be removed using two GPS receivers operating simultaneously. One receiver acting as the base station, is at a known position. The second remote receiver is in the unknown position. Differential corrections determined for the base station may then be applied to the remote station. Differential positions are accurate to five m CEP (for a one second sample). Averaging will reduce this error further.

Flight Path

The flight path is drawn using linear interpolation between x,y positions from the navigation system. These positions are updated every second (or about 1.5 mm at a scale of 1:20,000). Occasional dropouts occur when the optimum number of satellites are not available for the GPS to make accurate positional determinations. Interpolation is used to cover short flight path gaps. The navigator's flight path and/or the flight path recovered from the video tape may be stitched in to cover larger gaps. Such gaps may be recognized by the distinct straight line character of the flight path.

The manual fiducials are shown as a small circle and labelled by fiducial number. The 24-hour clock time is shown as a small square, plotted every 30 seconds. Small tick marks are plotted every two seconds. Larger tick marks are plotted every 10 seconds. The line and flight numbers are given at the start and end of each survey line.

The aircraft position is expressed in geographic latitude and longitude coordinates, using the North American Datum NAD27 based on the Clarke 1866 ellipsoid. Any particular survey area located on the globe has a specific reference ellipsoid or projection zone. A further refinement for a better fit to the earth's surface at the survey location is applied by adding or subtracting slight x, y and/or z datum shifts (a few metres to hundreds of metres) to the origin of the ellipsoid. The geographic coordinates are converted to fit this ellipsoid before calculating the UTM coordinates. The UTM coordinates are expressed as UTM eastings (x) and UTM northings (y).

The flight path map is merged with the base map by matching UTM coordinates from the base maps and the flight path record. The match is confirmed by checking the position of prominent topographic features as recorded by manual fiducial marks or as seen on the flight path video record.

5.3 Electromagnetic Survey Data

The electromagnetic data are recorded digitally at a sample rate of 10 per second with a time constant of 0.1 seconds. A two stage digital filtering process rejects major sferic events and reduces system noise. Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events. This is referred to as a "surgical mute" in signal processing terms. The signal to noise ratio is further enhanced by the application of a low pass digital filter. This filter has zero phase shift that prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 0.25 seconds. This low effective time constant gives minimal profile distortion.

Following the filtering process, a base level correction is made using electromagnetic zero levels determined during high altitude calibration sequences. The correction applied is a linear function of time that ensures the corrected amplitude of the various inphase and quadrature components is zero when no conductive or permeable source is present. The filtered and levelled data are the basis for the determination of apparent resistivity (see following section). The inphase and quadrature responses along the flight line are presented in profile form offset along the flight lines. Differentiation of the various profiles is achieved using two colours (coaxial and coplanar) and two line weights (inphase and quadrature). For interpretation purposes the coaxial and coplanar data sets for a similar frequency range are presented together on one map (900 Hz and/or 4,500 Hz)

5.4 Total Field Magnetics

The aeromagnetic data is corrected for diurnal variations by adjustment with the recorded base station magnetic values. No corrections for regional variations are applied. The corrected profile data are interpolated on to a regular grid using an Akima spline technique. The grid provided the basis for threading the presented contours. The minimum contour interval is 2 nT with a grid cell size of 50 m. Magnetic high areas are assigned warm colours (orange/red) while magnetic low areas show as cool colours (blue).

5.5 Calculated Vertical Magnetic Gradient

The vertical magnetic gradient is calculated from the gridded total field magnetic data. The calculation is based on a 17 x 17 point convolution in the space domain or FFT processing which involves using a two dimensional Fourier Transform, applying a vertical derivative operator and transforming the filtered data back into the space domain. The results are contoured using a minimum contour interval of 0.01 nT/m. Grid cell sizes are the same as those used in processing the total field data. The high and low amplitude responses are give the same colour representation as the total field contours.

5.6 Colour Relief or Shadow Map of Total Field Magnetics

A useful manipulation of the magnetic data is the production of a colour shadow map. It is an aid in the interpretation and presentation of the magnetic information. The shadow map displays two independent variables simultaneously on the same map. The two variables are the amplitude and the gradient of the quantity measured over the mapping region. At every point or grid cell on the map the hue represents the amplitude of the magnetic value and the lightness/darkness of the hue is varied according to the slope or gradient of the data at the cell location. The gradient is translated into a reflectance parameter with respect to a chosen illumination direction. Subtle magnetic structures having a specific trend are enhanced or attenuated depending on the position and angle to the horizon of the light source relative to the trend. If the light source is orthogonal to the trend there will be maximum shadow relief. Regional discontinuities representing fault structures are easily recognized with shadow enhancement.

5.7 Apparent Resistivity

The apparent resistivity is calculated by assuming a 200 metre thick conductive layer over resistive bedrock. The computer determines the resistivity that would be consistent with the sensor elevation and recorded inphase and quadrature response amplitudes at the selected frequency. The apparent resistivity profile data is re-interpolated onto a regular grid at a 50 metres true scale interval using an Akima spline technique and contoured using logarithmically arranged contour intervals. The minimum contour interval depends on the selected frequency and is in units of log(ohm.m) in logarithmic intervals of 0.1, 0.5, 1.0, 5.0 etc. The colour presentation assigns warmer colours (reds) to low resistivity or very conductive responses and cooler colours (blues) to high resistivity or poor conductivity responses.

The highest measurable resistivity is approximately equal to the transmitter frequency. The lower limit on apparent resistivity is rarely reached.

6. DELIVERABLES

The report on the results of the survey is presented in four copies. The report includes folded white print copies of all black line maps. Four copies of the colour and shadow maps are in accompanying map tube(s).

The black line maps show topography, UTM grid coordinates and the survey boundary. The survey data are presented in a set of numbered maps in the following format:

I BLACK LINE MAPS: (Scale 1:20,000)

Map No. Description

1. BASE MAP; screened topographic base map plus survey area boundary, and UTM grid.

2. COMPILATION / INTERPRETATION MAP; with base map, flight path map and HEM anomaly symbols with interpretation .

3. TOTAL FIELD MAGNETIC CONTOURS; with base map, HEM anomaly symbols and flight lines.

4. VERTICAL MAGNETIC GRADIENT CONTOURS; with base map, HEM anomaly symbols and flight lines.

5A. APPARENT RESISTIVITY CONTOURS; apparent resistivity calculated for the coplanar 900 Hz data, with base map, HEM anomaly symbols and flight lines.

5B. APPARENT RESISTIVITY CONTOURS; apparent resistivity calculated for the coaxial 4,500 Hz data, with base map, HEM anomaly symbols and flight lines.

5C. APPARENT RESISTIVITY CONTOURS; apparent resistivity calculated for the coplanar 4,500 Hz data, with base map, HEM anomaly symbols and flight lines.

II COLOUR MAPS: (Scale 1:20,000)

1. TOTAL FIELD MAGNETICS; with superimposed contours, flight lines, topographic features and HEM anomaly symbols.

2. VERTICAL MAGNETIC GRADIENT; with superimposed contours, flight lines, topographic features and HEM anomaly symbols.

3A. HEM OFFSET PROFILES; coplanar 900 Hz and coaxial 900 Hz data with flight lines, topographic features and HEM anomaly symbols.

3B. HEM OFFSET PROFILES; coplanar 4,500 Hz and coaxial 4,500 Hz data with flight lines, topographic features and HEM anomaly symbols.

3C. HEM OFFSET PROFILES; coplanar 33,000 Hz data with flight lines, topographic features and HEM anomaly symbols.

4A. APPARENT RESISTIVITY; calculated for the coplanar 900 Hz data with superimposed contours, flight lines, topographic features and HEM anomaly symbols.

4B. APPARENT RESISTIVITY; calculated for the coaxial 4,500 Hz data with superimposed contours, flight lines, topographic features and HEM anomaly symbols.

4C. APPARENT RESISTIVITY; calculated for the coplanar 4,500 Hz data with superimposed contours, flight lines, topographic features and HEM anomaly symbols.

III SHADOW DERIVATIVE: (Scale 1:20,000)

1. TOTAL FIELD MAGNETICS SHADOW MAP; with suitable sun angle

The processed digital data, including both the profile and the gridded data, is on CD ROM'S (ISO 9660). Profile data is written as columnar ASCII records and the gridded data as standard Geosoft PC grids. A full description of the format is included with the package. All gridded data can be displayed on IBM compatible microcomputers using the Aerodat AXIS (Aerodat Extended Imaging System) or RTI (Real Time Imaging) software package. The complete data package includes all analog records, base station magnetometer records, flight path video tape and original map cronaflexes.

7. INTERPRETATION

7.1 Area Geology

The property covers the mid-Palaeozoic volcanic-plutonic rocks of the Yukon-Tanana Terrane comprising, in part, mafic and felsic metavolcanics, carbonaceous metasediments, quartzeye grits and orthogneiss intruded by felsic and mafic stocks. Cominco Ltd.'s ABM deposit at its Kudz Ze Kayah project is 10 km to the north-northeast of the survey area.

This massive sulphide, Kuroko-style, base metal deposit is hosted by Devonian to Mississippian age interlayered metavolcanic and metasedimentary rocks of the Yukon-

Tanana Terrane. The deposit hosts a reserve, minable by open-pit methods, of 11.3 million tonnes grading 5.9% zinc, 1.5% lead and 0.9% copper. The Wolverine and Lynx deposits discovered by Westmin Resources are similar orebodies located about 20 km east of the ABM deposit. A geological resource estimate for these deposits totals 5.3 million tonnes grading 13.0% zinc, 1.5% lead and 1.4% copper plus values in gold and silver (The Northern Miner, June 23, 1997).

7.2 Magnetic Interpretation

The total field magnetic responses reflect major changes in the magnetite content of the underlying rock units. The amplitude of the magnetic responses relative to the regional background help to assist in identifying specific magnetic and nonmagnetic units related to, for example, mafic flows or tuffs, mafic to ultramafic intrusives, felsic intrusives, felsic volcanics and/or sediments etc. Obviously, several geological sources can produce the same magnetic response. These ambiguities can be reduced considerably if basic geological information on the area is available to the geophysical interpreter.

In addition to amplitude variations, magnetic patterns related to the geometry of the particular rock unit also help in determining the probable source of the magnetic response. For instance, long narrow magnetic linears usually reflect mafic tuff/flow horizons or mafic intrusive dyke structures while semi-circular features with complex magnetic amplitudes may be produced by local plug-like intrusive sources such as pegmatites, carbonatites or kimberlites.

The calculated vertical magnetic gradient assists considerably in mapping weaker magnetic linears that are partially masked by nearby higher amplitude magnetic features. The broad zones of higher magnetic amplitude, however, are severely attenuated in the vertical magnetic gradient results. These higher amplitude zones reflect rock units having magnetic susceptibility signatures. For this reason both the total and gradient magnetic data sets must be evaluated.

Theoretically the magnetic gradient zero contour line marks the contacts or limits of large magnetic sources. This applies to wide sources, greater than 50 metres, having simple slab geometries and shallow depth.(See discussion in Appendix II) Thus the gradient map also aids in the more accurate delineation of contacts between differing magnetic rock units.

The cross cutting structures, shown on the interpretation map as faults, are based on interruptions and discontinuities in the magnetic trends. Generally, sharp folding of magnetic units will produce a magnetic pattern indistinguishable from a fault break. Thus, if anomaly displacements are small such fault structures, where they mark an anomaly interruption, may actually represent a deformation node rather than faulting.

7.3 Magnetic Survey Results and Conclusions

To facilitate the following discussion of the magnetic results it is suggested the interpretation map be compared with the total field and vertical gradient magnetic colour contour maps either as overlays or side by side.

The magnetic background is interpreted to be approximately 58,105 nanoTesla (nT). Amplitudes range from about 25 nT below background to 70 nT above background. These low amplitude ranges indicate mostly felsic and/or sedimentary rocks underlie the area. On the interpretation map the magnetic trends are indicated with solid lines. These trends probably reflect intermediate intrusive and extrusive rocks related to volcanic activity. The anomaly patterns are very erratic and contorted with a general east-west grain. A few north-northwest faults and a northeast to north-south fault structure are positioned to explain some of the anomaly discontinuities. Below background non-magnetic zones are outlined with thick dashed lines and depression symbols. Such zones usually map felsic or sedimentary rocks. Local smaller negative zones can also indicate possible alteration effects, felsic intrusives or diatremes. A few non-magnetic zones occur in the south third of the survey block.

7.4 Electromagnetic Anomaly Selection/Interpretation

Vertical to Near Vertical Tabular Conductive Sources

Usually two sets of stacked colour coded profile maps of one coaxial and one coplanar inphase and quadrature responses are used to select conductive anomalies of interest. These HEM intercepts are automatically plotted on the various map products listed previously. Selection of HEM anomaly intercepts is based on conductivity as indicated by the inphase to quadrature ratios of the 900 Hz and/or 4,500 Hz coaxial data, anomaly shape, and anomaly profile characteristics relative to coaxial and corresponding coplanar responses. The peak of the coaxial responses is picked for digitizing as that defines the position of any near vertical to dipping tabular source.

These response shapes are illustrated in Appendix II, in the figure entitled "HEM Response Profile Shapes .....". Profile A illustrates the coaxial and coplanar signature of a vertical source while profiles B and C show the effect of dip on the coplanar and coaxial profiles. For a gently dipping source the small up-dip tail of the coplanar profiles B and C is not present and there is just a shift of the coplanar peak down dip from the coaxial peak.

Flat Lying Conductive Sources

Flat lying responses are characterized by identically shaped coaxial and coplanar response profiles. Profile I, Appendix II, illustrates a flat source response. Variations in the conductivity and thickness of flat lying sources produces peaks and valleys in the profile data. Ordinarily the anomaly peaks from flat lying sources are not selected for plotting as HEM intercepts. Their locations have little meaning if the source is flat lying. A much better presentation of conductive flat lying sources is achieved by the resistivity calculations and map plots. Comparison of the resistivity data with geological information can then ascertain if the source of the responses are of possible geological interest.

It is difficult to differentiate between responses associated with the edge effects of flat lying conductors and actual poor conductivity bedrock conductors on the edge of or overlain by flat lying conductors. Extensive flat lying to gently dipping conductors often have an "edge effect" anomaly which is a coaxial peak on the flank of the coplanar responses similar to one side of profile E, G or H, Appendix II. Often only one edge can be seen if the source is dipping. Such edge effect anomalies are often seen marking the perimeter of lakes or swamps containing conductive material.

Poor conductivity bedrock conductors having low dips will also exhibit responses that may be interpreted as surficial overburden conductors. In such cases, where the source of the conductive response appears to be ambiguous, the coaxial peak of the anomaly is still selected for plotting. In some situations the conductive response has line to line continuity and some magnetic association thus providing possible evidence that the response is related to an actual bedrock source.

Flat lying limited width ribbon type conductive responses with some strike length are sometimes also present. These responses are characterized by a "M" shaped coaxial anomaly with a single peaked coplanar anomaly centred in the trough between the two coaxial peaks. This is illustrated in Appendix II in the same figure as previously mentioned (see profile shape E or G). The actual geometry of the source of these ribbon type responses is difficult to determine. They could represent a synclinal structure such as would be produced by combining dipping profiles C and B.

Negative Inphase Responses

In some areas the inphase profile component exhibits a negative anomaly response usually over obvious magnetic areas. This is produced by local concentrations of magnetite and usually occurs when the sensor is flying close to the ground surface. If only magnetite is present there will be no quadrature response associated with the negative inphase response. If conductive material is present, however, such as graphite or sulphides, a positive quadrature response will be evident with the negative inphase response. In this case the anomaly is selected for plotting and evaluation and designated as a magnetic/conductive response.

Depth and Conductivity Calculation

The calculation of the depth to the conductive source and its conductivity is based on the 4,500 Hz coaxial data assuming a thin vertical sheet model. The amplitude of the inphase and quadrature responses are used for the calculations which are automatically determined by computer. These data are listed in Appendix III and the depth and conductivity values are shown with each plotted anomaly. Further detailed discussion and illustration of the determination of these values is contained in Appendix II. Note the depth calculation for those conductors having a gently dipping to flat lying profile signature will not be accurate although the conductivity value will have some relative meaning.

The selected HEM intercepts are automatically categorized according to their conductivity and amplitude. The calculation of the conductivity of low amplitude anomalies can be very inaccurate. Therefore, anomalies having amplitudes below a certain level and/or low conductivity value are given a zero rating with the category increasing for increasing conductivity values that are statistically reliable.

7.5 Electromagnetic Survey Results and Conclusions

Conductive flat lying to gently dipping material is contributing to the electromagnetic responses in various degrees throughout the survey block. There is a definite correlation between low resistivity and topographically low areas along drainage gulleys and on the flanks of hills. This implies slightly conductive surficial material such as talus and clay is the main source of the conductive effects. In fact, the area is very resistive relative to other areas in the Finlayson Lake camp where graphitic argillaceous sediments are quite conductive and often ubiquitous.

There are only a few HEM intercepts and all have very poor conductivity and are questionable bedrock sources. Two or more intercepts that are on adjacent lines are outlined and designated with a number. In all, seven anomalies are indicated. Of these, numbers 1, 3, 4 and 5 are related to drainage gulleys and are suspicious as valid bedrock responses. Numbers 2, 6 and 7 fall on the flanks of hills but 2 and 6 cross local magnetic trends furthering their questionable nature as bedrock responses. Anomaly 7 is slightly more interesting as it is centred on a local below background non-magnetic zone which may indicate alteration or the presence of a felsic intrusive plug-like body.

8. RECOMMENDATIONS

Selection of geophysical anomalies for further investigation is based on the structural and magnetic associations of the designated conductors as well as their relative conductivity. Prior to any ground follow-up the designated conductive zones should be reviewed with respect to the geological target model being sought and known geology and mineralization in the area. The conductors that might be valid bedrock conductors and are recommended for investigation are numbers 2, 6 and 7. Evaluation of the other four conductors is suggested as a low priority objective.

REGISTERED PROFESSIONAL ENGINEER
R. W. WOOLHAM
PROVINCE OF ONTARIO

Respectfully submitted,

R. W. Woolham, P.Eng.
Consulting Geophysicist

for

AERODAT INC.

July 17, 1997

J9755

APPENDIX I

PERSONNEL

FIELD

Flown	May 17 to June 9, 1997
Pilot(s)	D. Rokosh
Operator(s)	J. Douglas

OFFICE

Processing	Darcy McGill George McDonald
Report	R. W. Woolham

APPENDIX II

GENERAL INTERPRETIVE CONSIDERATIONS

GENERAL INTERPRETIVE CONSIDERATIONS

Electromagnetic

The Aerodat electromagnetic system utilized two different transmitter-receiver coil geometries. The traditional coaxial coil configuration is operated at widely separated frequencies. The horizontal coplanar coil configuration is similarly operated at different frequencies where at least one pair is approximately aligned with one of the coaxial frequencies.

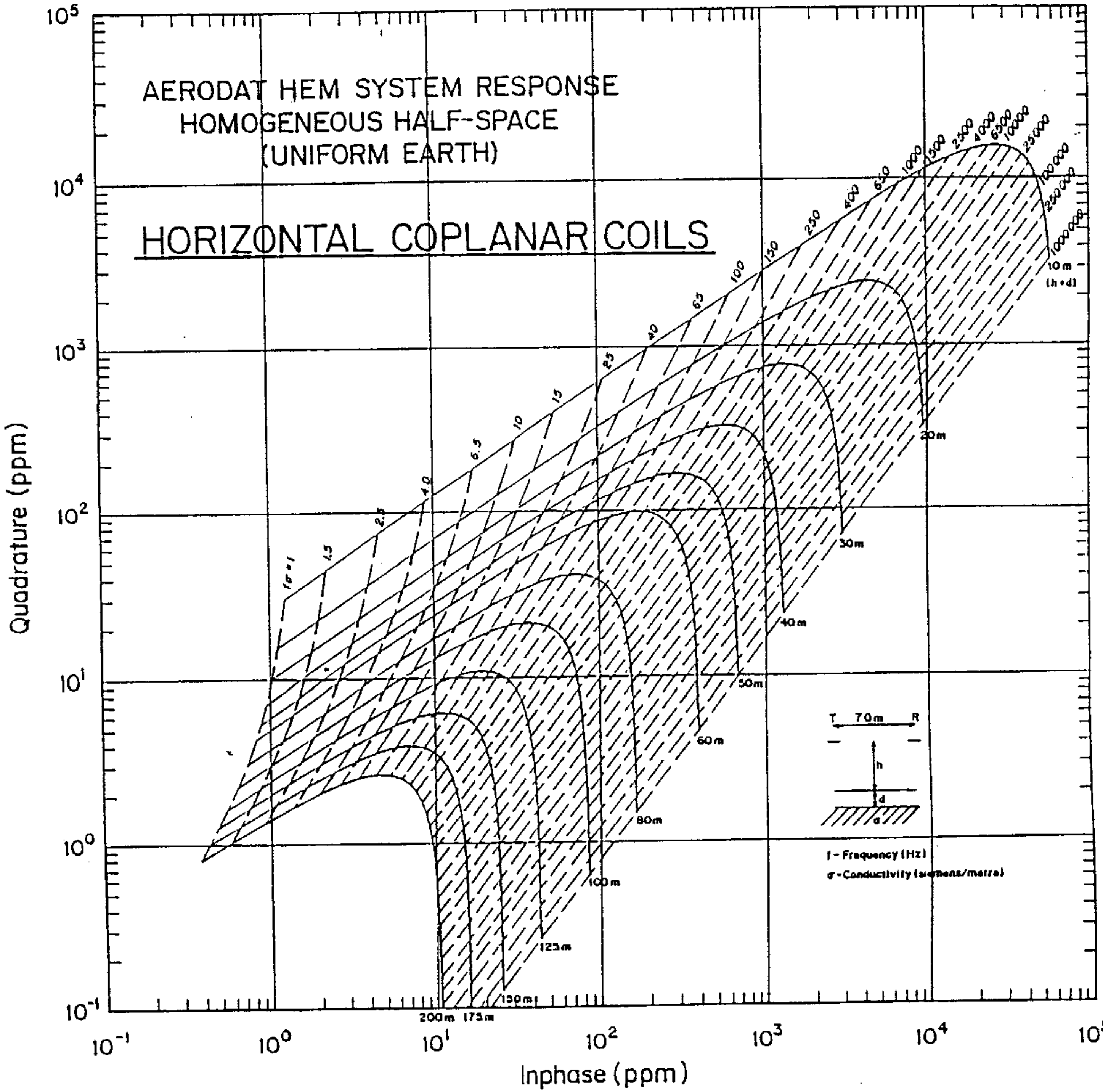
The electromagnetic response measured by the helicopter system is a function of the "electrical" and "geometrical" properties of the conductor. The "electrical" property of a conductor is determined largely by its electrical conductivity, magnetic susceptibility and its size and shape; the "geometrical" property of the response is largely a function of the conductor's shape and orientation with respect to the measuring transmitter and receiver.

Electrical Considerations

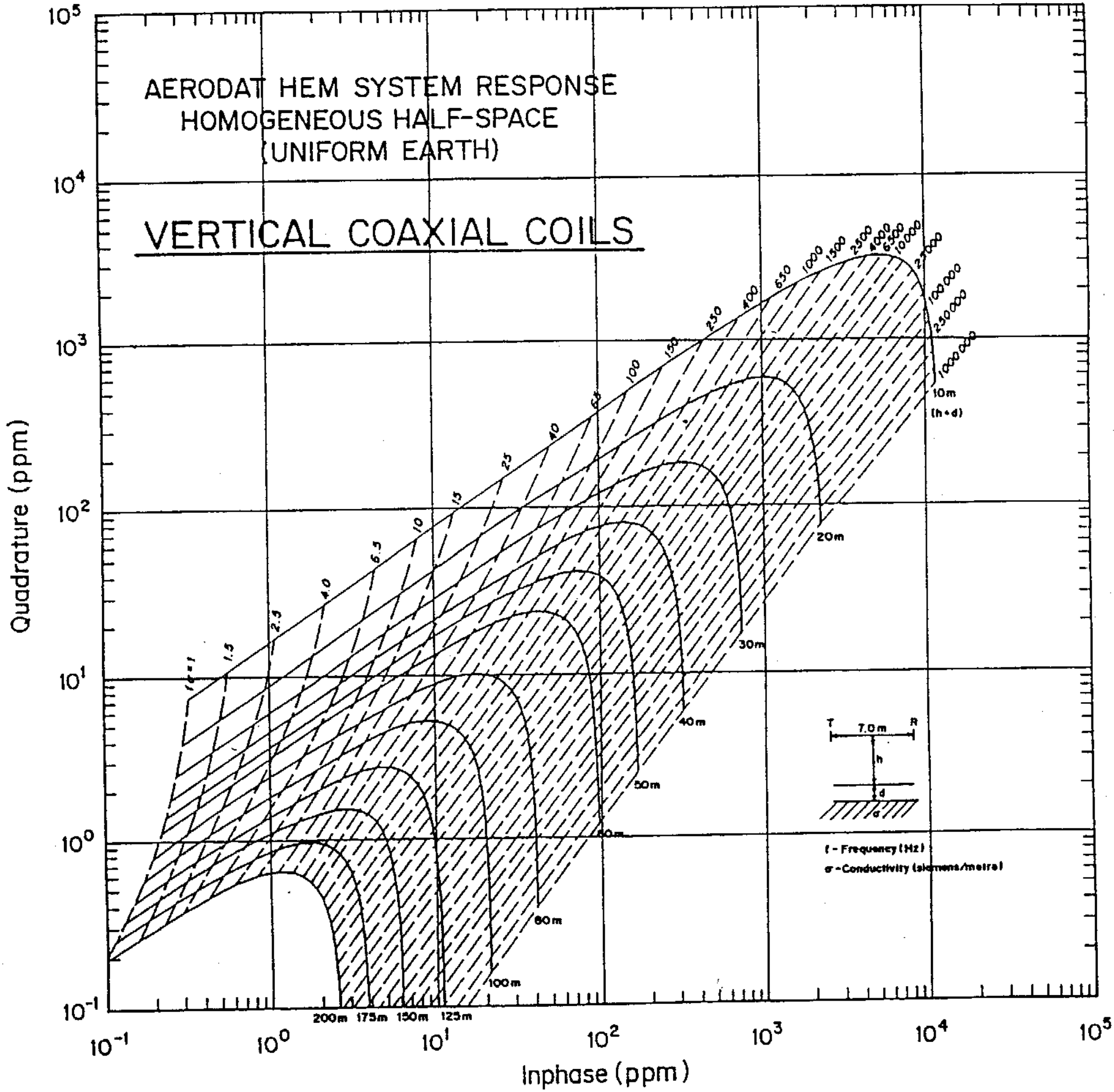
For a given conductive body the measure of its conductivity or conductance is closely related to the measured phase shift between the received and transmitted electromagnetic field. A small phase shift indicates a relatively high conductance, a large phase shift lower conductance. A small phase shift results in a large inphase to quadrature ratio and a large phase shift a low ratio. This relationship is shown quantitatively for a non-magnetic vertical half-plane and half space models on the accompanying phasor diagrams. Other physical models will show the same trend but different quantitative relationships

The phasor diagram for the vertical half-plane model, as presented, is for the coaxial coil configuration with the amplitudes in parts per million (ppm) of the primary field as measured at the response peak over the conductor. To assist the interpretation of the survey results the computer is used to identify the apparent conductance and depth at selected anomalies. The results of this calculation are presented in anomaly listings included in the survey report and the conductance and inphase amplitude are presented in symbolized form on the map presentation.

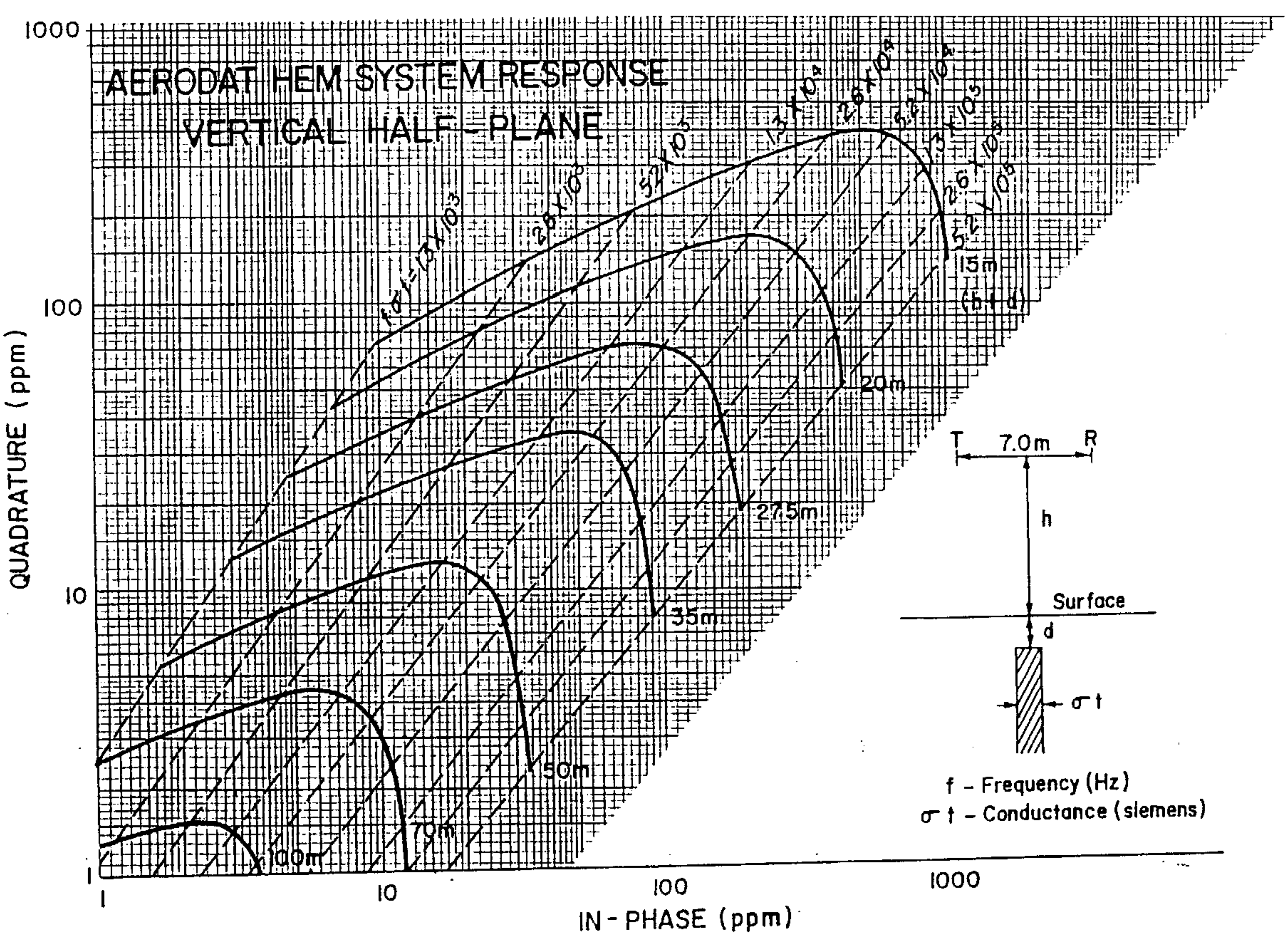
The conductance estimate is most reliable when anomaly amplitudes are large and background resistivities are high. Where the anomaly is of low amplitude and background resistivities are low, the conductance estimates are much less reliable. In such situations, the conductance estimate is often quite low regardless of the true nature of the conductor. This is due to the elevated background response levels in the quadrature channel. In an extreme case, the conductance estimate should be discounted and should not prejudice target selection.



AERODAT HEM SYSTEM RESPONSE
HOMOGENEOUS HALF-SPACE
(UNIFORM EARTH)
HORIZONTAL COPLANAR COILS
Quadrature (ppm)
Inphase (ppm)
10 m (h+d)
20m
30m
40m
50m
60m
80m
100m
125m
150m
200m
175m
T 70m R
h
d
σ
f - Frequency (Hz)
σ - Conductivity (siemens/metre)



AERODAT HEM SYSTEM RESPONSE
HOMOGENEOUS HALF-SPACE
(UNIFORM EARTH)
VERTICAL COAXIAL COILS
Quadrature (ppm)
Inphase (ppm)
10m
(h+d)
20m
30m
40m
50m
60m
80m
100m
125m
150m
175m
200m
7.0 m
T
R
h
d
f - Frequency (Hz)
σ - Conductivity (siemens/metre)



AERODAT HEM SYSTEM RESPONSE
VERTICAL HALF-PLANE
QUADRATURE (ppm)
IN-PHASE (ppm)
1000
100
10
1
1
10
100
1000
fσt=13x10³
2.6x10³
5.2x10³
1.3x10⁴
2.6x10⁴
5.2x10⁴
1.3x10⁵
2.6x10⁵
5.2x10⁵
15m
(h+d)
20m
27.5m
35m
50m
70m
100m
T
7.0m
R
h
Surface
d
σt
f - Frequency (Hz)
σt - Conductance (siemens)

The conductance and depth vales as presented are correct only as far as the model approximates the real geological situation. The actual geological source may be of limited length, have significant dip, may be strongly magnetic. Its conductivity and thickness may vary with depth and/or strike and adjacent bodies and overburden may have modified the response. In general the conductance estimate is less affected by these limitations than is the depth estimate, but both should be considered as relative rather than absolute guides to the anomaly's properties.

Conductance in mhos is the reciprocal of resistance in ohms and in the case of narrow slab-like bodies is the product of electrical conductivity and thickness.

The higher ranges of conductance, greater than 2-4 mhos, indicate that a significant fraction of the electrical conduction is electronic rather than electrolytic in nature. Materials that conduct electronically are limited to certain metallic sulphides and to graphite. High conductance anomalies, roughly 10 mhos or greater, are generally limited to massive sulphides or graphites.

Sulphide minerals, with the exception of such ore minerals as sphalerite, cinnabar and stibnite, are good conductors. Sulphides may occur in a disseminated manner that inhibits electrical conduction through the rock mass. In this case the apparent conductance can seriously underrate the quality of the conductor in geological terms. In a similar sense the relatively non-conducting sulphide minerals noted above may be present in significant concentrations in association with minor conductive sulphides, and the electromagnetic response will only relate to the minor associated mineralization. Indicated conductance is also of little direct significance for the identification of gold mineralization. Although gold is highly conductive, it would not be expected to exist in sufficient quantity to create a recognizable anomaly. Minor accessory sulphide mineralization may however provide a useful indirect indication.

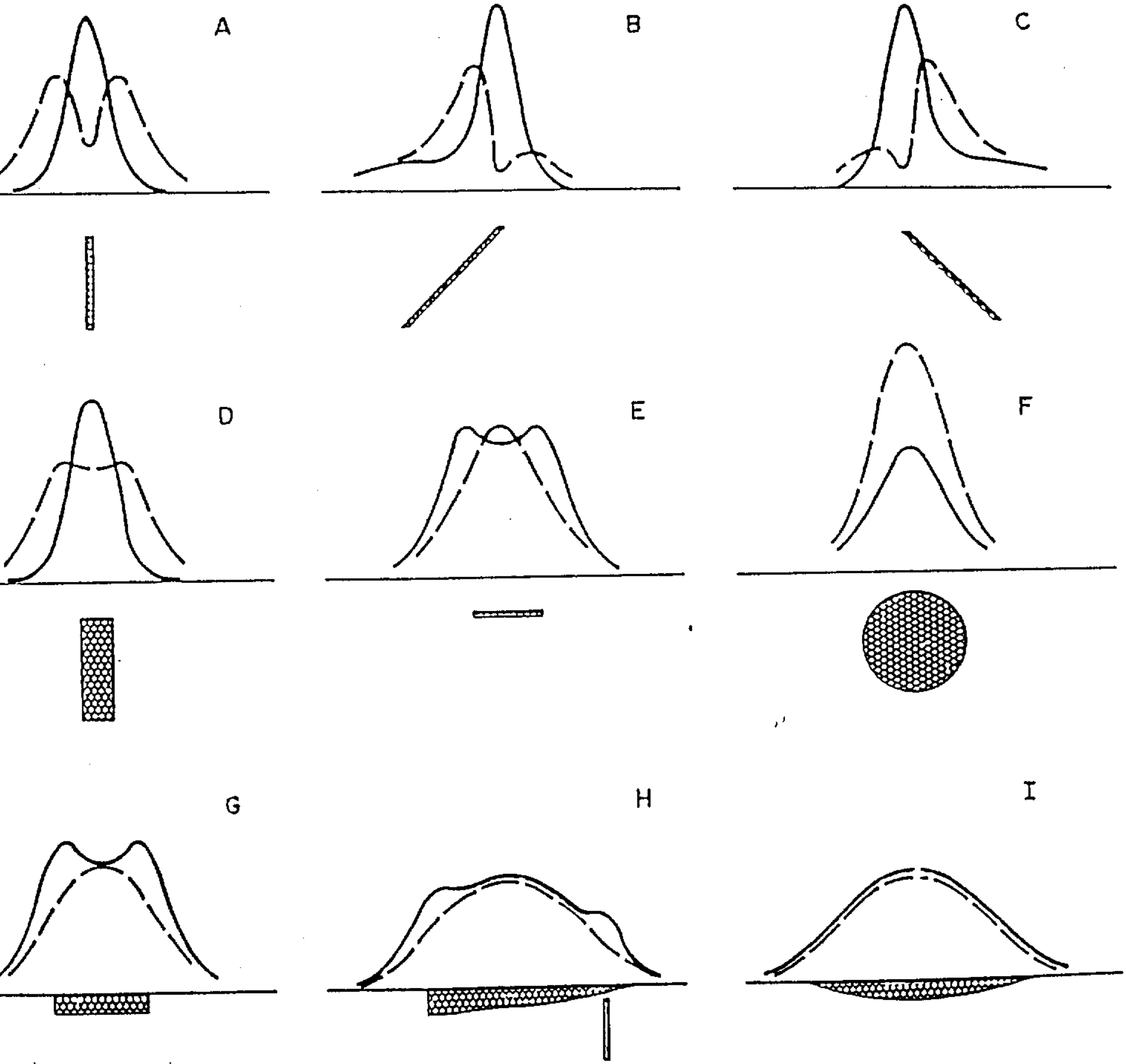
In summary, the estimated conductance of a conductor can provide a relatively positive identification of significant sulphide or graphite mineralization. A moderate to low conductance value does not rule out the possibility of significant economic mineralization.

Geometrical Considerations

Geometrical information about the geologic conductor can often be interpreted from the profile shape of the anomaly. The change in shape is primarily related to the change in inductive coupling among the transmitter, the target, and the receiver. The accompanying figure shows a selection of HEM response profile shapes from nine idealized targets. Response profiles are labelled A through I. These labels are used in the discussion which follows.

HEM RESPONSE PROFILE SHAPE AS AN INDICATOR OF CONDUCTOR GEOMETRY

COAXIAL vertical scale 1 ppm/unit
COPLANAR vertical scale 4ppm/unit



In the case of a thin, steeply dipping, sheet-like conductor, the coaxial coil pair will yield a near symmetric peak over the conductor. On the other hand, the coplanar coil pair will pass through a null couple relationship and yield a minimum over the conductor, flanked by positive side lobes (Profile A). As the dip of the conductor decrease from vertical, the coaxial anomaly shape changes only slightly, but in the case of the coplanar coil pair the side lobe on the down dip side strengthens relative to that on the up dip side (Profiles B and C).

As the thickness of the conductor increases, induced current flow across the thickness of the conductor becomes relatively significant and complete null coupling with the coplanar coils is no longer possible (Profile D). As a result, the apparent minimum of the coplanar response over the conductor diminishes with increasing thickness, and in the limiting case of a fully 3 dimensional body or a horizontal layer or half-space, the minimum disappears completely.

A horizontal conducting layer such as a horizontal thin sheet or overburden will produce a response in the coaxial and coplanar coils that is a function of altitude (and conductivity if not uniform). The profile shape will be similar in both coil configurations with an amplitude ratio (coplanar:coaxial) of about 4:1* (Profiles E and G).

In the case of a spherical conductor, the induced currents are confined to the volume of the sphere, but not relatively restricted to any arbitrary plane as in the case of a sheet-like form. The response of the coplanar coil pair directly over the sphere may be up to 8* times greater than that of the coaxial pair (Profile F).

In summary, a steeply dipping, sheet-like conductor will display a decrease in the coplanar response coincident with the peak of the coaxial response. The relative strength of this coplanar null is related inversely to the thickness of the conductor. A pronounced null indicates a relatively thin conductor. The dip of such a conductor can be inferred from the relative amplitudes of the side-lobes.

Massive conductors that could be approximated by a conducting sphere will display a simple single peak profile form on both coaxial and coplanar coils, with a ratio between the coplanar to coaxial response amplitudes as high as 8*.

Overburden anomalies often produce broad poorly defined anomaly profiles (Profile I). In most cases, the response of the coplanar coils closely follows that of the coaxial coils with a relative amplitude ration of 4*.

Occasionally, if the edge of an overburden zone is sharply defined with some significant depth extent, an edge effect will occur in the coaxial coils. In the case of a horizontal conductive ring or ribbon, the coaxial response will consist of two peaks, one over each edge; whereas the coplanar coil will yield a single peak (Profile H).

• It should be noted at this point that Aerodat's definition of the measured ppm unit is related to the primary field sensed in the receiving coil without normalization to the maximum coupled (coaxial configuration). If such normalization were applied to the Aerodat units, the amplitude of the coplanar coil pair would be halved.

Magnetics

The Total Field Magnetic Map shows contours of the total magnetic field, uncorrected for regional variation. Whether an EM anomaly with a magnetic correlation is more likely to be caused by a sulphide deposit than one without depends on the type of mineralization. An apparent coincidence between an EM and a magnetic anomaly may be caused by a conductor which is also magnetic, or by a conductor which lies in close proximity to a magnetic body. The majority of conductors which are also magnetic are sulphides containing pyrrhotite and/or magnetite. Conductive and magnetic bodies in close association can be, and often are, graphite and magnetite. It is often very difficult to distinguish between these cases. If the conductor is also magnetic, it will usually produce an EM anomaly whose general pattern resembles that of the magnetics. Depending on the magnetic permeability of the conducting body, the amplitude of the inphase EM anomaly will be weakened, and if the conductivity is also weak, the inphase EM anomaly may even be reversed in sign.

The interpretation of contoured aeromagnetic data is a subject on its own involving an array of methods and attitudes. The interpretation of source characteristics for example from total field results is often based on some numerical modelling scheme. The vertical gradient data is more legible in some aspects however and useful inferences about source characteristics can often be read off the contoured VG map.

The zero contour lines in contoured VG data are often sited as a good approximation to the outline of the top of the magnetic source. This only applies to wide (relative to depth of burial) near vertical sources at high magnetic latitudes. It will give an incorrect interpretation in most other cases.

Theoretical profiles of total field and vertical gradient anomalies from tabular sources at a variety of magnetic inclinations are shown in the attached figure. Sources are 10, 50 and 200 m wide. The source-sensor separation is 50 m. The thin line is the total field profile. The thick line is the vertical gradient profile.

The following comments about source geometry apply to contoured vertical gradient data for magnetic inclinations of 70 to 80°.

Outline

Where the VG anomaly has a single sharp peak, the source may be a thin near-vertical tabular source. It may be represented as a magnetic axis or as a tabular source of measurable width - the choice is one of geological preference.

Where the VG anomaly has a broad, flat or inclined top, the source may be a thick tabular source. It may be represented as a thick body where the width is taken from the zero contour lines if the body dips to magnetic north. If the source appears to be dipping to the south (i.e. the VG anomaly is asymmetric), the zero contours are less reliable indicators of outline. The southern most zero contour line should be ignored and the outline taken from the northern zero contour line and the extent of the anomaly peak width.

Dip

A symmetrical vertical gradient response is produced by a body dipping to magnetic north. An asymmetrical response is produced by a body which is vertical or dipping to the south. For southern dips, the southern most zero contour line may be several hundred meters south of the source.

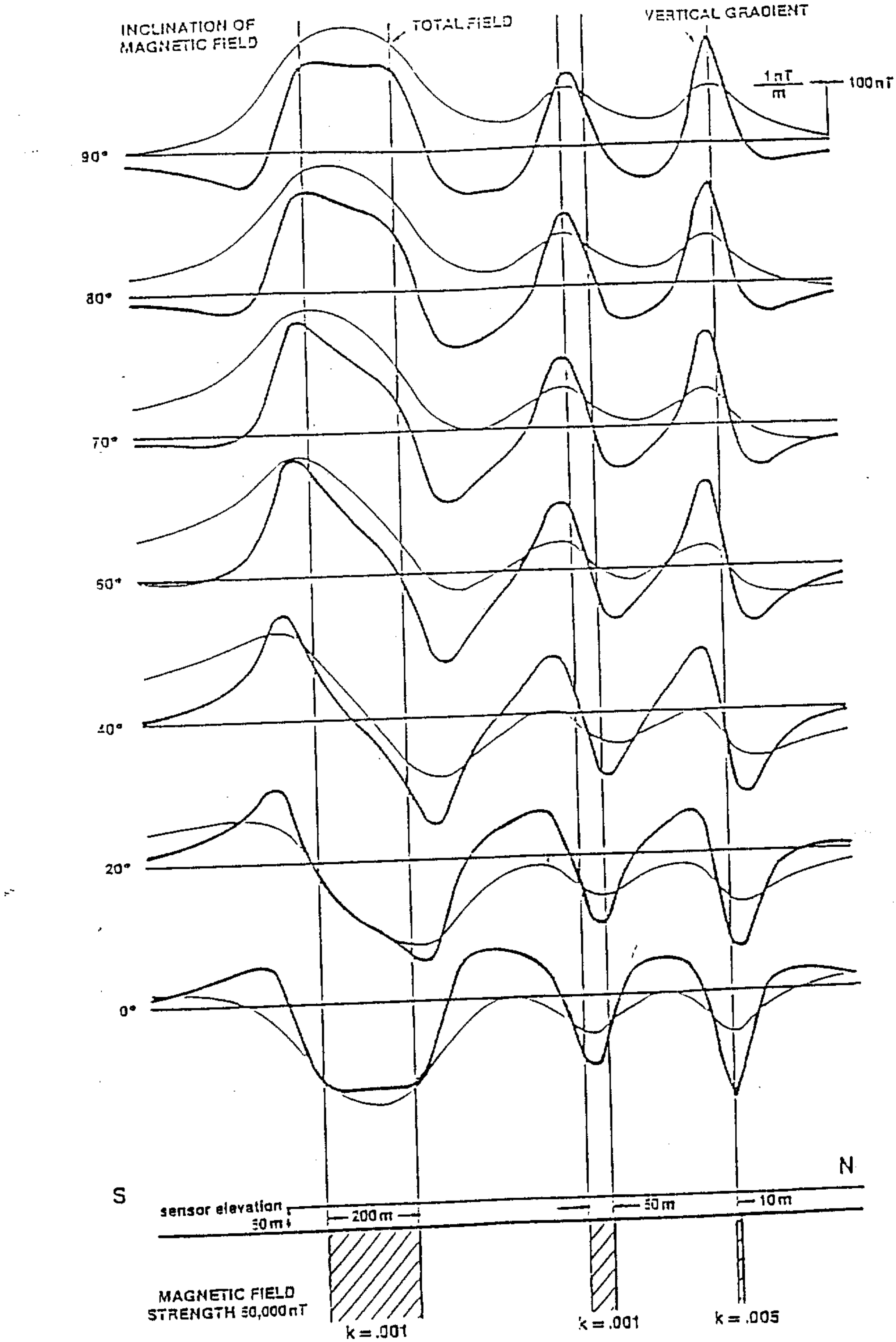
Depth of Burial

The source-sensor separation is about equal to half of the distance between the zero contour lines for thin near-vertical sources. The estimated depth of burial for such sources is this separation minus 50 m. If a variety of VG anomaly widths are seen in an area, use the narrowest width seen to estimate local depths.

VLF Electromagnetics

The VLF-EM method employs the radiation from powerful military radio transmitters as the primary signals. The magnetic field associated with the primary field is locally horizontal and normal to a line pointing at the transmitter.

The Herz Totem uses three coils in the X, Y, Z configuration to measure the total field and vertical quadrature component from two VLF stations. These stations are designated Line and Ortho. The line station is ideally in a direction from the survey area at right angles to the flight line direction. Conductors normal to the flight line direction point at the line station and are therefore optimally coupled to VLF magnetic fields and in the best situation to gather secondary VLF currents. The ortho station is ideally 90 degrees in azimuth from the line station.



INCLINATION OF MAGNETIC FIELD
TOTAL FIELD
VERTICAL GRADIENT
1 nT / m
100 nT
90°
80°
70°
60°
40°
20°
0°
S
N
sensor elevation
50 m
200 m
50 m
10 m
MAGNETIC FIELD STRENGTH 50,000 nT
k = .001
k = .001
k = .005

The relatively high frequency of VLF (15-25) kHz provides high response factors for bodies of low conductance. Relatively "disconnected" sulphide ores have been found to produce measurable VLF signals. For the same reason, poor conductors such as sheared contacts, breccia zones, narrow faults, alteration zones and porous flow tops normally produce VLF anomalies. The method can therefore be used effectively for geological mapping. The only relative disadvantage of the method lies in its sensitivity to conductive overburden. In conductive ground to depth of exploration is severely limited.

The effect of strike direction is important in the sense of the relation of the conductor axis relative to the energizing electromagnetic field. A conductor aligned along a radius drawn from a transmitting station will be in a maximum coupled orientation and thereby produce a stronger response than a similar conductor at a different strike angle. Theoretically, it would be possible for a conductor, oriented tangentially to the transmitter to produce no signal. The most obvious effect of the strike angle consideration is that conductors favourably oriented with respect to the transmitter location and also near perpendicular to the flight direction are most clearly rendered and usually dominate the map presentation.

The total field anomaly is an indicator of the existence and position of a conductor. The response will be a maximum over the conductor, without any special filtering, and strongly favour the upper edge of the conductor even in the case of a relatively shallow dip.

Conversely a negative total field anomaly is often seen over local resistivity highs. This is because the VLF field produces electrical currents which flow towards (or away from) the transmitter. These currents are gathered into a conductor and are taken from resistive bodies. The VLF system sees the currents gathered into the conductor as a total field high. It sees the relative absence of secondary currents in the resistor as a total field low.

As noted, VLF anomaly trends show a strong bias towards the VLF transmitter. Structure which is normal to this direction may have no associated VLF anomaly but may be seen as a break or interruption in VLF anomalies. If these structures are of particular interest, maps of the ortho station data may be worthwhile.

Conductive overburden will obscure VLF responses from bedrock sources and may produce low amplitude, broad anomalies which reflect variations in the resistivity of thickness of the overburden.

Extreme topographic relief will produce VLF anomalies which may bear no relationship to variations in electrical conductivity. Deep gullies which are too narrow to have been surveyed at a uniform sensor height often show up as VLF total field lows. Sharp ridges show up as total field highs.

The vertical quadrature component over steeply dipping sheet-like conductor will be a cross-over type response with the cross-over closely associated with the upper edge of the conductor.

The response is a cross-over type due to the fact that it is the vertical rather than total field quadrature component that is measured. The response shape is due largely to geometrical rather than conductivity considerations and the distance between the maximum and minimum on either side of the cross-over is related to target depth. For a given target geometry, the larger this distance the greater the depth.

The vertical quadrature component is rarely presented. Experience has shown the total field to be more sensitive to bedrock conductors and less affected by variations in conductive overburden.

Apparent Resistivity/Conductivity Maps

Overburden and different types of bedrock may be modelled as a large area horizontal conductor of fixed thickness. A phasor diagram may be constructed, in the same fashion as for the vertical sheet, to convert the measured HEM in-phase and quadrature response to a depth and conductivity value for a horizontal layer. Traditionally if the thickness is large, an infinite half-space, the associated conductivity value is referred to as "apparent conductivity". We have generalized the use of the word "apparent" to include any model where the thickness of the layer is a fixed as opposed to a variable parameter. The units of apparent resistivity are ohm-m and those of apparent conductivity are the inverse mhos/m or siemen/m. If the chosen model layer thickness is close to the true thickness of the conductor then the apparent conductivity will closely conform to the true value; however, if the thickness is inappropriate the apparent value may be considerably different from the true value.

The benefit of the apparent conductivity mapping is that it provides a simple robust method of converting the HEM in-phase and quadrature response to apparent change in ground conductivity.

A phasor diagram for several apparent resistivity models is presented. The general forms for the various thicknesses is very similar and also closely resembles the diagram for the vertical sheet. The diagrams also show the curves for apparent depth. As with the conductivity value the depth value is meaningful if the model thickness closely resembles the true conductive layer thickness. If the HEM response from a thin conducting layer is applied to a thick layer model the apparent conductivity and depth will be less than the true conductivity and depth.

APPENDIX III

ANOMALY LISTINGS

EQUITY ENGINEERING LTD. -- SUN BLOCK

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
2	20100	A/	0	13.5	43.4	0.2	7	17	406034.9	6811131.0
3	20110	A/	0	8.6	21.4	0.2	16	16	406097.3	6806020.5
3	20110	B/	0	5.3	12.1	0.2	17	24	406195.5	6809039.5
3	20110	C/	0	11.9	20.8	0.5	5	32	406278.0	6811083.0
3	20110	D/	0	14.0	28.8	0.4	0	36	406273.6	6811284.5
7	20121	A/	0	2.2	15.4	0.0	0	34	406386.3	6809058.5
7	20121	B/	0	4.5	21.5	0.0	0	28	406259.3	6804661.5
3	20130	A/	0	2.7	17.8	0.0	4	22	406598.2	6809075.5
3	20130	B/	0	3.1	16.0	0.0	1	28	406575.6	6808017.5
3	20130	C/	0	7.2	21.7	0.1	1	30	406493.6	6804775.5
2	20140	A/	0	4.8	13.1	0.1	15	23	406792.0	6808092.0
1	20160	A/	0	3.0	28.1	0.0	2	17	407131.0	6806847.5
3	20170	A/	0	8.6	21.4	0.2	5	28	407289.4	6804689.0
3	20190	A/	0	9.0	23.7	0.2	7	24	407696.4	6805615.5
3	20190	B/	0	3.9	27.4	0.0	9	13	407737.3	6806317.5
3	20190	C/	0	3.4	10.4	0.1	17	23	407820.8	6809866.0
1	20200	A/	0	5.8	24.5	0.1	2	25	407892.3	6806198.0
1	20200	B/	0	1.3	9.9	0.0	0	33	408005.6	6809883.5
3	20210	A/	0	4.1	9.3	0.2	9	36	408226.8	6809273.0
5	20221	A/	0	1.9	9.5	0.0	5	31	408349.9	6809930.5
5	20221	B/	0	3.1	13.1	0.0	0	34	408380.9	6809367.0
3	20231	A/	0	3.2	25.0	0.0	0	25	408497.9	6805848.5
3	20231	B/	0	4.8	17.6	0.1	5	27	408656.2	6809612.5
3	20231	C/	0	1.4	9.5	0.0	8	24	408644.0	6810048.0

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

APPENDIX IV

CERTIFICATE OF QUALIFICATION

I, Roderick W. Woolham of the town of Pickering, Province of Ontario, do hereby certify that:-

1. I am a geophysicist and reside at 1463 Fieldlight Blvd., Pickering, Ontario, L1V 2S3

2. I graduated from the University of Toronto in 1961 with a degree of Bachelor of Applied Science, Engineering Physics, Geophysics Option. I have been practising my profession since graduation.

3. I am a member in good standing of the following organizations: Professional Engineers Ontario (Mining Branch); Society of Exploration Geophysicists; South African Geophysical Association; Prospectors and Developers Association of Canada.

4. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the properties or securities of Equity Engineering Ltd. or any affiliate.

5. The statements contained in this report and the conclusions reached are based upon evaluation and review of maps and information supplied by Aerodat.

6. I consent to the use of this report in submissions for assessment credits or similar regulatory requirements.

R. W. Woolham, P.Eng.

Registered Professional Engineer
R. W. WOOLHAM
Province of Ontario

Pickering, Ontario

J9755

July 17, 1997

APPENDIX III
Certificates of Analysis

CanTech *Laboratories Inc.*

4200B - 10 Street N.E.
Calgary, Alberta
Canada T2E 6K3
Tel (403) 250-1901
Fax (403) 250-8265

KETZA GROUP
Suite 320, 475 Howe Street
Vancouver, B.C.
V6C 2B3

Attention: Blake Macdonald

Certificate of Analysis

Work Order: 9863B-96
Date: January 17, 1997

Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
BALL 4E	23 N	32	11	96	10
BALL 4E	24 N	156	28	135	19
BALL 4E	25 N	64	18	128	25
BALL 4E	26 N	236	2	195	15
BALL 4E	27 N	30	4	62	9
BALL 4E	28 N	46	3	69	12
BALL 4E	29 N	35	14	55	9
BALL 4E	30 N	28	16	84	11
BALL 4E	31 N	30	22	112	12
BALL 4E	32 N	33	18	46	19
SUN 1E	0 S	13	17	64	10
SUN 1E	1 S	14	22	69	15
SUN 1E	2 S	17	40	89	16
SUN 1E	3 S	25	26	83	21
SUN 1E	4 S	24	7	72	17
SUN 1E	5 S	22	5	57	15
SUN 1E	6 S	32	6	65	20
SUN 1E	7 S	39	6	77	22
SUN 1E	8 S	15	18	98	26
SUN 1E	9 S	14	9	92	28
SUN 1E	10 S	10	21	82	16
SUN 1E	11 S	22	12	83	28
SUN 1E	12 S	13	19	73	23
SUN 1E	13 S	17	13	92	19
SUN 1E	14 S	64	44	242	19
SUN 1E	15 S	32	2	83	28
SUN 1E	16 S	36	38	485	10
SUN 1E	17 S	10	23	78	18
SUN 1E	18 S	12	27	76	20
SUN 1E	19 S	13	12	82	23

Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
SUN 1E	20 S	14	16	91	23
SUN 1E	21 S	15	22	86	21
SUN 1E	22 S	27	14	79	26
SUN 1E	23 S	13	20	68	17
SUN 1E	24 S	18	16	76	13
SUN 1E	25 S	14	8	63	13
SUN 1E	26 S	14	5	89	21
SUN 1E	27 S	17	8	76	18
SUN 1E	28 S	10	3	41	7
SUN 1E	29 S	9	5	29	3
SUN 1E	30 S	17	7	62	12
SUN 1E	31 S	11	5	43	6
SUN 1E	32 S	19	27	95	9
SUN 1E	33 S	21	17	69	15
SUN 1E	34 S	32	18	91	20
SUN 1E	35 S	15	5	44	9
SUN 1E	36 S	13	7	41	6
SUN 1E	37 S	18	8	70	15
SUN 1E	38 S	21	7	76	12
SUN 1E	39 S	17	9	77	12
SUN 1E	40 S	9	8	46	7
SUN 1E	41 S	9	6	46	3
SUN 1E	42 S	17	14	33	5
SUN 1E	43 S	7	4	39	3
SUN 1E	44 S	16	6	49	5
SUN 1E	45 S	12	11	65	8
SUN 1E	46 S	8	4	18	2
SUN 1E	47 S	15	7	59	8
SUN 1E	48 S	8	8	36	4
SUN 1E	49 S	5	5	30	4

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Certificate of Analysis

Work Order: 9863B-96
Date: January 17, 1997

Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
SUN 1E	50 S	12	9	57	12
SUN 1E	51 S	22	17	56	11
SUN 1E	52 S	26	15	62	14
SUN 1E	53 S	22	15	98	23
SUN 1E	54 S	7	5	20	2
SUN 1E	55 S	14	13	65	7
SUN 1E	56 S	13	4	30	3
SUN 1E	57 S	7	7	25	4
SUN 1E	58 S	13	19	56	6
SUN 1E	59 S	16	19	78	9
SUN 1E	60 S	18	6	37	3
SUN 1E	61 S	13	6	32	3
LSUN 2E	1 N	35	<2	84	24
LSUN 2E	2 N	70	3	106	21
LSUN 2E	3 N	35	16	144	21
LSUN 2E	4 N	28	14	69	17
LSUN 2E	5 N	43	16	118	35
LSUN 2E	6 N	18	7	37	5
LSUN 2E	7 N	99	15	104	27
LSUN 2E	8 N	75	19	100	24
LSUN 2E	9 N	41	16	83	23
LSUN 2E	10 N	10	5	22	4
LSUN 2E	11 N	19	8	71	13
LSUN 2E	12 N	46	7	81	16
LSUN 2E	13 N	23	6	62	12
LSUN 2E	14 N	17	6	52	9
LSUN 2E	15 N	27	5	56	10
LSUN 2E	16 N	18	9	55	8
LSUN 2E	17 N	45	13	70	25
LSUN 2E	18 N	60	20	117	35

Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
LSUN 2E	19 N	6	<2	6	<2
LSUN 2E	20 N	62	15	99	37
LSUN 2E	21 N	6	7	43	4
LSUN 2E	22 N	34	14	92	13
LSUN 2E	23 N	13	4	36	6
LSUN 2E	24 N	29	13	85	24
LSUN 2E	25 N	23	10	50	13
LSUN 2E	26 N	32	6	68	20
LSUN 2E	27 N	21	9	85	24
LSUN 2E	28 N	11	7	27	10
LSUN 2E	29 N	8	5	28	4
LSUN 2E	30 N	32	11	80	17
LSUN 2E	31 N	28	22	74	14
LSUN 2E	32 N	18	7	62	11
LSUN 2E	33 N	14	9	44	9
LSUN 2E	34 N	16	21	74	15
LSUN 2E	35 N	15	11	79	14
LSUN 2E	36 N	14	34	68	13
LSUN 2E	37 N	11	17	83	12
LSUN 2E	38 N	15	16	95	21
LSUN 2E	39 N	36	5	155	28
LSUN 2E	40 N	50	9	156	27
LSUN 2E	41 N	12	18	79	20
LSUN 2E	42 N	10	41	63	15
SUN 2E	0 S	14	15	75	18
SUN 2E	1 S	16	19	87	22
SUN 2E	2 S	23	28	96	29
SUN 3E	0 N	5	7	12	2
SUN 3E	1 N	15	10	60	14
SUN 3E	2 N	13	10	66	12

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Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
SUN 3E	3 N	25	15	72	13
SUN 3E	4 N	26	10	75	21
SUN 3E	5 N	9	3	31	3
SUN 3E	6 N	12	7	55	7
SUN 3E	7 N	17	8	71	12
SUN 3E	8 N	12	12	37	10
SUN 3E	9 N	14	7	46	6
SUN 3E	10 N	25	9	62	14
SUN 3E	11 N	57	13	112	18
SUN 3E	12 N	29	17	80	22
SUN 3E	13 N	40	11	123	35
SUN 3E	14 N	17	9	64	14
SUN 3E	15 N	28	14	74	30
SUN 3E	16 N	23	22	88	29
SUN 3E	17 N	24	13	98	32
SUN 3E	18 N	31	79	78	31
SUN 3E	19 N	28	25	79	28
SUN 3E	20 N	30	18	85	24
SUN 3E	21 N	24	11	79	22
SUN 3E	22 N	27	8	75	22
SUN 3E	23 N	17	22	70	19
SUN 3E	24 N	17	7	54	13
SUN 3E	25 N	22	7	71	20
SUN 3E	26 N	21	10	63	16
SUN 3E	27 N	14	<2	48	25
SUN 3E	28 N	13	2	18	5
SUN 3E	29 N	21	2	62	21
SUN 3E	30 N	24	2	61	19
SUN 3E	31 N	21	7	71	20
SUN 3E	32 N	16	13	67	15

Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
SUN 3E	33 N	24	14	92	25
SUN 3E	34 N	22	14	72	20
SUN 3E	35 N	17	13	71	16
SUN 3E	36 N	25	14	97	21
SUN 3E	37 N	20	15	98	22
SUN 3E	38 N	15	14	79	18
SUN 3E	39 N	14	13	71	18
SUN 3E	40 N	14	12	76	18
SUN 3E	41 N	19	11	96	15
SUN 3E	42 N	14	7	77	13
SUN 3E	43 N	18	16	92	19
SUN 3E	44 N	17	9	84	19
SUN 3E	45 N	21	19	127	24
SUN 3E	46 N	33	14	174	23
SUN 3E	47 N	24	9	144	21
SUN 3E	48 N	11	8	53	9
SUN 3E	49 N	36	9	136	21
SUN 3E	50 N	19	21	105	30
SUN 3E	51 N	15	16	80	16
SUN 3E	52 N	14	17	83	22
SUN 3E	53 N	13	15	82	21
SUN 3E	54 N	13	6	74	28
SUN 3E	55 N	22	7	88	27
SUN 3E	56 N	46	10	74	27
SUN 3E	57 N	58	5	74	26
SUN 3E	58 N	41	5	64	20
SUN 3E	59 N	23	7	67	19
SUN 3E	60 N	24	4	40	6
SUN 3E	61 N	67	15	66	23
SUN 3E	62 N	36	4	56	12

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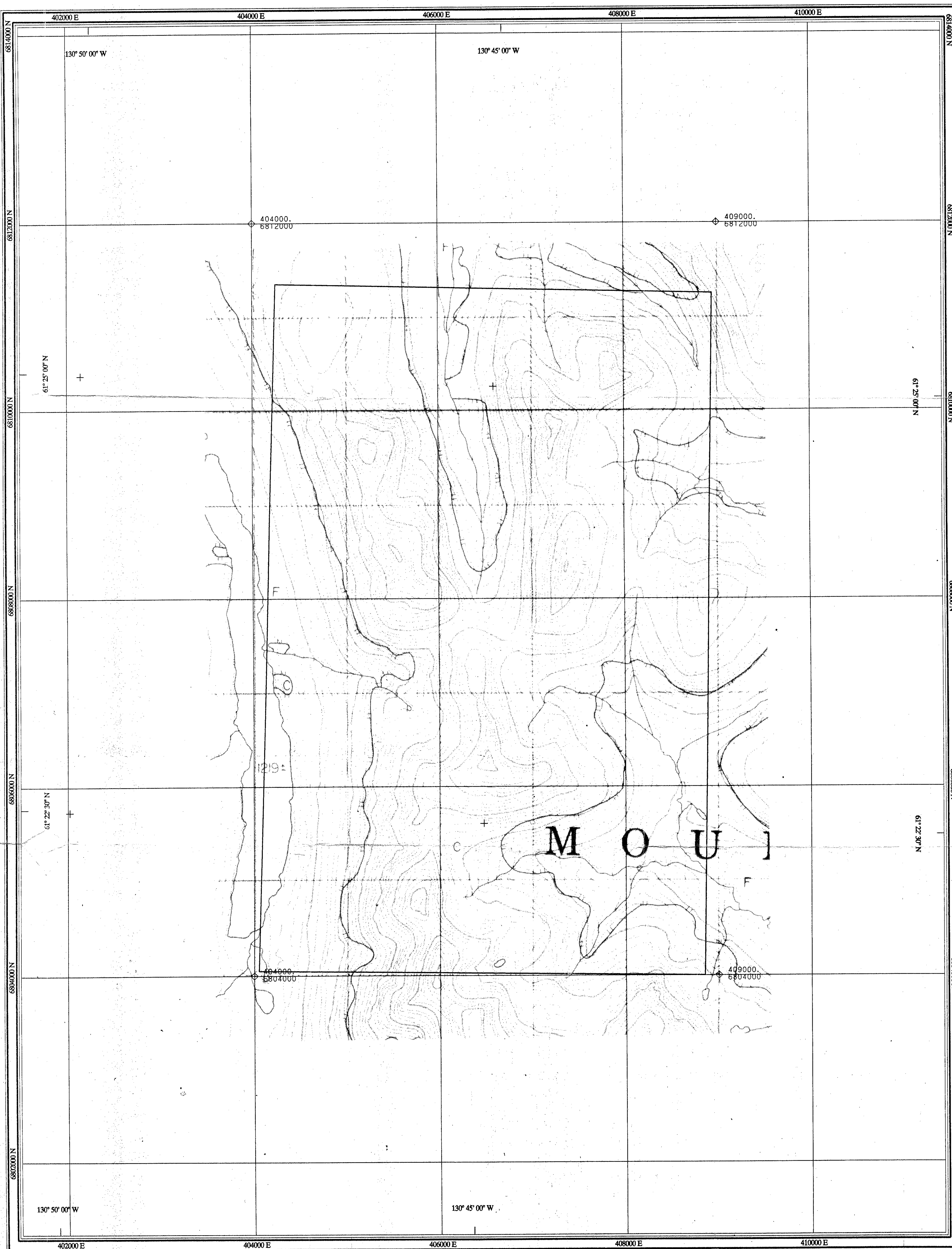
Date: January 17, 1997

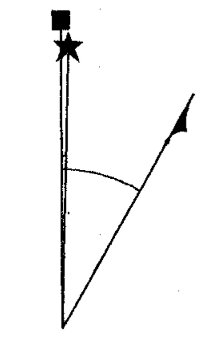
Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
SUN 4E	0 N	24	10	75	17
SUN 4E	1 N	13	3	32	10
SUN 4E	2 N	11	4	56	7
SUN 4E	3 N	17	4	24	7
SUN 4E	4 N	18	4	63	14
SUN 4E	5 N	14	2	38	7
SUN 4E	6 N	11	3	27	6
SUN 4E	7 N	8	5	42	8
SUN 4E	8 N	22	5	75	18
SUN 4E	9 N	27	4	77	21
SUN 4E	10 N	21	10	86	18
SUN 4E	11 N	39	8	92	21
SUN 4E	12 N	27	5	73	15
SUN 4E	13A N	42	13	150	28
SUN 4E	13B N	29	5	72	18
SUN 4E	14 N	45	8	104	23
SUN 4E	15 N	38	5	86	18
SUN 4E	16 N	42	11	96	19
SUN 4E	17 N	35	7	47	5
SUN 4E	18 N	19	6	52	12
SUN 4E	19 N	14	10	39	5
SUN 4E	20 N	12	11	37	7
SUN 4E	21 N	15	5	45	7
SUN 4E	22 N	15	5	38	8
SUN 4E	23 N	10	4	48	7
SUN 4E	24 N	15	4	52	10
SUN 4E	25 N	16	13	58	9
SUN 4E	26 N	28	10	69	21
SUN 4E	27 N	29	9	75	22
SUN 4E	28 N	42	6	95	33

Sample Number		Cu ppm	Pb ppm	Zn ppm	Co ppm
SUN 4E	29 N	40	13	93	28
SUN 4E	30 N	19	6	67	13
SUN 4E	31 N	15	7	48	13
SUN 4E	32 N	20	5	56	15
SUN 4E	33 N	17	24	76	15
SUN 4E	34 N	14	11	56	10
SUN 4E	35 N	22	<2	93	44
SUN 4E	36 N	14	11	56	14

CanTech Laboratories, Inc.

Signed:
Richard Magner, B.Sc.
Laboratory Manager

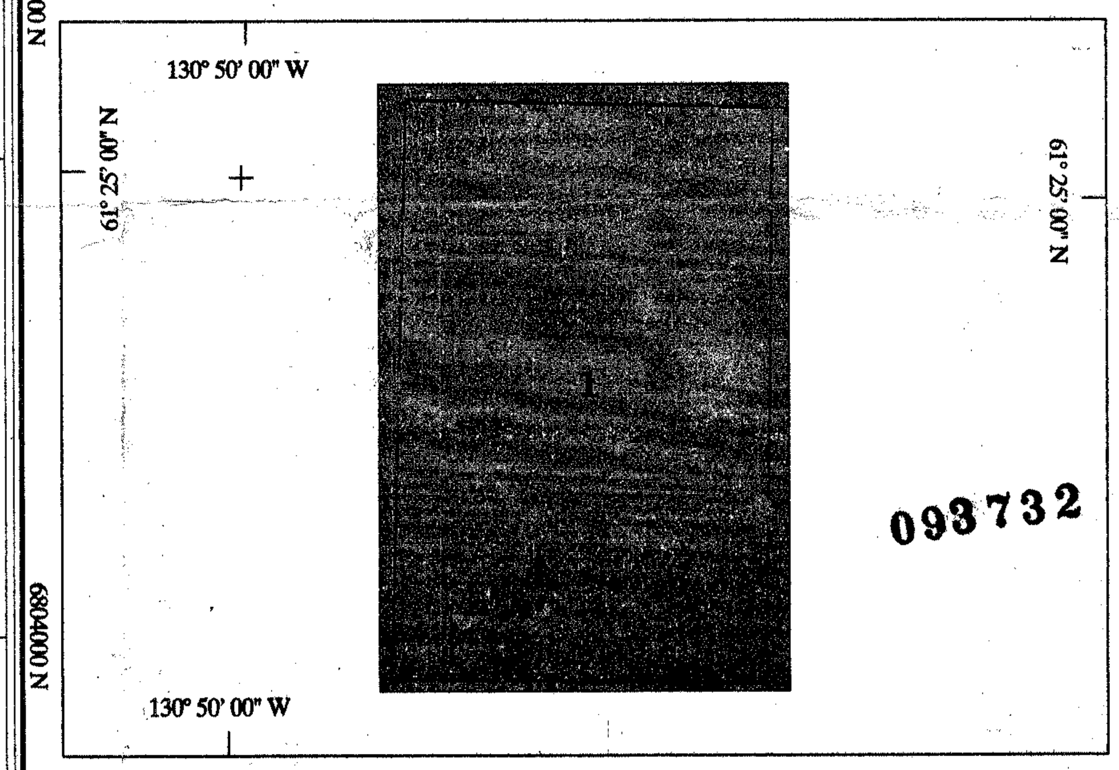




Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°



EQUITY ENGINEERING LTD.

BASE MAP

SUN BLOCK

FINLAYSON LAKE AREA, YUKON DWG (4)

SCALE 1:20 000

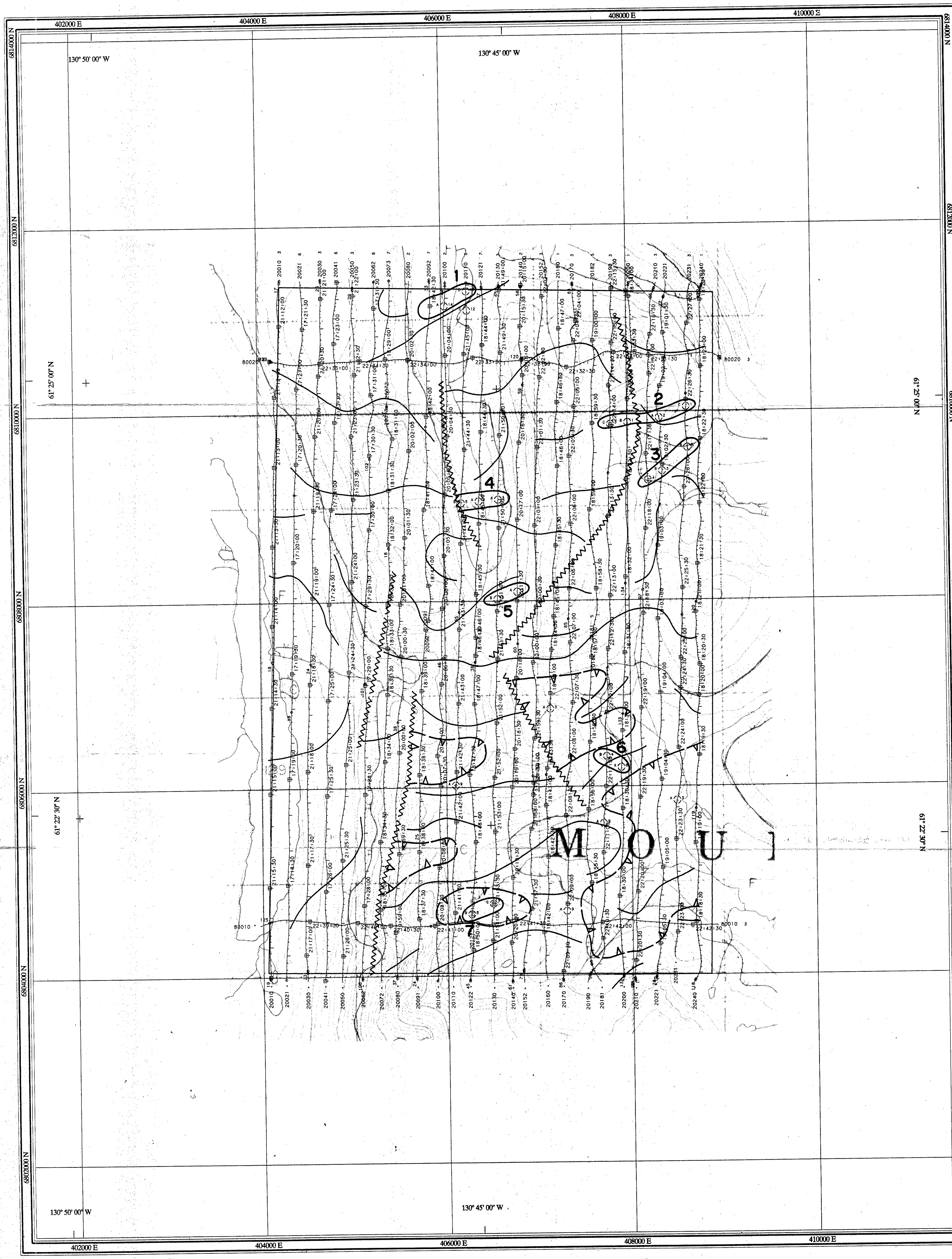
500 0 200 400 1000 2000 metres

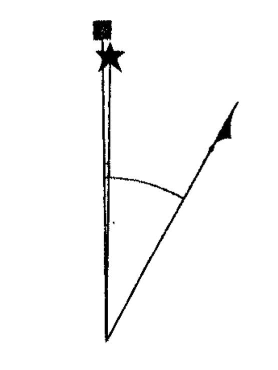
aerodat
AERODAT INC.

Date Flown : MAY-JUNE 1997

NTS : 105 G/7

Project : J9755 Map Ref : 1 - 1





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°

FLIGHT PATH

North American Datum 1927
Clarke 1866 Ellipsoid
Local Transformation: DX=-10.0 DY=158.0 DZ=187.0
UTM Projection
Central Meridian: 129 °W
Navigation and flight path recovery was conducted using a Global Positioning System (GPS) satellite navigation system.

Lines were flown at an azimuth of 0 - 180°, with an average line spacing of 200m.

Nominal helicopter-terrain clearance of 60m was monitored by radar and barometric altimeters.

EM ANOMALIES

EM anomalies selected manually. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

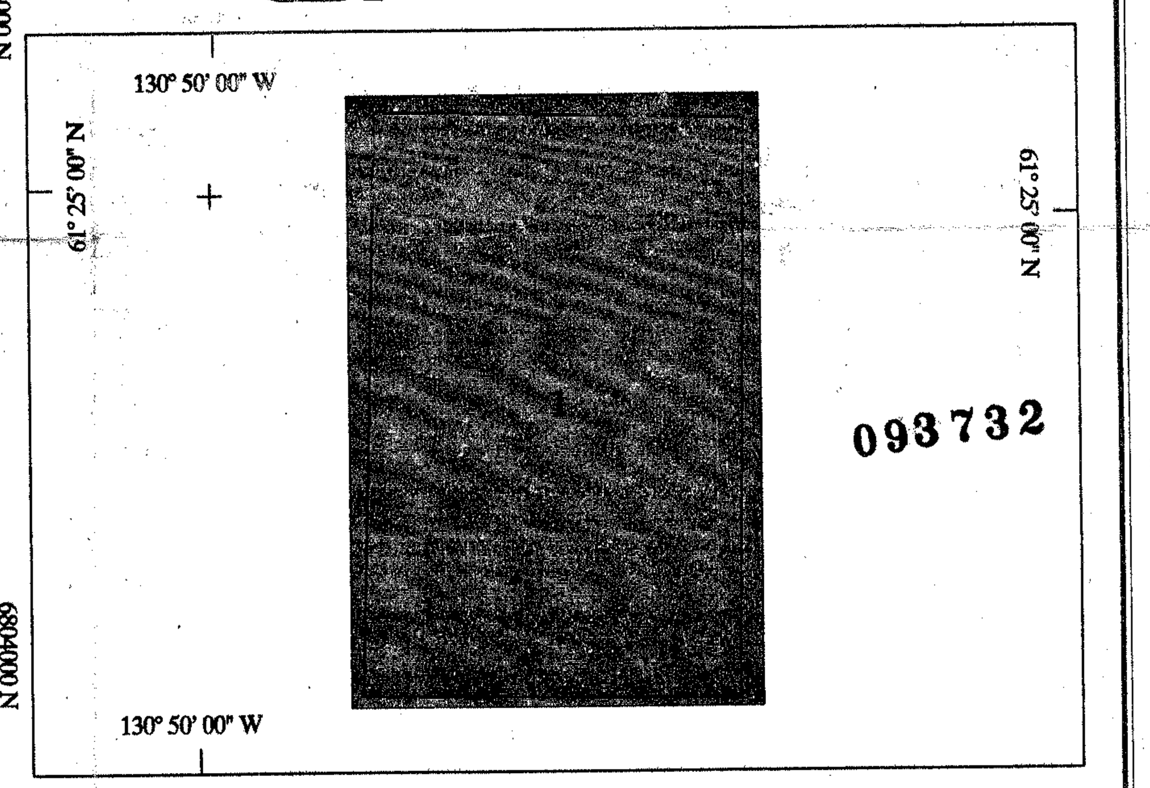
Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos

INTERPRETATION

- Magnetic trend
- Non-magnetic below background zone
- Fault/contact structure interpreted from magnetics
- 2 Conductive zone designated for investigation



093732

EQUITY ENGINEERING LTD.

INTERPRETATION

SUN BLOCK

FINLAYSON LAKE AREA, YUKON

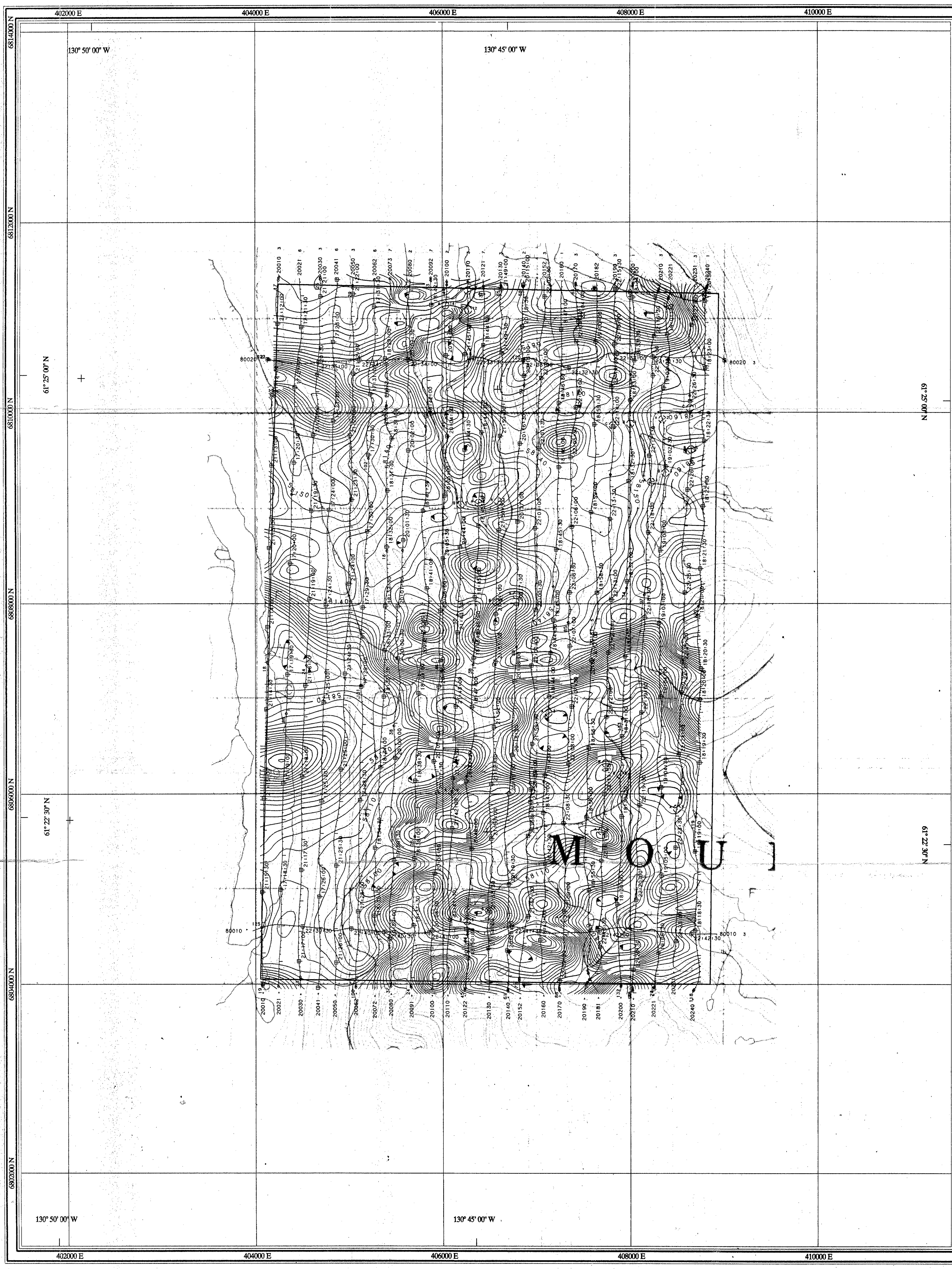
Dwg (5)

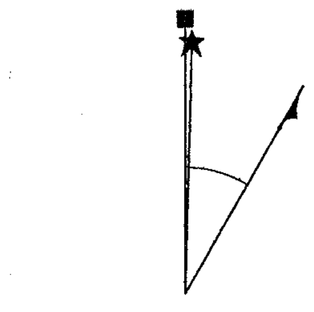
SCALE 1:20 000

500 0 200 400 1000 2000 metres

aerodat
AERODAT INC.

Date Flown : MAY-JUNE 1997
NTS : 105 G/7
Project : J9755 Map Ref : 1 - 2





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°

FLIGHT PATH

North American Datum 1927
Clarke 1866 Ellipsoid
Local Transformation: DX=-10.0 DY=158.0 DZ=187.0
UTM Projection
Central Meridian: 129 °W
Navigation and flight path recovery was conducted using a Global Positioning System (GPS) satellite navigation system.

Lines were flown at an azimuth of 0 - 180°, with an average line spacing of 200m.

Nominal helicopter-terrain clearance of 60m was monitored by radar and barometric altimeters.

TOTAL FIELD MAGNETICS

Total field magnetic intensity contour data, measured by a cesium high sensitivity magnetometer at an average sensor elevation of 45m, and corrected for diurnal variation.

Map contours are in nanoTeslas, and are multiples of those listed below:

2 nT
10 nT
50 nT
250 nT
1000 nT

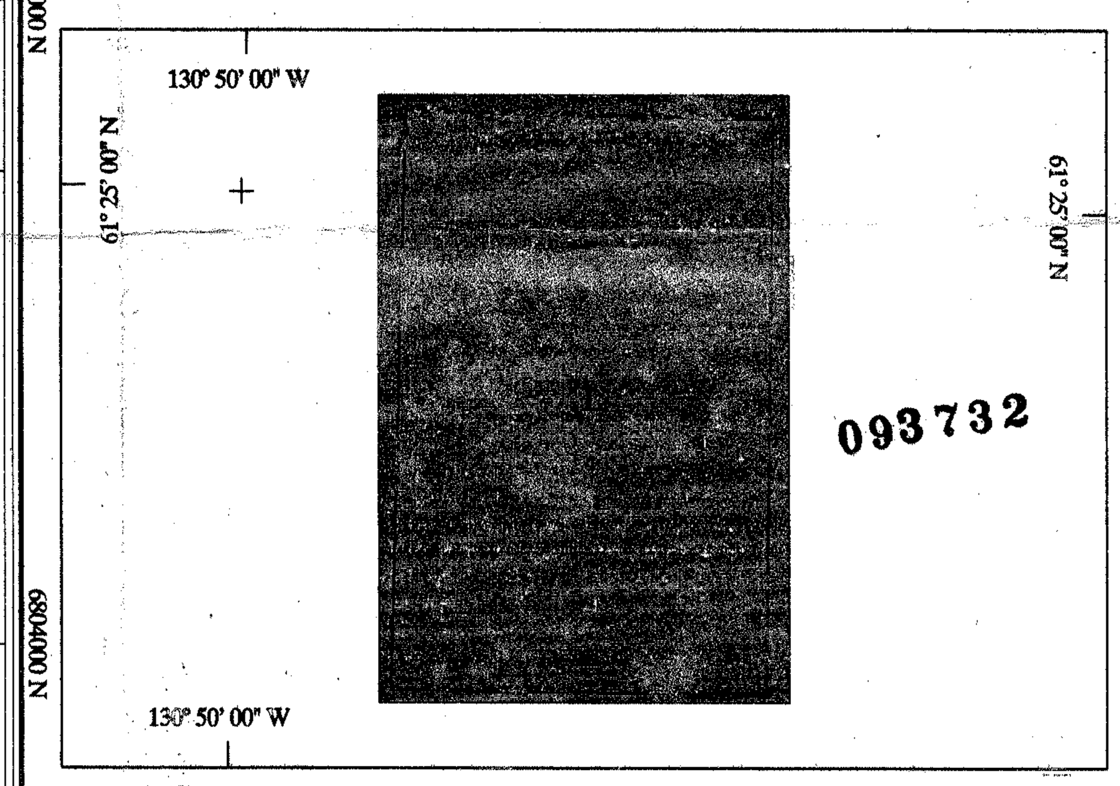
EM ANOMALIES

EM anomalies selected manually. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos



EQUITY ENGINEERING LTD.

TOTAL FIELD MAGNETICS

SUN BLOCK

FINLAYSON LAKE AREA, YUKON

Dwg 6

SCALE 1:20 000

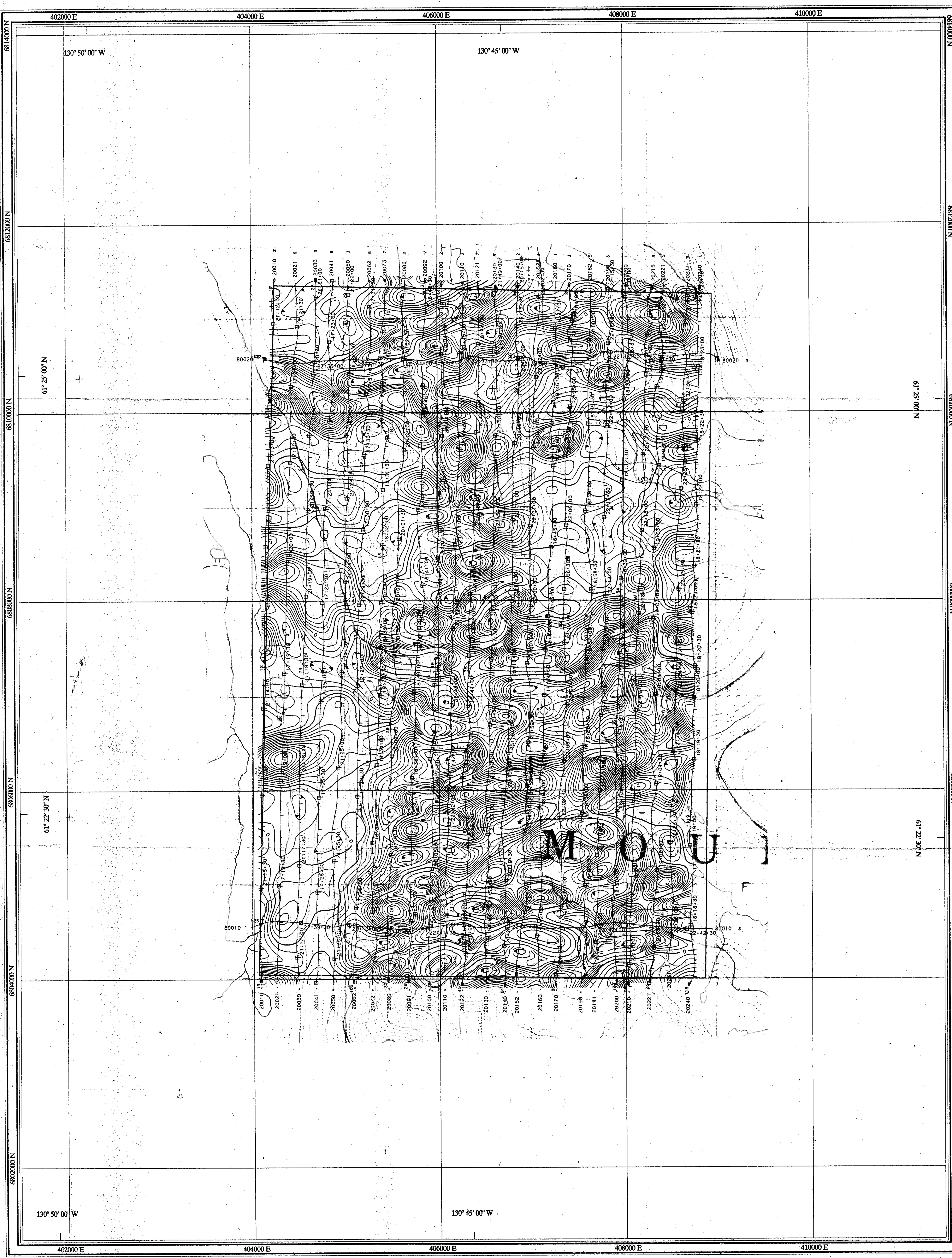
500 0 200 400 1000 2000 metres

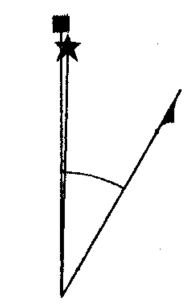
aerodat
AERODAT INC.

Date Flown : MAY-JUNE 1997

NTS : 105 G/7

Project : J9755 Map Ref : 1 - 3





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°

FLIGHT PATH

North American Datum 1927
Clarke 1866 Ellipsoid
Local Transformation: DX=-10.0 DY=158.0 DZ=187.0
UTM Projection
Central Meridian: 129 °W
Navigation and flight path recovery was conducted using a Global Positioning System (GPS) satellite navigation system.

Lines were flown at an azimuth of 0 - 180°, with an average line spacing of 200m.

Nominal helicopter-terrain clearance of 60m was monitored by radar and barometric altimeters.

VERTICAL GRADIENT

Vertical magnetic gradient contour data, calculated from the gridded total field magnetics data by a convolution operator.

Map contours are in nanoTeslas/metre, and are multiples of those listed below:

0.01 nT/m
0.05 nT/m
0.25 nT/m
1.00 nT/m
5.00 nT/m

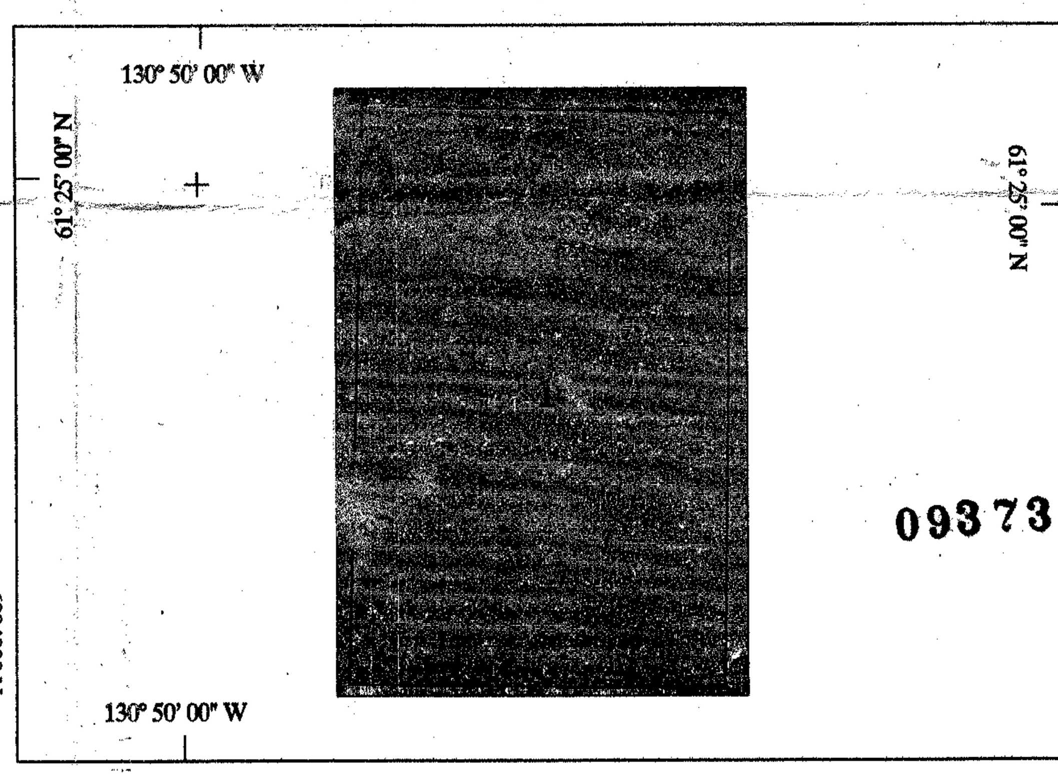
EM ANOMALIES

EM anomalies selected manually. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos



093732

EQUITY ENGINEERING LTD.

VERTICAL MAGNETIC GRADIENT

SUN BLOCK

FINLAYSON LAKE AREA, YUKON

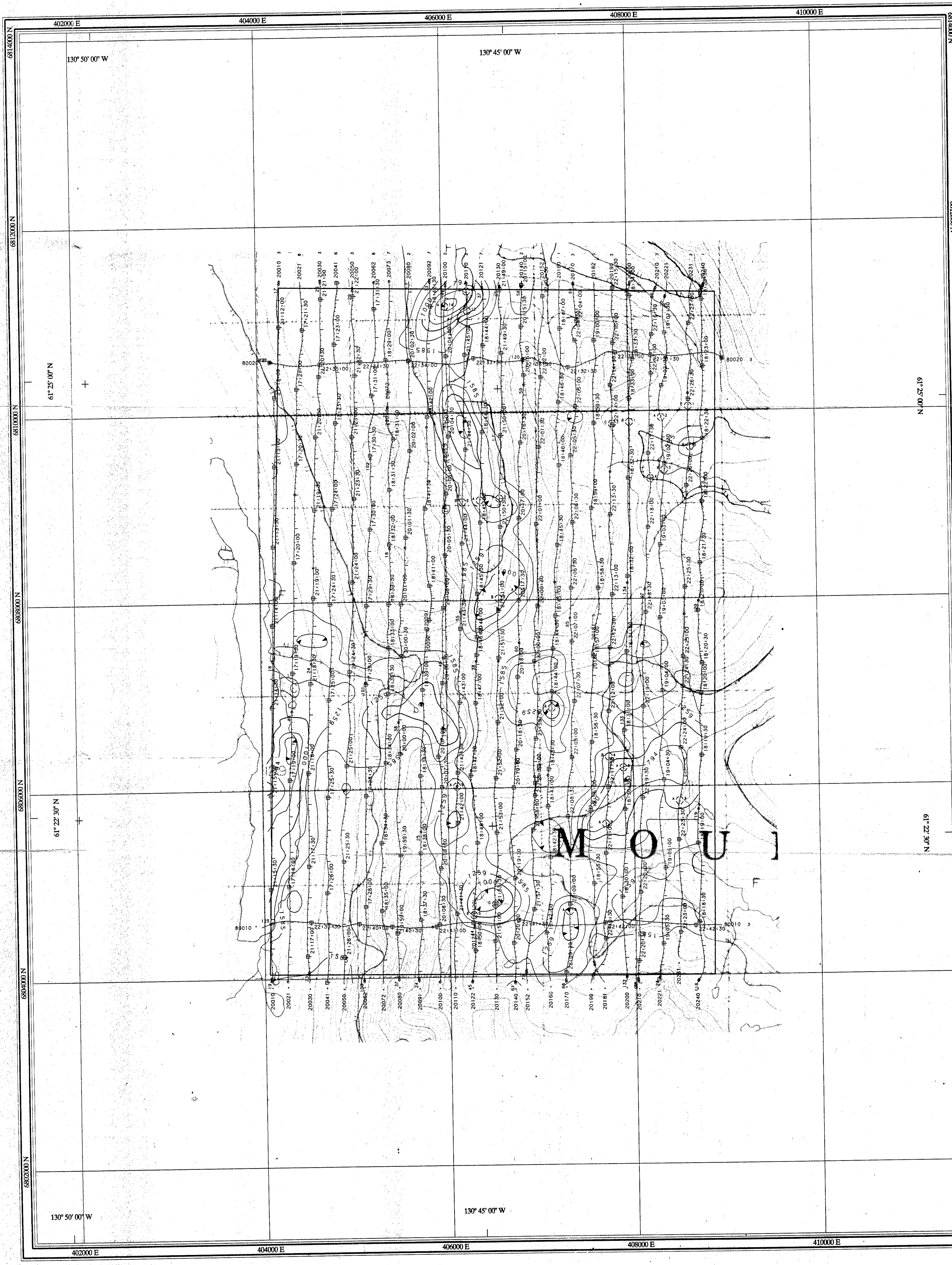
DWG 7

SCALE 1:20 000

500 0 200 400 1000 2000 metres

aerodat
AERODAT INC.

Date Flown : MAY-JUNE 1997
NTS : 105 G/7
Project : J9755 Map Ref : 1 - 4



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°

FLIGHT PATH

North American Datum 1927
Clarke 1866 Ellipsoid
Local Transformation: DX=-10.0 DY=158.0 DZ=187.0
UTM Projection
Central Meridian: 129 °W
Navigation and flight path recovery was conducted using a Global Positioning System (GPS) satellite navigation system.

Lines were flown at an azimuth of 0 - 180°, with an average line spacing of 200m.

Nominal helicopter-terrain clearance of 60m was monitored by radar and barometric altimeters.

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 850 Hz coplanar EM response, assuming a resistive half-space (200m) model. Average sensor elevation was 30m.

Map contours are in ohm-m, at logarithmic intervals, in multiples of those listed below:

0.1 log(ohm·m)
0.5 log(ohm·m)
1.0 log(ohm·m)

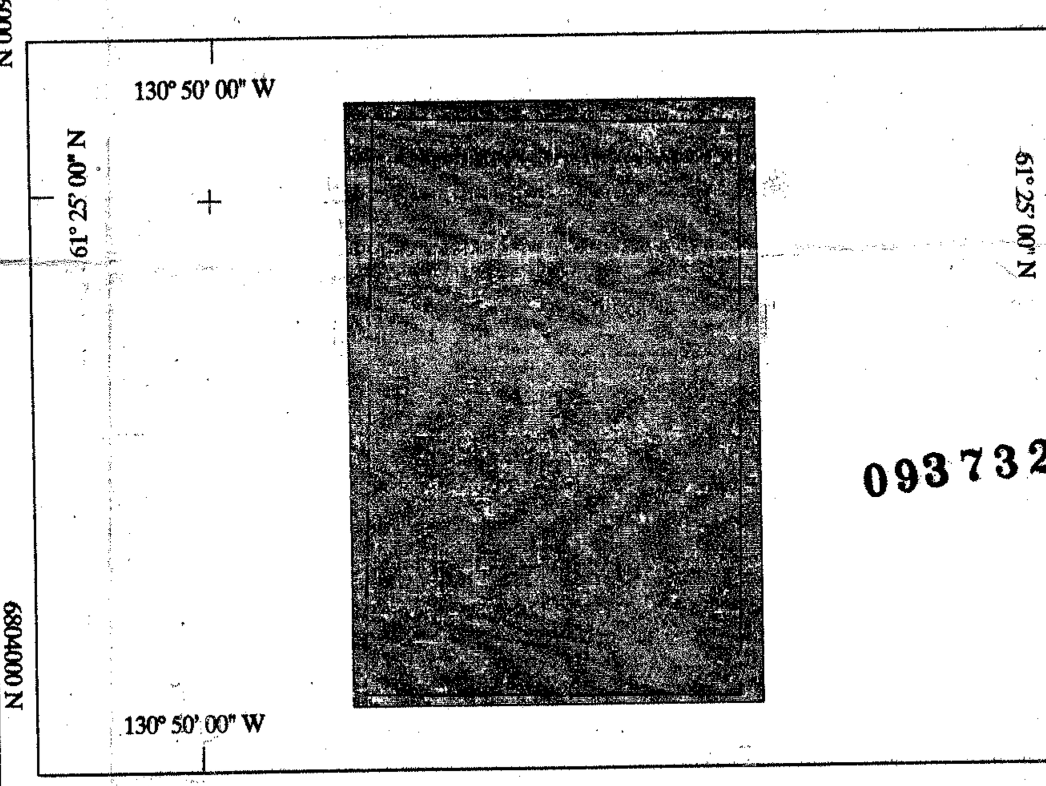
EM ANOMALIES

EM anomalies selected manually. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



093732

EQUITY ENGINEERING LTD.

APPARENT RESISTIVITY
850 Hz COPLANAR

SUN BLOCK
FINLAYSON LAKE AREA, YUKON

Dwg (8)

SCALE 1:20 000

500 0 200 400 1000 2000 metres

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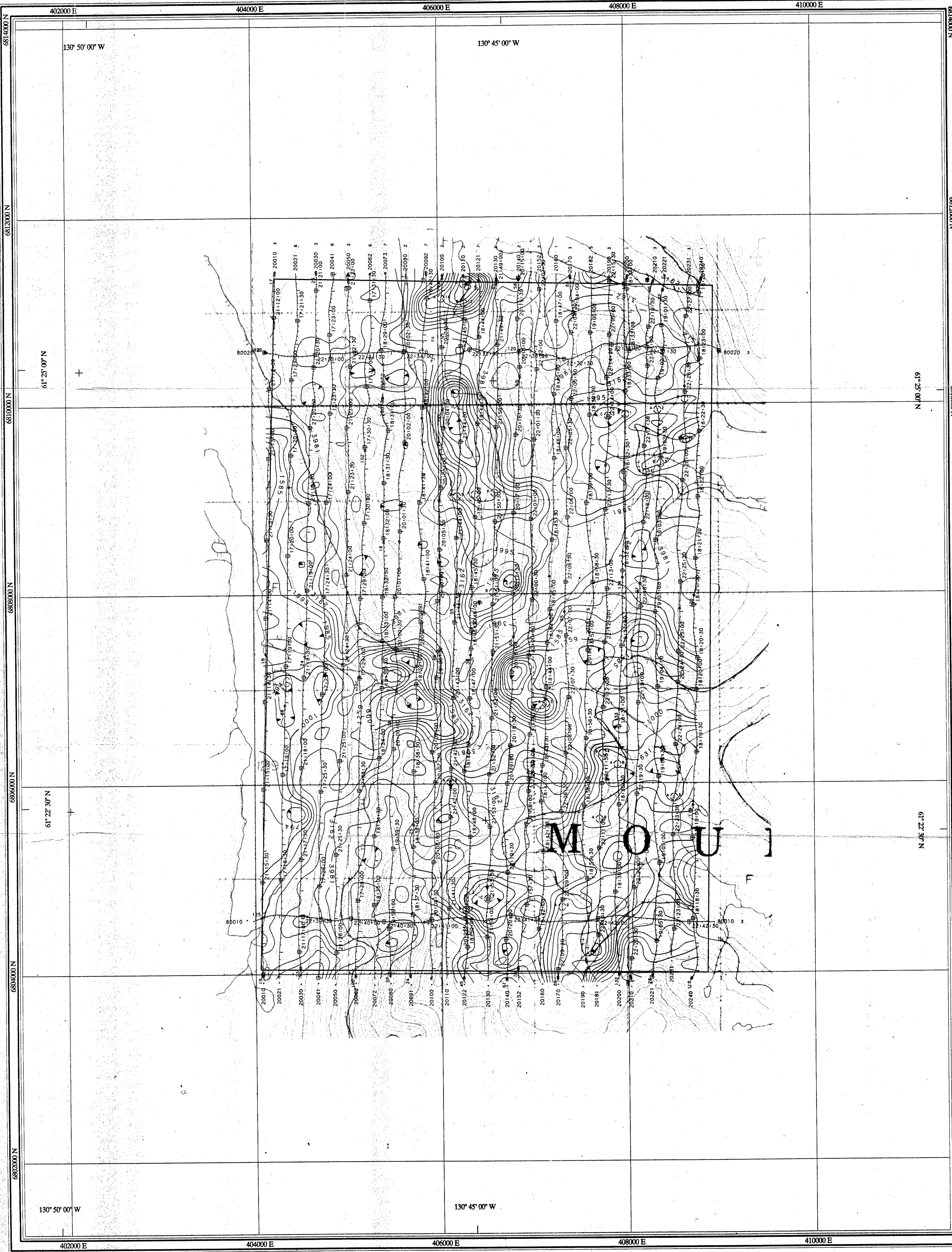
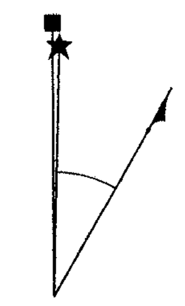
Date Flown : MAY-JUNE 1997
NTS : 105 G/7
Project : J9755 Map Ref : 1 - 5A





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°

FLIGHT PATH

North American Datum 1927
Clarke 1866 Ellipsoid
Local Transformation: DX=-10.0 DY=158.0 DZ=187.0
UTM Projection
Central Meridian: 129 °W
Navigation and flight path recovery was conducted using a Global Positioning System (GPS) satellite navigation system.

Lines were flown at an azimuth of 0 - 180°, with an average line spacing of 200m.

Nominal helicopter-terrain clearance of 60m was monitored by radar and barometric altimeters.

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 4600 Hz coaxial EM response, assuming a resistive half-space (200m) model. Average sensor elevation was 30m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

- 0.1 log(ohm·m)
- 0.5 log(ohm·m)
- 1.0 log(ohm·m)

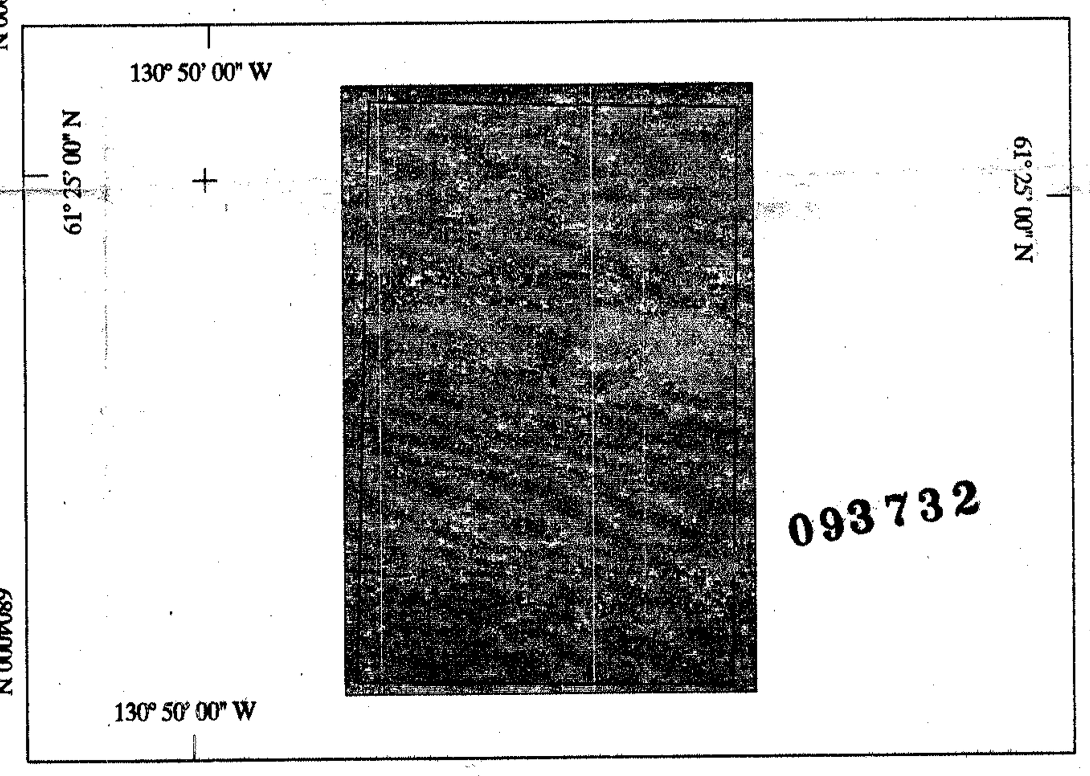
EM ANOMALIES

EM anomalies selected manually. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



EQUITY ENGINEERING LTD.

APPARENT RESISTIVITY
4600 Hz COAXIAL

SUN BLOCK
FINLAYSON LAKE AREA, YUKON

DWG 9

SCALE 1:20 000

500 0 200 400 1000 2000 metres

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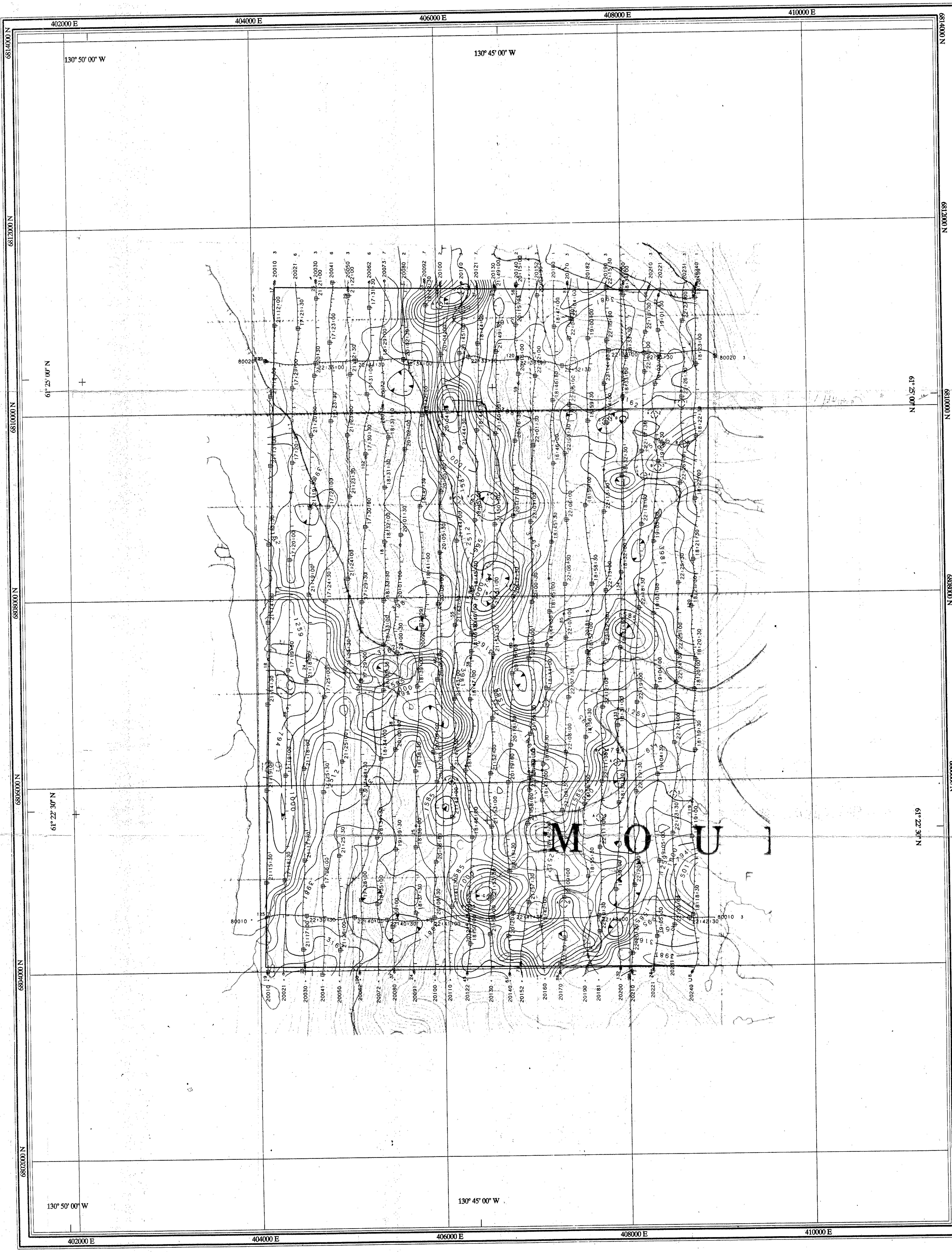
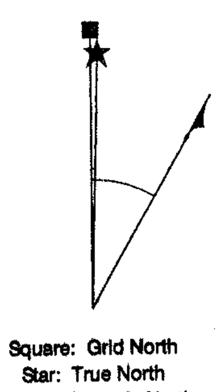
Date Flown : MAY-JUNE 1997
NTS : 105 G/7
Project : J9755 Map Ref : 1 - 5B





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for centre of NTS sheet. Use diagram for reference only.

Grid North - True North : 1.5°
Grid North - Magnetic North : 30.2°
Annual change : 0.24°

FLIGHT PATH

North American Datum 1927
Clarke 1866 Ellipsoid
Local Transformation: DX=-10.0 DY=158.0 DZ=187.0
UTM Projection
Central Meridian: 129 °W
Navigation and flight path recovery was conducted using a Global Positioning System (GPS) satellite navigation system.

Lines were flown at an azimuth of 0 - 180°, with an average line spacing of 200m.

Nominal helicopter-terrain clearance of 60m was monitored by radar and barometric altimeters.

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 4175 Hz coplanar EM response, assuming a resistive half-space (200m) model. Average sensor elevation was 30m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

- 0.1 log(ohm·m)
- 0.5 log(ohm·m)
- 1.0 log(ohm·m)

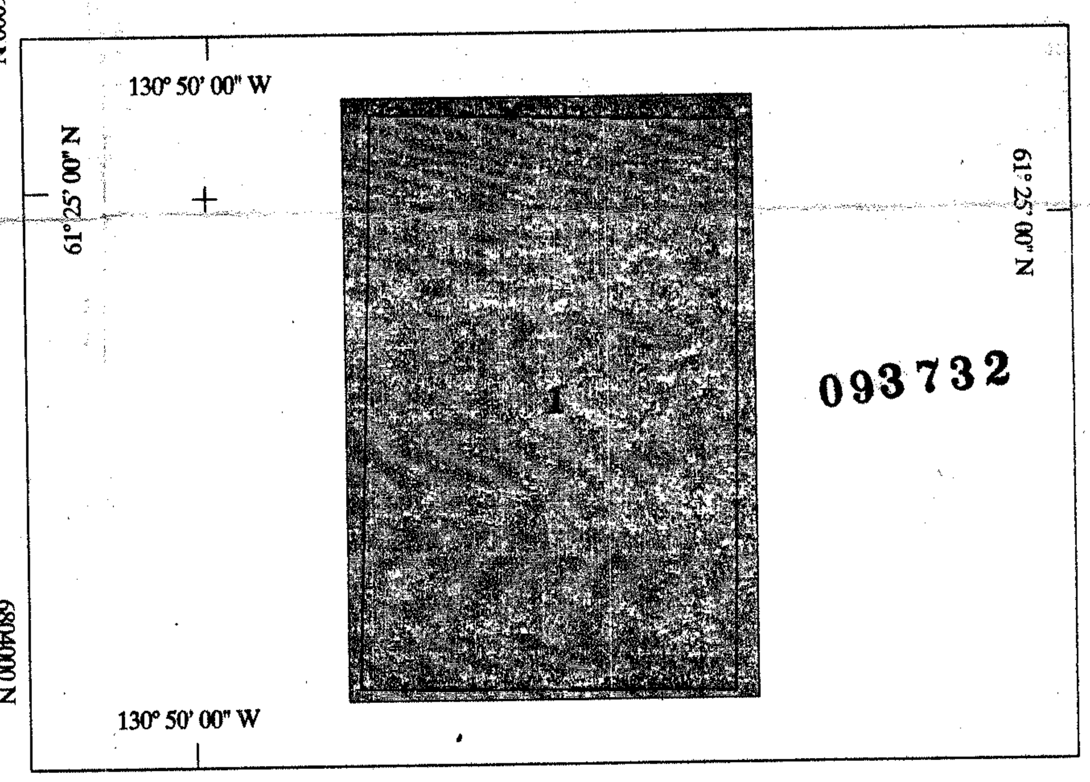
EM ANOMALIES

EM anomalies selected manually. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



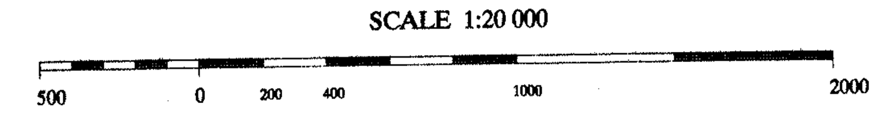
EQUITY ENGINEERING LTD.

APPARENT RESISTIVITY
4175 Hz COPLANAR

SUN BLOCK
FINLAYSON LAKE AREA, YUKON

DWG (10)

SCALE 1:20 000



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Date Flown : MAY-JUNE 1997
NTS : 105 G/7
Project : J9755 Map Ref : 1 - 5C