093958

1998 PROJECT REPORT

on the

ICE PROPERTY

YUKON TERRITORY
NTS 105F/10
61°35'N 132°31'W

ATNA RESOURCES LTD.
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March 1, 1999

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RESOURCES LTD.

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 $ 8400.00.

M. Burk

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

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SUMMARY

The Ice property is located in the south-central Yukon Territory and covers 18 contiguous claims located along the McConnell River on Pass Peak map sheet (NTS 105F/10). The area covered by the Ice claim block has been explored since 1980. The current claim block, under option to Atna Resources Ltd., was staked by Eagle Plains Resources and Miner River Resources in 1996 and 1997.

The 1998 field program, operated by Atna, consisted of geochemical sampling, geophysical surveying, and geological mapping. The claim block is underlain by Mississippian aged intermediate to felsic volcanic rocks and similar aged sediments of the Pelly Mountains Volcanic Belt. The stratigraphy, which includes syenite, pyritic trachyte, pyrite-lapilli tuff, pyritic tuffs, and argillite, is similar to the Wolf deposit. Lead and zinc soil geochemical anomalies reflect the trend of the BNOB barite showing which is situated at a favourable horizon in the stratigraphy. A co-planar horizontal loop EM geophysical survey identified two moderate conductors away from the favourable geology that are weakly indicative of a fault zone and a graphitic argillite horizon.

Based on the 1998 work, it is concluded that the property contains favorable stratigraphy with coincidental geochemical anomalies. However, strong geophysical responses were not detected. The favourable stratigraphy could be tested with a single 150 - 200m drill hole as there is just sufficient room for a moderate sized massive sulphide deposit to occur down-dip and south of the BNOB barite showing

1 INTRODUCTION

This report describes work completed on the Ice property during 1998. The property was optioned as a part of the Pelly Project for it's zinc, lead, and silver potential based on the presence of exhalative barite and a zinc-lead showing on the property. The showing is contained within rocks similar to that which hosts the Wolf and MM volcanogenic massive sulphide deposits.

1.1 LOCATION AND ACCESS

The Ice property consists of 18 contiguous claims located on the Pass Peak map sheet, NTS 105F/10, centered at approximately 61°35'N 132°31'W (UTM 6830000 N, 631000 E) Figure 1.1. During the 1998 field season, access to the claim group was gained by helicopter based in Ross River, located approximately 40 km to the north. The crew was housed at the Ketza River mine site located approximately 14 km to the east-southeast.

The claims cover sub-alpine to alpine terrain within the St. Cyr range of the Pelly Mountains. Elevations on the claim group range from 1160 to 1520 meters. The majority of the claim block is covered with thin veneer of talus or colluvium. A rock landslide has disrupted the central portion of the claims. Overall outcrop exposure averages less than 10%.

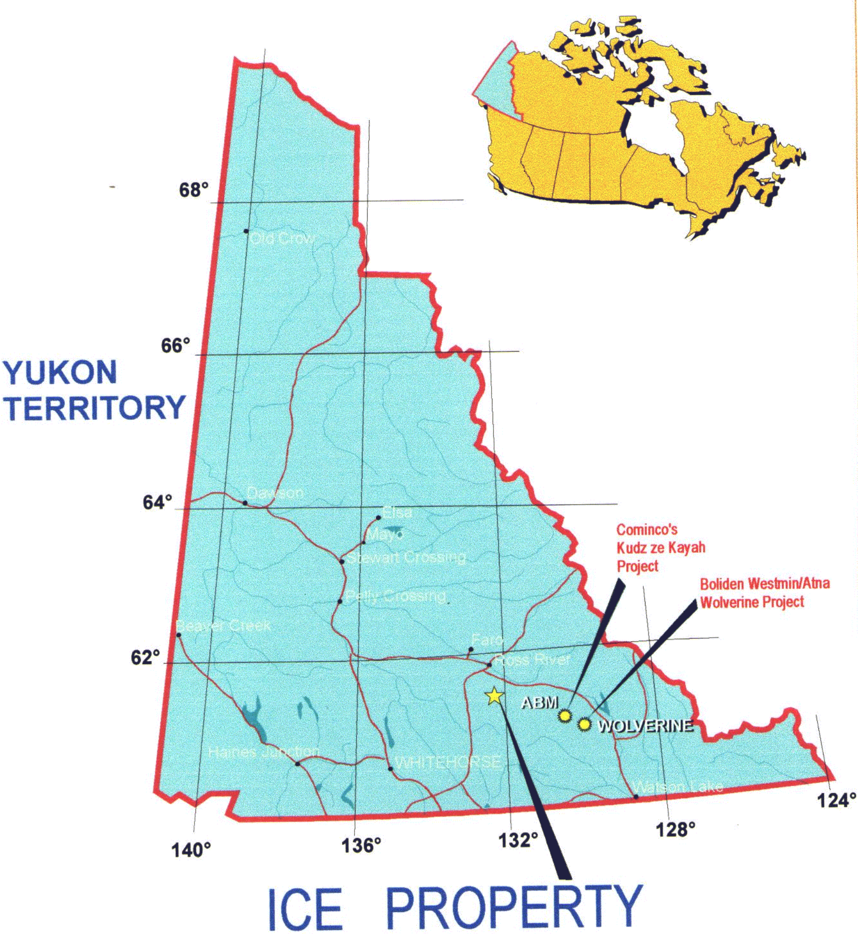
1.2 CLAIMS

The Ice property consists of contiguous mineral claims covering approximately 376 hectares (figure 1.2). The property is owned 100% by Eagle Plains Resources Ltd. and Miner River Resources Ltd. Atna Resources Ltd. has an option to earn 60% interest in the property by completing an escalating series of field work programs and making graduated property payments. The claims are recorded in the Watson Lake Mining District as follows:

Table 1: Claim Data

Name	Grant number	Expiry date*
Ice 1-6	YB74423-YB74428	September 16, 2002
Ice 7-8	YB84555-YB84556	September 16, 2003
Ice 9-10	YB87288-YB87289	September 16, 2003
Ice 11-18	YB89927-YB89934	September 16, 2003

* with acceptance of this report.



LOCATION MAP

ICE CLAIMS
PELLY MOUNTAINS REGION
YUKON TERRITORY

Figure 1.1

50 100 200 Km
50 100 miles

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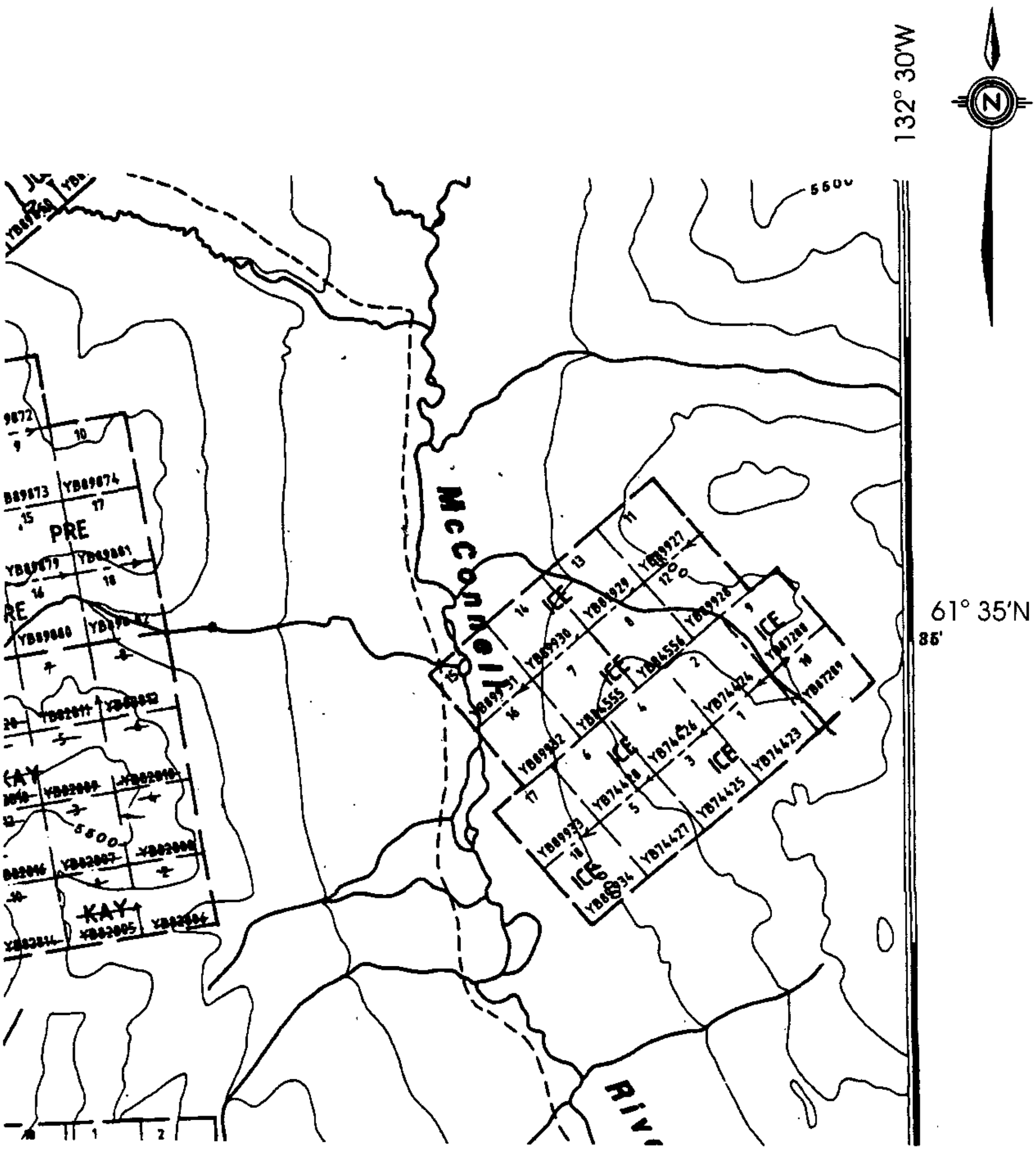

0 3000 6000

1500 4500 7500

Scale in feet

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PELLY PROJECT

Ice Claims

Claims Location

NTS 105F/10			Date Dec /98
Scale As Shown	DWG by RGW		Figure 1.2

1.3 HISTORY

The area was staked in 1976 as the BNOB claims resulting from a prospecting joint venture between Hudson's Bay Oil and Gas Company Limited and Cyprus Anvil Mining Corporation. Work completed from 1976 to 1980 included soil sampling, mapping, magnetometer and EM geophysical surveying, and a single drillhole, (Pigage, 1980).

The area was restaked in 1996 as the Ice claims by B. Kreft of Whitehorse, Yukon. Kreft transferred 100% interest to Eagle Plains Resources Ltd. who in turn transferred 50% interest to Miner River Resources Ltd. A program of limited geological mapping plus soil/talus geochemical sampling was completed along with prospecting during 1996. The grid geochemistry outlined an anomalous area of Zn/Pb geochemistry spatially associated with the trend of a bedded exhalitive? barite showing. A new showing of barite with galena and sphalerite was discovered and sampled.

Atna Resources Ltd. optioned the property in 1997 after discovering the Wolf massive sulphide deposit within similar rocks 60 km southeast of the Ice claims.

1.4 1998 EXPLORATION PROGRAM

During the 1998 field season, geological mapping, gridding, soil sampling, and 5.6 km of ground HLEM geophysical surveys were carried out on the Ice claim block.

In preparation for geochemical and geophysical surveys, the grid established by Eagle Plains was re-established and extended. The base line for the grids was chained and slope corrected and wing lines were hip chained with no slope correction. The Ice grid consists of a base line run at 215° and 14 grid lines at 100 meter spacing.

2 GEOLOGY

2.1 REGIONAL GEOLOGY

The volcano-sedimentary rocks which host the Wolf and MM deposits as well as the Ice claims form a narrow arcuate belt that extends 80 kilometres along a northwesterly trend within the Pelly Mountains of the southern Yukon (Fig. 2.2). These rocks have been termed the Pelly Mountains Volcanic Belt (PMVB) by Hunt (1999) and are characterized by high potassium content and, locally, bedded barite and volcanogenic massive sulphide deposits and showings. The PMVB is early to middle Paleozoic in age and occurs within the Pelly-Cassiar Platform, considered to be part of ancestral North America (Tempelman-Kluit, 1977). The tectonic framework for the Pelly Mountains area is described by Gabrielse and Yorath (1991), Templemen-Kluit and Blusson, (1977) and Gordey (1977) and is summarized below.

The miogeoclinal sequence and related rocks which underlie much of the Pelly Mountains are part of a large area about 70 km wide and 600 km long that is referred to as the Pelly-Cassiar Platform (PCP) (figure 2.1). The PCP formed slightly outboard of, but parallel to the craton edge and consisted of a thick accumulation of volcanic rocks and related sediments upon which shallow water sedimentation, predominantly carbonate, took place until late Devonian time. To the northeast of the PCP during late Proterozoic through to Silurian time, a sequence of shallow water carbonates, tuffaceous shale and andesitic rocks were deposited on the western edge of ancestral North America in the Selwyn Basin and, to the south, in the Kechika Trough.

During Late Devonian to Mississippian time, shale, greywacke, and chert pebble conglomerate was deposited over much of the PCP and Selwyn Basin. These rocks were derived from a westerly source, or from locally uplifted parts of the PCP. Felsic igneous activity, including intrusion and volcanism, occurred locally within the PCP, possibly within rifts or graben-like structures created by variable uplift and block faulting within the platformal rocks. Sedimentation resumed within PCP sub-basins during the Upper Triassic.

Deformation of the Paleozoic rocks took place post-Late Triassic and consisted of compression and/or transpression along a northeasterly axis which resulted in northwesterly trending and northeasterly verging folds and southwesterly dipping thrust faults. The Anvil-Campbell allochthon, part of the Omineca Crystalline belt, was emplaced during this event as a large thrust-sheet and is now preserved as local klippen on mountain ridges. An anastomosing system of steeply dipping, strike-slip faults related to movement along the northwesterly trending Tintina Fault cuts the folds and thrust faults and extends for up to 20 kilometres southwest of the Tintina Trench. Late normal faults cross-cut earlier structures and divide the region into a number of panels which commonly represent different structural levels. Cretaceous intrusions develop thermal and structural aureoles in the western part of the Pelly Mountains. Metamorphism and degree of deformation varies from block to block but generally increases in a westerly direction and varies from lower to upper greenschist facies.

The Pelly Mountains Volcanic Belt is composed of localized volcanic centers separated by basins in-filled with sediments and volcaniclastic rocks. Associated with these volcanic rocks are at least two VMS deposits (the Wolf and the MM) and a number of historical showings, including the Chzerpnough (Fire/Tree claims), and the BNOB (Ice claims).

The volcanic rocks are predominantly felsic, but in some areas significant accumulations of andesite to basalt occur. The most common feature of the belt are flows, epi-zonal sills, and small plugs of trachyte. The trachyte flows and/or sills are laterally very extensive, probably due to low magmatic viscosity caused in part by high alkali element content. Typically the trachyte contains significant amounts of pyrite which gives rise to extensive gossans. The trachytes are commonly cream coloured, with very fine to medium grained phenocrysts of feldspar and rare quartz and are locally massive, amygdaloidal or brecciated. Syenite intrusions have been noted at a number of locations within the PMVB (Mortensen, 1981; Morin, 1977) and are thought to be rounded plugs which represent volcanic feeders. Although they may still represent volcanic feeders, drill data from the Wolf and Ice properties indicates that the syenite intrusions are sills.

The structural and stratigraphic relationships of the Pelly Mountains Volcanic Belt with other parts of the Pelly-Cassiar Platform are not always clear. In the southern part in the belt near the Wolf and Fox claims the PMVB rocks are separated from platformal carbonates and associated sediments by thrust, and possibly, steeply dipping normal faults. In the northeastern most part of the belt, immediately northeast of the Ketza River Mine site, the volcanic sequence is very thin (+/- 100m) and is overlain by chert and chert pebble conglomerate and underlain by shale. Both contacts appear conformable but are not well exposed.

The shale and conglomerate are considered age equivalent with the volcanic rocks that have been mapped in conformable relationships by Gordey (1977). On the Fire (Chzerpnough) and Tree claim area, the PMVB appears to conformably overlie, and in places be intercalated with, a relatively thick sequence of shale and minor greywacke. Similarly on the Mamu property, adjacent to the McConnell River, volcanic rocks conformably overlie an extensive shale-greywacke sequence. On the Ice (BNOB) property, between the Tree-Fire and Mamu properties, the volcanic rocks are surrounded by an argillite-limestone sequence that appears to be continuous with the shale-sequence of the Fire property. Gordey (1977) describes a Siluro-Devonian assemblage of shallow water dolomite and platy siltstone which represent a stable marine carbonate bank environment, and are supposed basement for the PMVB. The Siluro-Devonian siltstones, however, are quartz bearing and tan weathering and do not seem to be a good match with the shale attached to the Pelly Mountain Volcanic rocks. Similarly, the younger Triassic sedimentary package has not been observed in contact with PMVB. Consequently, there is little or no contact information that gives a clear indication of the tectono-stratigraphic environment in which the PMVB was deposited other than the nature of the rocks within the belt itself.

The platformal setting on the continental margin, the high potassium geochemistry of the volcanic rocks, and the presence of bedded barite and volcanogenic massive sulphide deposits indicate that the Pelly Mountain Volcanic Belt was likely deposited in a continental rift-type environment (Mortensen and Godwin, 1982). The coarse volcanic debris flows that overlie the Wolf deposit indicate a high energy environment consistent with a graben type structure.

2.2 PROPERTY GEOLOGY

Bedrock exposure on the Ice property is about 2% and is mostly limited to small to medium sized outcrops along the southern side of the dome in the central part of the property. An exception to this is the northwest slope of the dome where a 300 by 200 m area of syenite outcrop is exposed. The lack of bedrock exposure and the supergene oxidation of what exposure there is makes it difficult to determine the property geology.

2.2.1 STRATIGRAPHY

In general, the rocks exposed on the Ice property are similar to parts of the stratigraphy on the Wolf property. The volcanic rocks of the Pelly Mountains Volcanic Belt (PMVB) on the Ice property are bounded to the west by a fault, marked by the McConnell River. On the other three sides the volcanic rocks are bounded by underlying or overlying shale and argillite (+/- carbonate) that appear to be conformable and part of the PMVB, or the Devonian to Mississippian Black Clastic unit (Pigage, 1980), or the Upper Triassic assemblage of shale, siltstone and carbonate (Gordey, 1977). On the western side of the property rocks strike northeasterly and dip moderately to the northwest, whereas on the eastern side of the property the rocks dip gently to the east. The dips are defined primarily by foliation surfaces and suggest a refolding of S1 axial plane cleavage. If the change in dips reflects a fold, then the axial plane of this fold trends northeasterly across the middle of the property and the shale unit to the east and north would overlie the volcanic rocks, if they are right side up.

There is insufficient exposure to determine the actual volcanic stratigraphy on the Ice property but a number of units can be recognized. The western most outcrop exposure is a relatively large area of syenite (Figure 2.3). This unit consists of fine to medium grained, equigranular, pink to grey feldspar and hornblende. The rock is fresh in appearance, unfoliated and has blocky weathering in outcrop due to widely spaced, perpendicular joint sets. Initially this unit was thought to represent a small plug or pipe-like intrusion. Based on limited exposure, however, the lower contact appears to be somewhat strataform and this unit wasn't intersected in the Cyprus -Anvil drill hole, (figure 2.3) indicating that it may be sill like.

To the south of, and in fault contact with the syenite is an outcrop of pyritic trachyte. This unit appears to be in the apex of two faults or a fault and intrusive contact. Below the trachyte in contact with the north side of the syenite is a strongly foliated unit of fine lapilli tuff with rare pyrite fragments and moderate to intense sericite alteration. The altered lapilli tuff hosts the barite horizon which is best exposed on the southwest slope of the property. Below the altered lapilli tuff (to the east) is a package of ash to lapilli tuffs which commonly contain up to 5% disseminated pyrite.

2.2.3 MINERALIZATION

There are two mineralized showings on the property, the BNOB barite showing on the southwest slope of the property and the ICE 1 barite-lead showing one kilometre to the NE. At the BNOB showing the barite is strataform, up to 4m in width, and is exposed in trenches and outcrop over a strike length of 250 m. The zone is reflected by anomalous

Zn and Pb soil geochemistry and defines a trend parallel to the foliation/bedding. Previous sampling of the BNOB showing has returned elevated levels of Zn and Pb and Ag. No new sampling was completed on the BNOB showing in 1998.

The ICE 1 showing appears to be an orphan boulder which is either in place or not far moved from its bedrock source. The showing is downslope east of the rusted hill and consists of massive crystalline barite which forms a knob and is surrounded by recessive argillite. Most of the knob has no visible sulphides although local galena and sphalerite in veinlets exist such that a selected sample would contain significant quantities of lead and zinc. Composite samples collected from the showing in this manner (98-Ice-98-1 & 1A) contain up to 1.5% Pb and 6.5% Zn but only 1 g/t Ag. A trace of chalcopyrite was also noted in the knob on the western side.

The ICE 1 showing is only poorly reflected in soil geochemistry. Elevated Pb and Zn values in soil samples are seen in the vicinity of the showing and trend along the shallow depression between the two local hilltops. This indicates that the BNOB and ICE 1 showings probably are not connected, although one may lie on the opposite side of a gentle fold from the other.

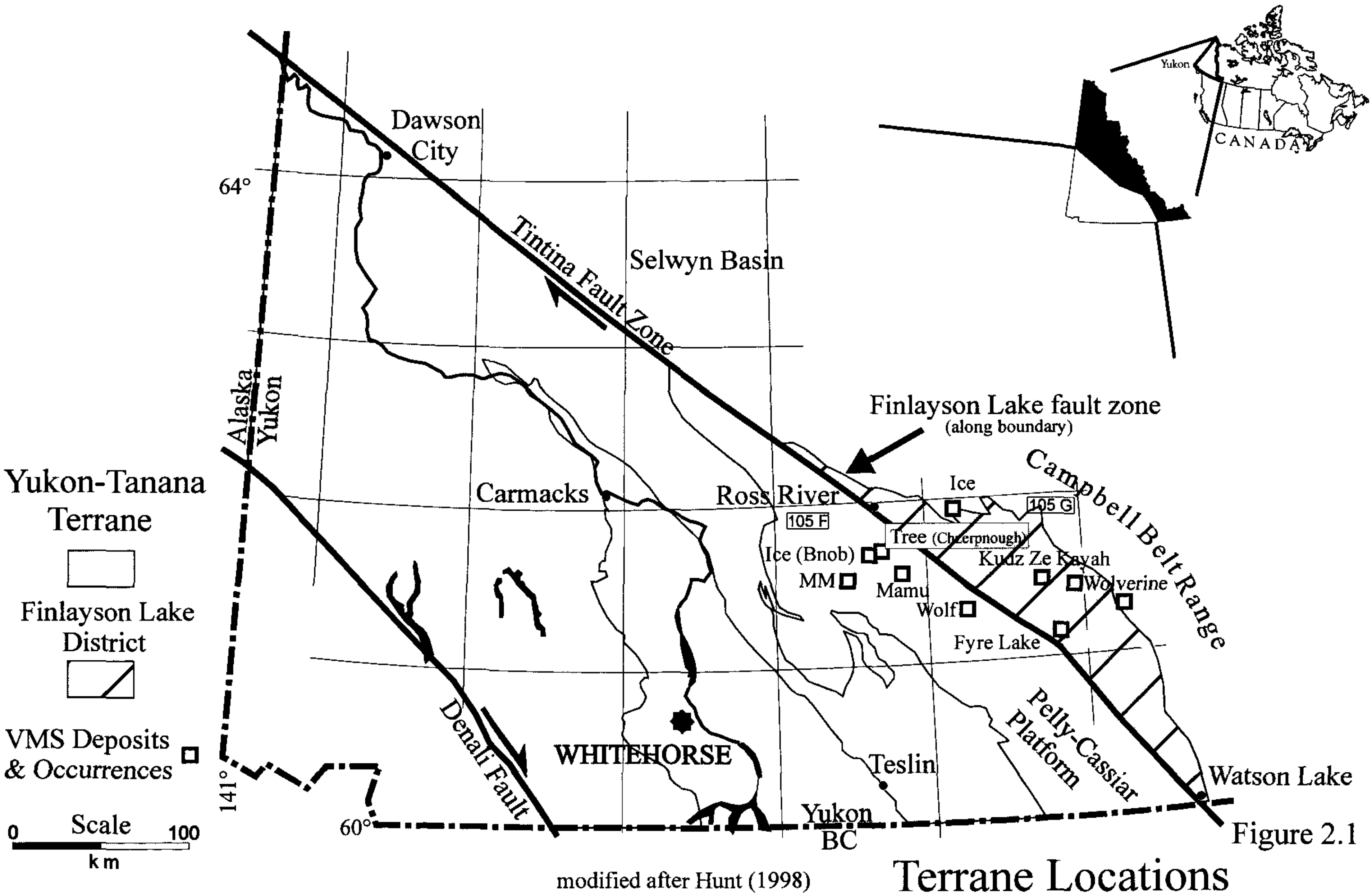

Figure 2.1

Terrane Locations

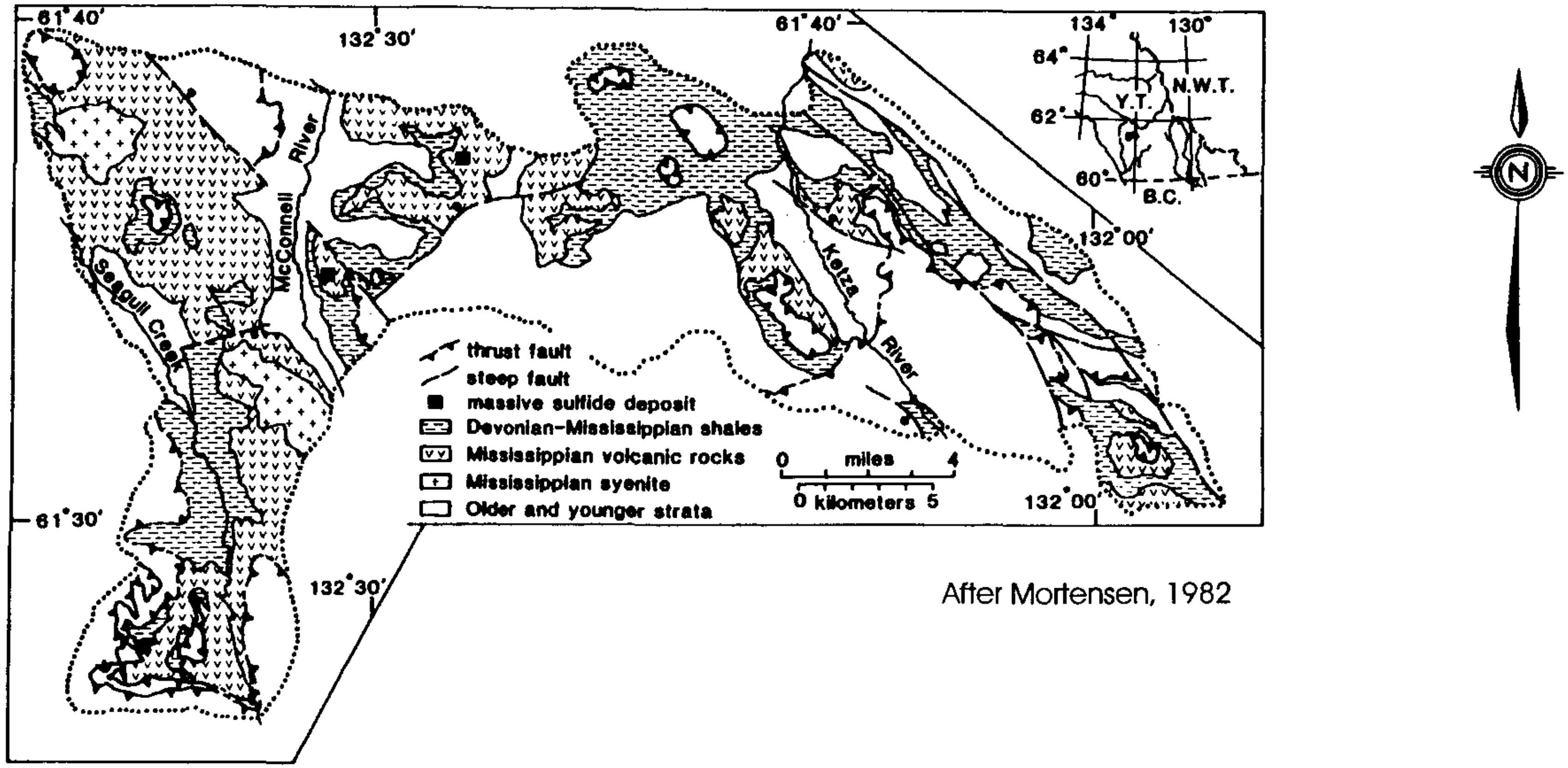

FIG. Distribution of Upper Devonian and Mississippian strata in the study area in the central Pelly Mountains, Yukon Territory.

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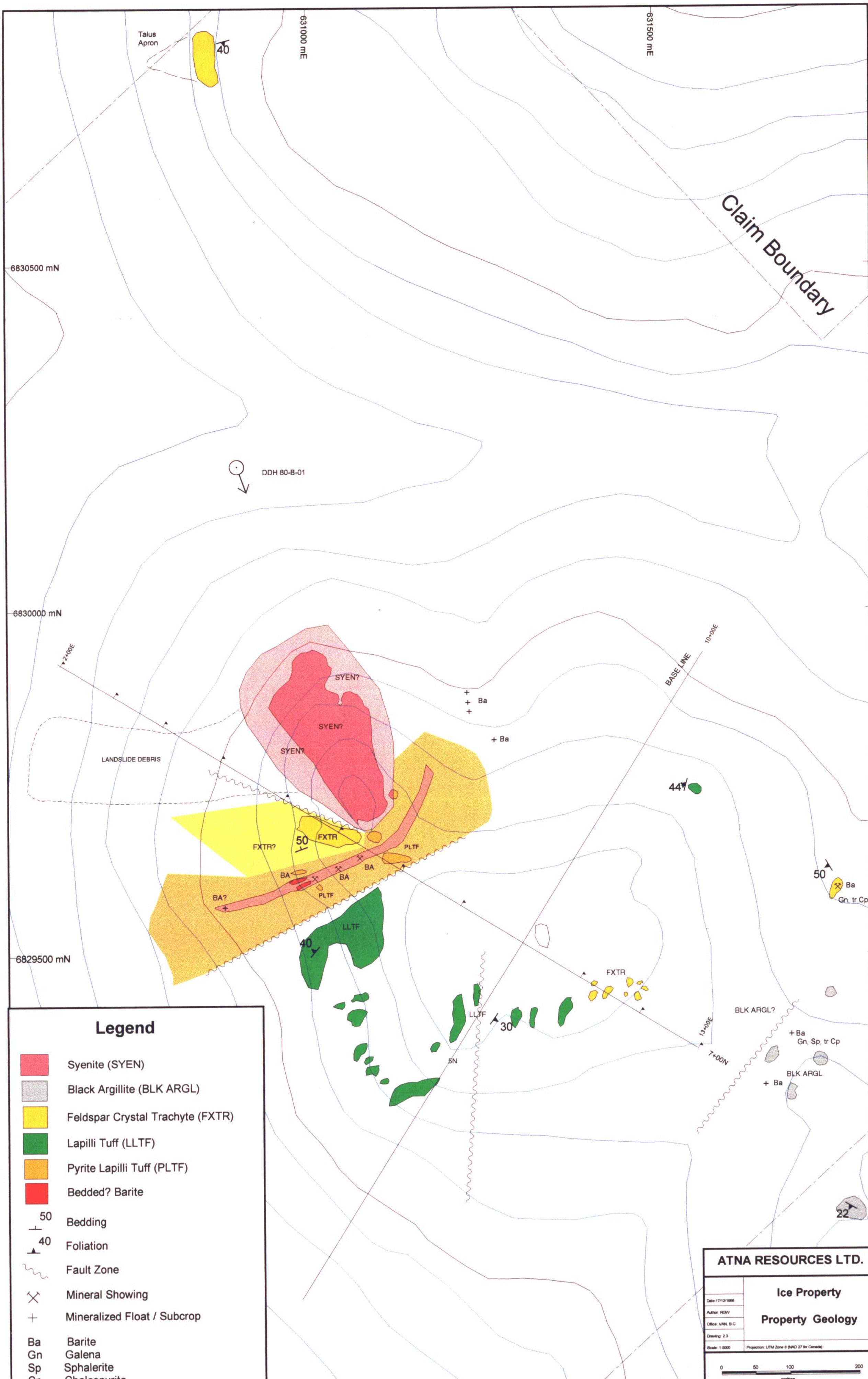
PELLY PROJECT

ICE PROPERTY

Regional Geology

NTS 105F & 105G			Date Dec /98
Scale As Shown	DWG by RGW		Figure 2.2



Talus Apron
631000 mE
631500 mE
Claim Boundary
6830500 mN
DDH 80-B-01
6830000 mN
2+00E
10+00E
BASE LINE
SYEN?
SYEN?
SYEN?
Ba
Ba
LANDSLIDE DEBRIS
FXTR
FXTR?
PLTF
BA
BA
BA
BA?
PLTF
LLTF
6829500 mN
FXTR
LLTF
5N
13+00E
7+00N
BLK ARGL?
Ba
Gn, tr Cp
Ba
Gn, Sp, tr Cp
BLK ARGL
Ba
Legend
Syenite (SYEN)
Black Argillite (BLK ARGL)
Feldspar Crystal Trachyte (FXTR)
Lapilli Tuff (LLTF)
Pyrite Lapilli Tuff (PLTF)
Bedded? Barite
Bedding
Foliation
Fault Zone
Mineral Showing
Mineralized Float / Subcrop
Ba Barite
Gn Galena
Sp Sphalerite
Cp Chalcopyrite
ATNA RESOURCES LTD.
Ice Property
Property Geology
metres

3 GEOCHEMISTRY

The 1998 geochemical program consisted of grid and contour soil sampling. Grid sampling included extending existing 1997 grid lines in the south-western portion of the grid as well as adding two new lines to the south-west. Contour sampling was completed via two lines over the northern part of the claims.

A total of 150 grid samples and 85 contour samples were collected from shovel or mattock dug holes which averaged 30 cm in depth. The samples were taken from "B" horizon soils in areas of soil development, or from talus fines on scree slopes. Samples were placed in kraft bags for air drying prior to shipment. All samples were analyzed by Acme Laboratories of Vancouver, B.C. using aqua regia digestion followed by 30 element ICP detection. Certificates of analysis from Acme Laboratories are located in Appendix I.

3.1 GRID SOIL GEOCHEMISTRY

Soil grid extensions were designed to trace anomalies trending off the 1997 grid, and to provide control for the HLEM geophysical survey. Discussion of results is limited to zinc and lead analysis since only values for these two elements were available from the 1997 sampling.

Within the gridded area, several Eagle Plains sample sites were re-sampled to determine the degree of sampling and analytical bias between the two sampling periods. By comparing 1997 and 1998 sample results on X-Y graphs, the 1997 zinc and lead results are seen to be 1.25 and 1.13 times higher than for equivalent samples taken in 1998 (figures 3.1a and b). The combined data set for the two years sampling was evaluated by creating histogram and probability plots for zinc and lead results (figure 3.2a & b). The data follow a log normal distribution as can be seen in the histogram plot. A probability plot of each element confirms the presence of multiple populations. The approximate thresholds (mildly anomalous, very anomalous, and extremely anomalous) that can be defined in these latter plots are 90 - 370 and 720 ppm for zinc and 100 - 180 and 490 ppm for lead. Since the majority of the data points occur below the mildly anomalous cutoffs, no additional data manipulation was completed to level the 1997 and 1998 data sets.

Sample locations are shown on figure 3.3 with samples from each year identified on the map by differing symbols. Interpreted zinc anomalies are displayed as a colored dot plot on figure 3.4 while figure 3.5 is the equivalent plot for lead.

The strongest zinc anomaly occurs in the south-west portion of the grid within the Gully Zone. Nine values greater than 781 ppm Zn are seen over a 200 x 100m zone the size of which may, in part, be due to down-slope dispersion. The cause of the anomaly has not been determined due to limited outcrop. Additional spot anomalies (one to two samples) coincide with the BNOB Zone and the Ice 1 Zone.

The pattern of anomalous lead values in soils closely follows the trace of the zinc anomalies. The strongest lead anomaly tracks the projected trace of the barite bed occurring at the surface trace of the BNOB zone barite bed. The zone is generally one to two samples wide (50m) and occurs over a strike length of 500 metres. Anomalous lead values are also found in the Gully Zone, seen as spot highs over 200m. Second order anomalies (greater than 180 ppm Pb) are seen south of the Ice 1 Zone and follow the trace of a topographic depression which mapping has inferred to be a fault zone.

Three zones of anomalous zinc and lead in soils were defined by the grid geochemistry, BNOB, Ice 1, and Gully zones. Elevated to anomalous values of Zn and Pb occur in each of the three zones. Greater downslope dispersion of zinc over lead is seen within the overburden covered Gully zone. One possible explanation for this is that the strongly pyritic host rocks are acid producing which causes leaching and dispersion of zinc over that of lead. The more gently sloping BNOB and Ice 1 zones are better defined by lead, reflecting the galena seen in outcrop. The suggestion is thus made that similar zinc leaching has occurred at these two zones.

3.2 CONTOUR SOIL GEOCHEMISTRY

Contour soil sampling was completed over the northern area of the property as part of the regional exploration on the claims. Samples were collected at 50 and 75m intervals. Although coincident zinc and lead highs are seen, the results are not strongly anomalous. A two sample Pb high coinciding with a zinc anomaly requires follow-up, and other spot zinc and lead anomalies should similarly be examined.

Figure 3.1a: 1998 vs 1997 Zn (ppm) Soils

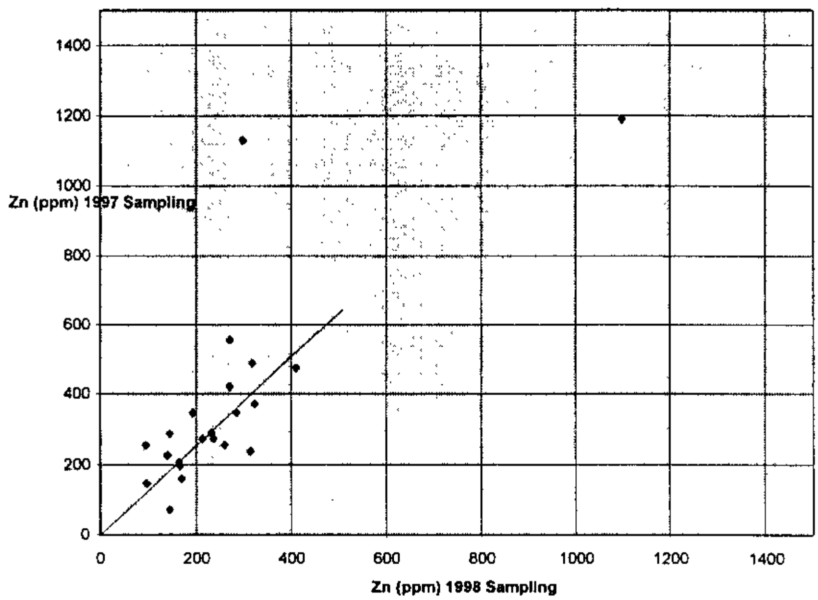


Figure 3.1b: 1998 vs 1997 Pb (ppm) Soils

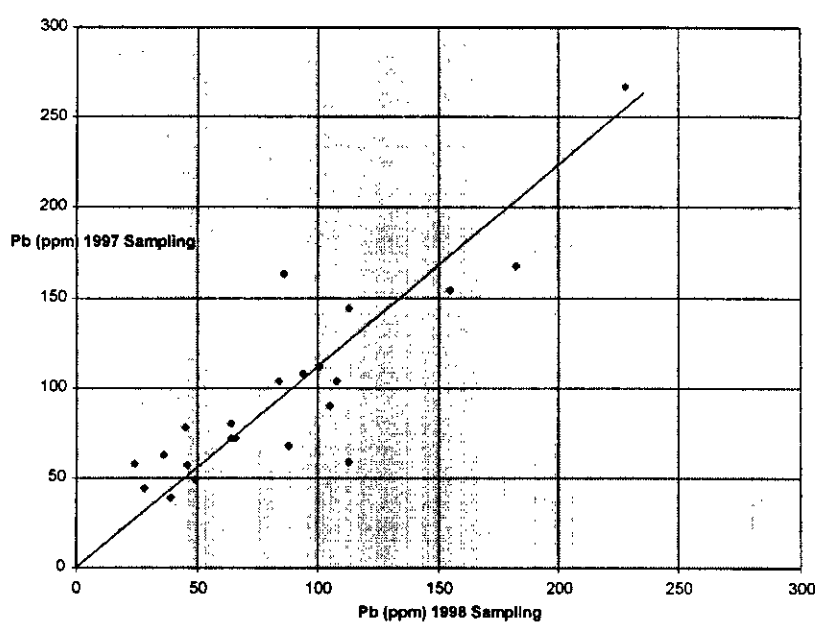
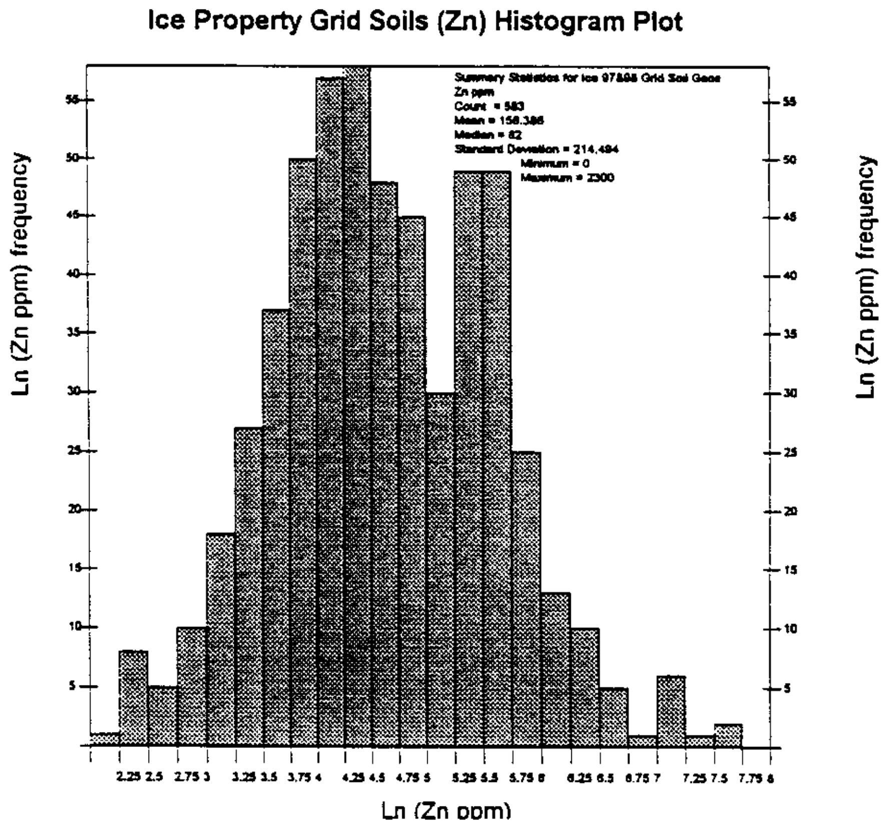


Figure 3.2a: Zn Histogram and Probability Plots



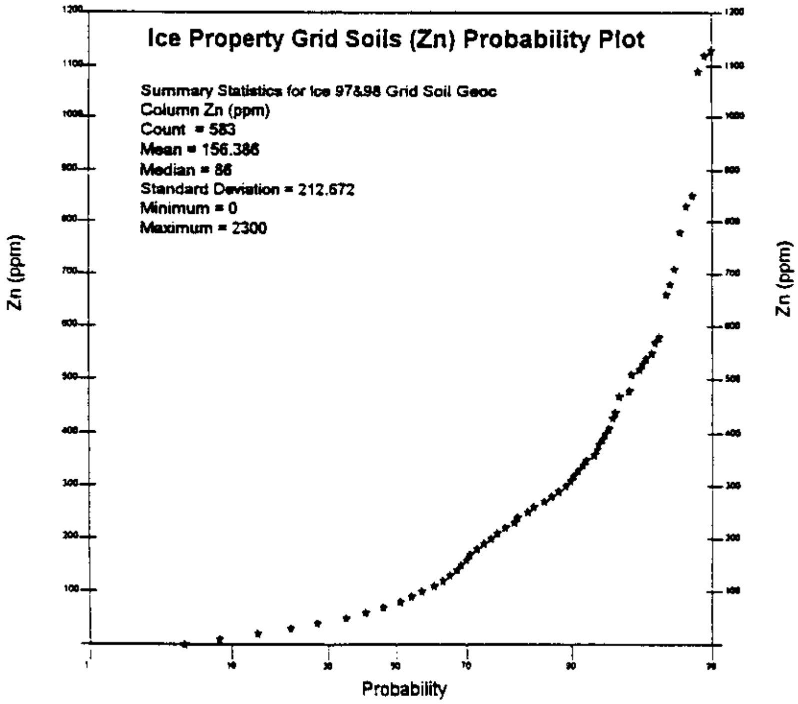
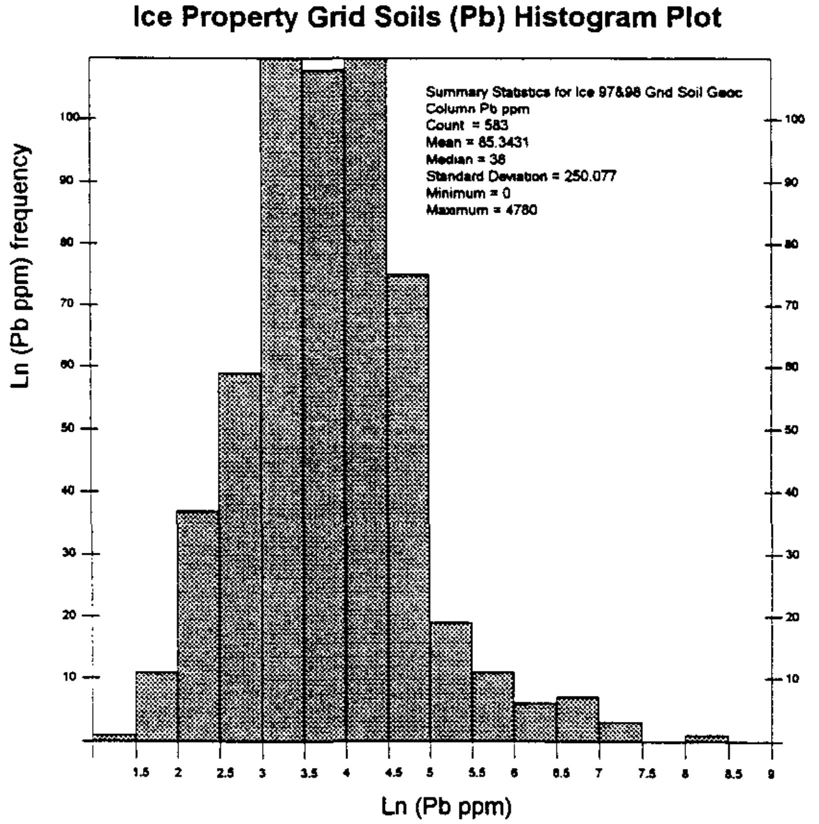
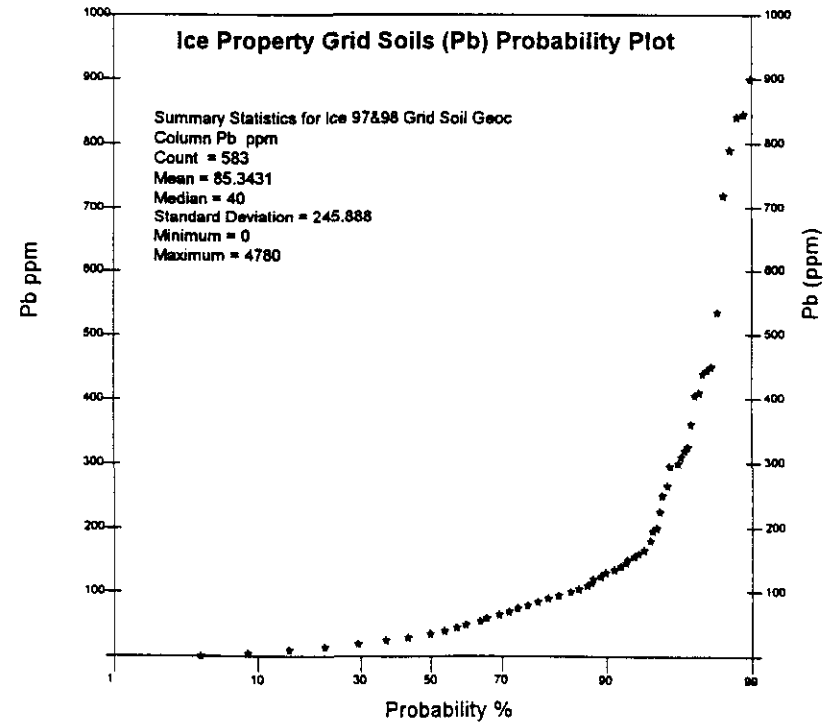
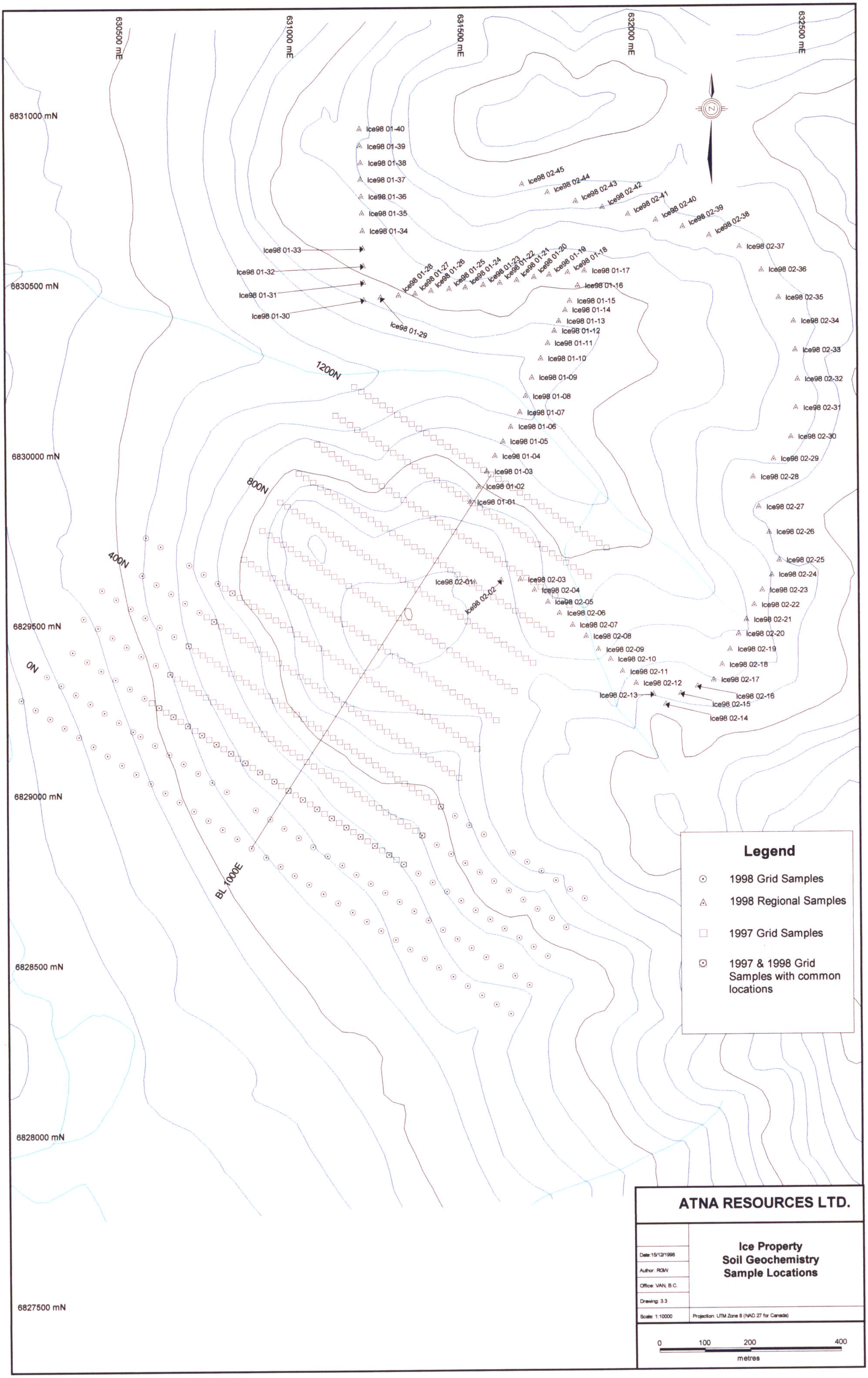


Figure 3.2b: Pb Histogram and Probability Plots







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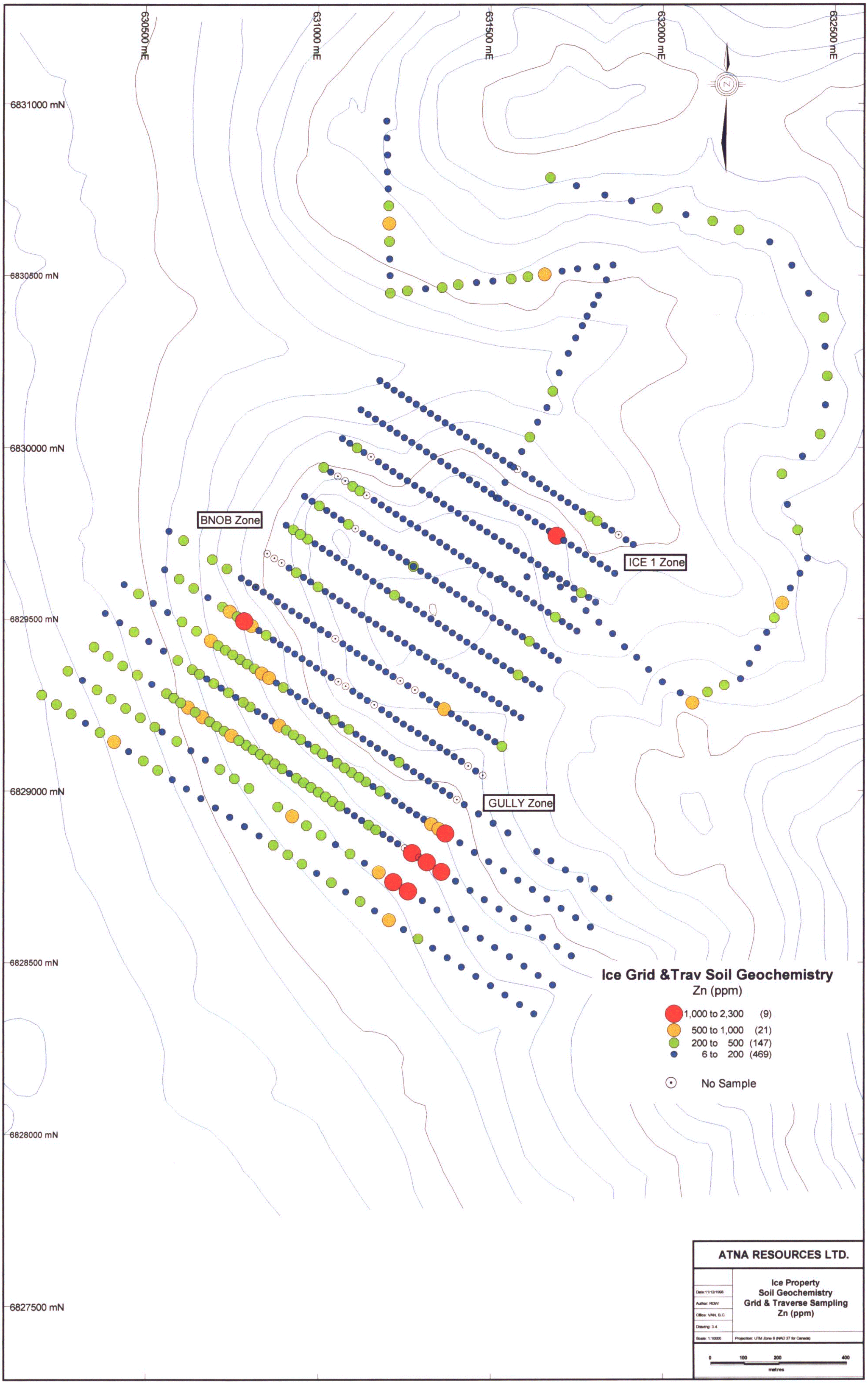
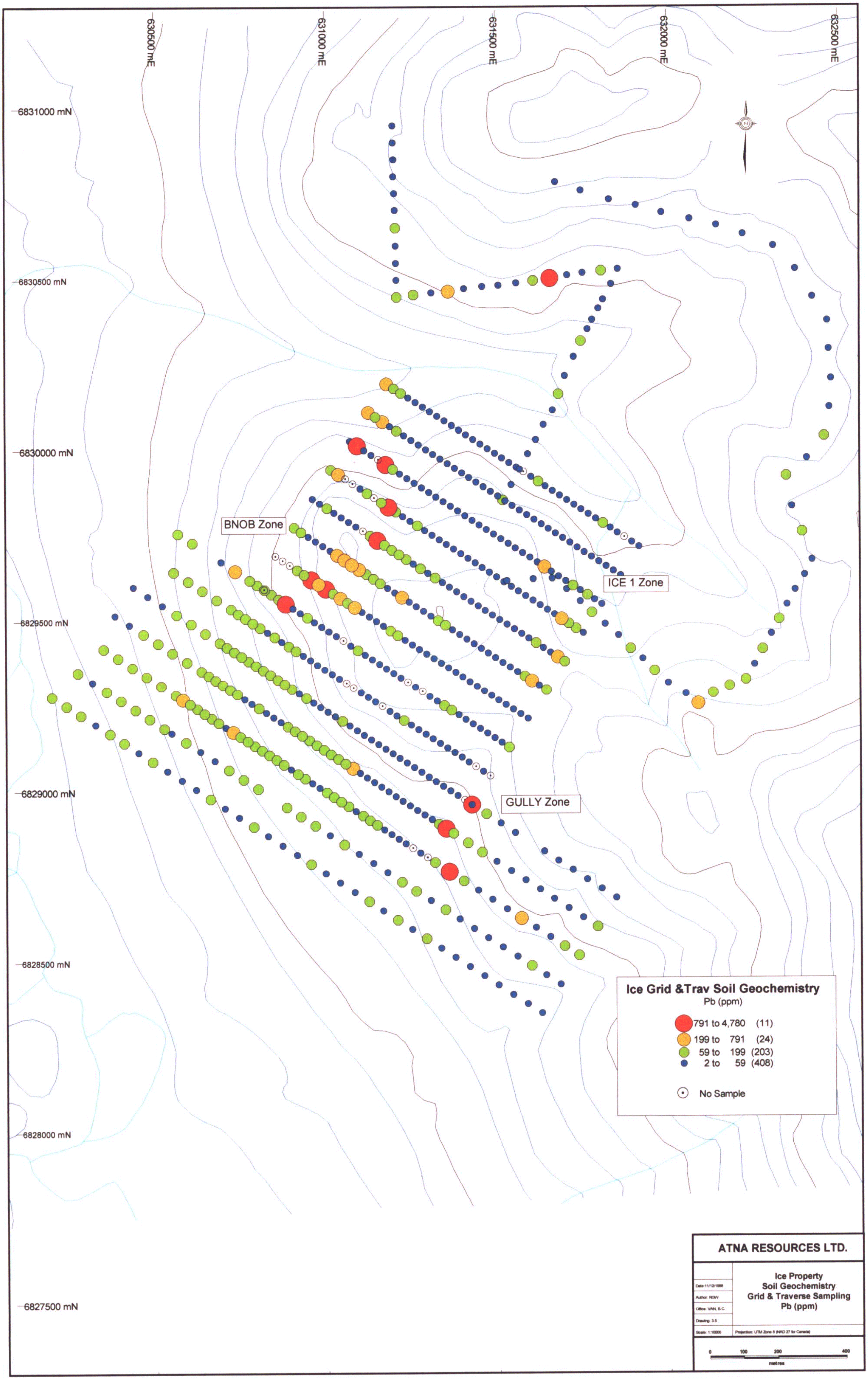
Ice Property
Soil Geochemistry
Sample Locations

Date: 15/12/1998
Author: RGW
Office: VAN, B.C.
Drawing: 3.3
Scale: 1:10000
Projection: UTM Zone 8 (NAD 27 for Canada)


630500 mE
631000 mE
631500 mE
632000 mE
632500 mE
6831000 mN
6830500 mN
6830000 mN
6829500 mN
6829000 mN
6828500 mN
6828000 mN
6827500 mN
BNOB Zone
ICE 1 Zone
GULLY Zone
Ice Grid &Trav Soil Geochemistry
Zn (ppm)
1,000 to 2,300 (9)
500 to 1,000 (21)
200 to 500 (147)
6 to 200 (469)
No Sample
ATNA RESOURCES LTD.
Date:11/12/1998
Author: RGW
Office: VAN, B.C.
Drawing: 3.4
Scale: 1:10000
Ice Property
Soil Geochemistry
Grid & Traverse Sampling
Zn (ppm)
Projection: UTM Zone 8 (NAD 27 for Canada)
0 100 200 400
metres


630500 mE
631000 mE
631500 mE
632000 mE
632500 mE
6831000 mN
6830500 mN
6830000 mN
6829500 mN
6829000 mN
6828500 mN
6828000 mN
6827500 mN
BNOB Zone
ICE 1 Zone
GULLY Zone
Ice Grid &Trav Soil Geochemistry
Pb (ppm)
791 to 4,780 (11)
199 to 791 (24)
59 to 199 (203)
2 to 59 (408)
No Sample
ATNA RESOURCES LTD.
Ice Property
Soil Geochemistry
Grid & Traverse Sampling
Pb (ppm)
Date:11/12/1998
Author: RGW
Office: VAN, B.C.
Drawing: 3.5
Scale: 1:10000
Projection: UTM Zone 8 (NAD 27 for Canada)
0
100
200
400
metres

4 GEOPHYSICS

Ground geophysics was completed over selected grid lines to determine the BNOB Zone response to horizontal loop electromagnetic surveying (HLEM), and to map other potential conductors on the property.

4.1 GROUND MAX-MIN HLEM SURVEY

A Max-Min HLEM survey was conducted by Delta Geoscience over the Ice grid. An interpretation report written by Grant Hendrickson of Delta Geoscience is contained within Appendix II, the results of which are reproduced here. HLEM profiles with interpretations are included as figures 4.1 to 4.6 (back pocket).

Four main bedrock conductors were outlined by this survey, however, only the eastern two have significant amplitude and strike length to be discussed further. The surface trace of these conductors is shown on the 220Hz data plan. There is also good evidence throughout the data for broad areas of weak conductivity, a fact which generally is indicative of argillaceous metasediments.

In the low frequency (220Hz) data, the two shallow conductors on the east side of the grid become quite discrete and this apparent focus to the best conductivity may be of exploration significance.

CONDUCTOR #1:

- centered at 1475E, 800N.
- strike length 500 meters, but open in both directions.
- depth to top 5 meters, good depth extent.
- conductivity thickness product 10 Seimens.
- dip uncertain due to flanking weak conductivity zones, however probably moderate dip to grid east.
- width at low frequency 20 meters, but much greater at the higher frequencies.
-

CONDUCTOR #2:

- centered at 1250E, 500N. Conductivity thickness product 11 Seimens.
- thin conductor, depth to top 15 meters.
- dip and depth extent uncertain due to flanking conductors.
- strike length 200 meters, but longer if much weaker conductivity is considered along strike.

The very shallow nature of the main conductive horizon (#1) suggests it may be visible in outcrop and if mineralized should have produced a significant geochemical response. The 220Hz data helps focus on the best conductivity, which often is directly related to increased sulphide mineralization.

The exploration significance of the shallow conductors outlined will clearly depend on a review of the area's geology. There is ample evidence in the E.M. data for a large sedimentary component to the underlying geology, thus one should be cautious in the selection of a drill target.

5 DISCUSSION

The Ice property is underlain by volcanic rocks of the Pelly Mountains Volcanic Belt and contains the same stratigraphy as that which hosts the Wolf deposit on the Wolf property 40 km to the SE. That lithology includes syenite, pyritic trachyte, pyrite-lapilli tuff, pyritic tuffs, possibly monzonite and argillite. The syenite exposure looks like a plug, but, based on historic drilling, appears to be sheet like in form.

The BNOB showing is a NE trending NW dipping strataform barite body occurring within a pyrite-lapilli tuff and a pyritic trachyte. The trachyte along this trend appears to be faulted but cannot be resolved due to a lack of exposure. Anomalous levels of Pb and Zn in soil geochemistry trace the Pb and Zn bearing barite body over the saddle and downdip to the NW. A sub-surface connection between the BNOB and ICE 1 showings therefore is unlikely. The two zones could, however, be on either side of a gentle antiformal structure.

The HLEM geophysical survey identified a one line, very weak conductor near the BNOB showing. No strike or dip determinations could be made. Of the strongest geophysical anomalies, Conductor #1 follows a topographic linear which contains the ICE 1 and Gully geochemical anomalies. The area is underlain by black argillite which is the likely source of the anomaly. Conductor #2 is not exposed in outcrop except near the northern end where it occurs within pyritic trachyte near it's contact with lapilli tuff. No geochemical anomalies exist along this trend.

6 CONCLUSIONS AND RECOMMENDATIONS

The 1998 exploration program on the Ice property did not identify any clear drill targets, and a decision was made not to drill. Due to the general lack of outcrop in the showings area, future exploration programs on the property will require a component of stratigraphic drilling. The BNOB barite showing occurs in the correct stratigraphic position (relative to the Wolf property) to represent the mineralized horizon (MH). It was tested to the north and down-dip by the Cyprus-Anvil drill hole and significant mineralization was not intersected. Surface mapping, however, indicates faults which trend towards the mineralization in that area and it is possible that the mineralized horizon is displaced in the drilled area. The MH is open down-dip and to the south of the BNOB showing. A single drillhole located at 6+20N 5+75E would be sufficient to test this area of the property.

It is difficult to establish the geological context of the ICE 1 showing and it may take a couple of shallow, angled drill holes to test whether this showing represents a potentially mineralized horizon. The absence of a strong geochemical or geophysical response makes the ICE 1 a lower priority target.

7 ACKNOWLEDGMENTS

Able assistance for the project was provided by Peter Daubeny, Nick Mitchell, Mike Callaghan, Bart Piekarski, and Ron Vedd.

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APPENDIX I

GEOCHEMICAL CERTIFICATES

OF ANALYSIS

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
(ISO 9002 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

Atna Resources Ltd. PROJECT ICE File # 9803623 Page 1
1550 - 409 Granville St., Vancouver BC V6C 1T2 Submitted by: P. Holbek

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE98 1-01	15	37	67	59	.6	34	7	107	3.84	28	<8	<2	3	45	.7	13	<3	41	.03	.118	23	13	.08	235	.01	<3	.54	.02	.08	<2
ICE98 1-02	8	169	8	127	.3	76	29	611	4.37	14	13	<2	11	21	1.4	5	4	23	.04	.111	31	6	.08	81	<.01	4	1.34	<.01	.08	2
ICE98 1-03	3	56	36	34	.3	11	2	37	1.37	5	<8	<2	3	18	<.2	<3	<3	20	.02	.091	21	6	.09	82	<.01	<3	.71	.02	.06	<2
ICE98 1-04	4	68	15	52	<.3	20	9	392	1.64	8	9	<2	<2	12	.4	<3	3	16	.04	.081	11	6	.06	65	.01	<3	.98	.03	.04	<2
ICE98 1-05	3	31	43	421	.4	39	12	2497	3.00	12	<8	<2	4	33	2.1	3	<3	22	1.21	.109	14	10	.35	322	<.01	5	.80	.01	.07	<2
ICE98 1-06	1	18	18	94	.8	16	2	283	.77	3	<8	<2	3	151	2.2	<3	<3	9	17.71	.048	2	4	.28	128	<.01	3	.40	.01	.04	<2
ICE98 1-07	2	15	15	73	<.3	16	2	54	1.18	3	<8	<2	<2	10	.3	<3	<3	23	.16	.043	17	8	.11	129	<.01	3	.52	.01	.05	<2
ICE98 1-08	4	39	83	273	.4	43	9	258	2.61	17	<8	<2	6	17	1.5	3	5	33	.13	.097	31	16	.27	105	.01	3	.91	.01	.08	<2
ICE98 1-09	5	24	33	95	.4	10	1	48	1.70	9	<8	<2	3	25	<.2	<3	3	42	.02	.099	27	8	.06	77	.01	3	.66	.01	.05	<2
ICE98 1-10	3	38	46	181	.5	34	8	280	2.86	17	<8	<2	<2	10	.3	6	<3	35	.08	.109	22	14	.20	74	.01	5	.80	.01	.05	<2
ICE98 1-11	2	24	98	156	<.3	24	5	212	2.46	16	<8	<2	2	11	.9	<3	<3	41	.14	.061	21	21	.26	142	.03	3	.84	.01	.06	<2
ICE98 1-12	2	21	15	110	<.3	27	6	312	2.15	8	<8	<2	5	30	.2	3	<3	27	3.17	.102	21	17	1.85	131	.01	<3	.68	<.01	.06	<2
ICE98 1-13	4	32	54	161	.6	50	12	591	3.19	25	<8	<2	3	39	1.1	4	<3	19	5.00	.109	12	6	2.69	157	<.01	5	.37	.01	.04	<2
ICE98 1-14	2	17	17	78	.4	25	3	80	1.28	3	<8	<2	2	29	.3	<3	<3	18	.61	.100	12	7	.19	226	.01	<3	.73	.02	.04	<2
ICE98 1-15	3	26	24	137	.3	33	7	188	2.13	3	<8	<2	5	27	<.2	3	3	30	.88	.098	20	16	.45	262	<.01	<3	.99	.01	.09	<2
ICE98 1-16	2	25	20	106	<.3	29	6	137	1.70	3	<8	<2	3	27	.7	4	<3	29	.79	.082	15	14	.31	358	.01	<3	1.00	.01	.06	<2
ICE98 1-17	1	17	15	49	.4	15	3	130	.95	<2	<8	<2	<2	22	<.2	<3	<3	17	.77	.088	8	6	.19	273	.01	10	.51	.03	.04	<2
ICE98 1-18	8	24	87	133	.5	37	11	762	3.07	21	<8	<2	3	48	.6	5	<3	25	.74	.132	24	11	.41	380	<.01	<3	.91	<.01	.05	<2
RE ICE98 1-18	8	26	81	133	.5	38	11	769	3.05	23	<8	<2	3	47	.7	6	<3	24	.76	.129	24	11	.42	375	<.01	3	.88	.01	.05	<2
ICE98 1-19	16	36	33	175	.3	53	15	406	2.72	18	<8	<2	4	19	<.2	6	<3	26	.09	.076	22	12	.30	116	<.01	<3	.65	<.01	.04	<2
ICE98 1-20	3	30	19	77	.3	26	9	328	2.95	4	<8	<2	2	11	.7	4	3	24	.06	.065	17	9	.18	243	<.01	<3	.74	.02	.04	<2
ICE98 1-21	4	40	1464	984	2.4	31	17	460	6.33	39	<8	<2	6	173	2.5	16	3	20	.35	.189	19	6	.21	332	<.01	<3	.76	.03	.09	<2
ICE98 1-22	4	40	133	249	.3	32	10	292	2.75	12	<8	<2	6	31	.8	5	<3	16	.31	.129	41	12	.29	268	<.01	<3	.75	.01	.06	<2
ICE98 1-23	4	30	26	224	<.3	36	8	166	2.34	13	<8	<2	5	27	.6	7	5	23	.15	.127	36	11	.27	93	<.01	<3	.65	<.01	.05	<2
ICE98 1-24	5	32	31	172	4.5	17	16	134	5.69	78	<8	<2	6	13	1.1	5	5	27	.05	.082	45	19	.12	214	<.01	3	.82	<.01	.06	<2
ICE98 1-25	7	61	30	140	1.1	26	8	220	2.97	16	<8	<2	6	8	.9	4	4	34	.03	.031	36	20	.24	163	.01	4	1.05	.01	.07	<2
ICE98 1-26	5	60	24	323	.4	64	12	234	2.86	16	<8	<2	10	48	1.2	7	3	28	.34	.131	37	13	.51	303	<.01	<3	.90	<.01	.07	<2
ICE98 1-27	4	60	322	320	.9	49	11	284	2.77	20	<8	<2	9	54	.6	5	<3	17	.32	.125	34	7	.21	174	<.01	4	.50	<.01	.07	<2
ICE98 1-28	3	25	29	109	.3	21	8	211	2.37	13	<8	<2	4	51	.7	4	<3	19	1.09	.089	17	7	.34	326	<.01	<3	.84	.01	.07	<2
ICE98 1-29	3	42	94	430	.3	40	12	305	3.10	12	<8	<2	5	68	1.5	5	<3	28	1.40	.124	20	14	.55	444	<.01	<3	1.08	.01	.06	<2
ICE98 1-30	3	44	60	234	.4	46	10	236	2.49	12	<8	<2	8	28	1.3	3	<3	28	.52	.129	32	19	.38	314	.01	<3	.73	<.01	.07	<2
ICE98 1-31	3	44	27	129	.4	32	8	178	1.77	7	<8	<2	3	24	.9	4	<3	19	.45	.087	21	11	.21	297	.01	<3	.60	.01	.06	<2
ICE98 1-32	2	26	22	84	.7	21	3	53	1.41	7	<8	<2	<2	11	.2	3	<3	21	.09	.069	16	10	.18	287	<.01	<3	.73	.01	.06	<2
ICE98 1-33	2	35	17	222	<.3	37	9	114	2.51	9	<8	<2	7	33	.9	<3	3	21	.28	.136	35	11	.34	164	<.01	<3	.80	<.01	.05	<2
ICE98 1-34	2	81	101	567	.8	56	20	448	1.78	59	<8	<2	8	29	2.4	3	<3	17	1.12	.116	31	14	.16	169	<.01	<3	.42	<.01	.11	<2
STANDARD C3	25	63	37	165	5.1	37	12	780	3.34	56	25	3	22	30	22.1	15	20	80	.54	.086	19	174	.57	152	.09	19	1.81	.04	.17	15
STANDARD G-2	1	5	4	40	<.3	6	2	514	1.90	<2	<8	<2	4	81	<.2	<3	<3	38	.62	.088	8	77	.55	238	.13	<3	1.02	.11	.48	3

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 2-2-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND MASSIVE SULFIDE AND LIMITED FOR NA K AND AL.
- SAMPLE TYPE: SOIL Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: AUG 24 1998 **DATE REPORT MAILED:** Aug 27/98 **SIGNED BY** .... D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

 Data ✓ FA ____

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE98 1-35	4	58	29	343	.6	49	14	272	2.49	11	<8	<2	5	20	1.3	8	<3	24	.13	.124	34	13	.33	93	<.01	<3	.75	<.01	.05	<2
ICE98 1-36	4	40	22	165	.4	44	15	244	3.39	13	<8	<2	4	10	.5	5	<3	37	.02	.101	37	12	.22	147	<.01	<3	.81	<.01	.05	<2
ICE98 1-37	5	68	30	168	.3	46	14	165	3.58	18	<8	<2	8	5	<.2	5	<3	16	.03	.150	44	12	.13	73	<.01	<3	.45	<.01	.05	<2
ICE98 1-38	5	36	39	44	.4	27	10	184	3.48	15	<8	<2	5	27	<.2	9	<3	21	.02	.078	34	7	.17	132	<.01	<3	.72	.01	.06	<2
ICE98 1-39	1	17	13	54	<.3	8	2	36	.90	3	<8	<2	<2	9	<.2	<3	<3	16	.03	.038	15	5	.07	113	.01	<3	.56	.02	.04	<2
ICE98 1-40	3	66	17	92	<.3	42	9	97	2.31	7	<8	<2	8	12	<.2	4	<3	16	.21	.114	50	7	.11	138	<.01	<3	.40	<.01	.05	<2
ICE98 2-01	6	46	31	61	.7	17	4	126	5.88	35	<8	<2	6	17	<.2	3	<3	31	.02	.081	40	29	.34	141	.01	<3	1.23	.01	.07	<2
ICE98 2-02	61	43	34	37	.4	15	3	82	3.90	156	<8	<2	<2	19	.3	5	<3	209	.01	.167	21	17	.05	93	.01	3	.79	.01	.05	<2
ICE98 2-03	20	48	33	60	.3	18	5	74	4.19	36	<8	<2	4	21	.2	5	<3	63	.01	.086	36	22	.10	169	<.01	<3	1.04	<.01	.06	2
ICE98 2-04	18	27	25	53	<.3	16	3	75	2.69	23	<8	<2	3	11	<.2	3	<3	46	.01	.063	37	9	.08	96	<.01	<3	.74	.01	.04	2
ICE98 2-05	6	63	16	29	<.3	34	9	160	3.65	12	<8	<2	2	3	<.2	4	<3	21	.02	.130	25	9	.08	29	<.01	<3	.51	<.01	.03	<2
ICE98 2-06	1	18	95	28	<.3	9	5	222	2.67	7	<8	<2	<2	3	<.2	3	<3	20	.03	.076	19	6	.03	565	<.01	<3	.58	<.01	.03	<2
ICE98 2-07	2	15	4	25	<.3	7	2	43	1.31	8	<8	<2	<2	4	<.2	3	<3	39	.02	.091	20	8	.08	31	.01	<3	.55	.01	.03	<2
ICE98 2-08	4	23	9	19	<.3	27	6	68	1.89	10	<8	<2	2	7	<.2	<3	4	20	.13	.062	21	6	.15	199	<.01	<3	.49	.01	.03	<2
ICE98 2-09	2	21	135	146	1.1	57	45	1757	7.17	33	<8	<2	3	30	1.4	7	<3	27	5.29	.169	8	8	2.90	146	.01	<3	.37	<.01	.06	<2
ICE98 2-10	1	14	45	60	<.3	10	7	2145	2.78	16	<8	<2	<2	15	.4	6	<3	19	1.06	.101	9	9	.30	199	.01	4	.52	.01	.03	<2
ICE98 2-11	2	25	97	115	.6	38	12	2553	4.89	18	<8	<2	2	15	.3	6	<3	25	2.18	.067	14	15	1.18	230	.01	5	.60	<.01	.03	<2
RE ICE98 2-11	2	23	102	110	.5	30	12	2508	4.80	18	<8	<2	2	14	.9	9	<3	24	2.15	.065	14	15	1.16	227	.01	<3	.60	<.01	.02	<2
ICE98 2-12	22	66	46	124	.5	128	41	914	6.74	31	10	<2	3	38	1.0	13	<3	35	4.02	.255	26	6	2.14	145	<.01	4	.46	.01	.05	<2
ICE98 2-13	5	39	46	131	.4	48	11	636	2.49	11	<8	<2	4	23	.3	6	<3	28	1.37	.098	23	11	.87	165	.01	<3	.65	<.01	.08	<2
ICE98 2-14	15	47	462	781	1.1	72	17	1726	5.24	60	<8	<2	4	16	2.5	14	<3	51	.28	.123	28	13	.13	300	<.01	4	.50	<.01	.04	<2
ICE98 2-15	5	26	110	358	.7	38	13	2217	4.29	25	<8	<2	<2	21	1.7	10	<3	38	1.54	.162	23	15	.83	202	.01	<3	.69	<.01	.03	<2
ICE98 2-16	7	17	124	312	<.3	28	11	2347	3.93	36	<8	<2	<2	4	.6	9	<3	38	.03	.104	16	11	.06	72	.01	4	.40	<.01	.03	<2
ICE98 2-17	1	16	101	117	.4	19	8	743	2.57	14	<8	<2	3	39	.5	4	<3	25	7.70	.070	12	11	4.40	79	.02	4	.37	.01	.02	<2
ICE98 2-18	10	19	13	60	<.3	19	5	137	1.67	10	<8	<2	<2	9	<.2	4	4	25	.10	.080	20	5	.11	80	<.01	<3	.43	<.01	.02	<2
ICE98 2-19	8	30	62	180	<.3	60	17	1184	3.07	21	<8	<2	<2	14	.6	8	<3	31	.59	.097	18	12	.38	150	.01	<3	.68	<.01	.04	<2
ICE98 2-20	4	21	39	102	<.3	17	5	221	1.85	7	<8	<2	<2	7	<.2	3	<3	27	.06	.073	13	5	.14	49	.01	3	.45	.01	.03	<2
ICE98 2-21	4	26	119	215	.3	24	21	762	3.06	27	<8	<2	2	11	.3	5	<3	25	.20	.070	15	8	.18	99	<.01	<3	.57	.01	.04	<2
ICE98 2-22	5	78	26	518	.4	45	10	202	2.60	14	<8	<2	11	45	1.8	5	3	22	.28	.132	40	8	.13	186	<.01	10	.47	.01	.10	<2
ICE98 2-23	4	46	50	189	.5	58	14	509	2.68	14	<8	<2	6	23	.3	6	3	28	.26	.133	44	12	.32	127	.01	6	.76	.01	.05	<2
ICE98 2-24	5	41	23	53	<.3	42	8	203	2.46	13	<8	<2	2	21	<.2	7	<3	17	.05	.082	28	5	.09	48	<.01	<3	.32	.01	.03	<2
ICE98 2-25	1	12	39	36	.4	16	7	692	2.02	14	<8	<2	2	56	<.2	5	6	10	11.11	.079	9	5	6.02	43	<.01	5	.10	.01	.02	<2
ICE98 2-26	3	17	104	278	<.3	23	8	877	2.99	13	<8	<2	<2	19	.6	3	<3	31	1.32	.073	19	16	.84	144	.01	4	.86	.01	.04	<2
ICE98 2-27	1	11	39	118	<.3	15	5	578	2.12	5	<8	<2	2	29	<.2	<3	<3	25	2.78	.092	14	16	2.01	103	.02	3	.91	.01	.04	<2
ICE98 2-28	3	14	92	209	<.3	22	8	676	2.70	8	<8	<2	<2	16	.2	4	<3	30	.77	.071	18	14	.48	138	.01	<3	.85	.01	.04	<2
STANDARD C3	25	67	37	169	5.2	37	11	786	3.33	59	21	3	21	29	22.0	19	22	81	.55	.084	19	174	.59	162	.09	22	1.84	.03	.17	15
STANDARD G-2	2	4	5	40	<.3	9	4	528	1.89	<2	<8	<2	4	78	.2	<3	<3	39	.63	.089	8	76	.57	224	.12	4	1.02	.09	.47	2

Sample type: SOIL. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ✓ FA ____

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE98 2-29	10	34	47	101	.3	63	9	193	1.66	16	<8	<2	<2	13	<.2	5	<3	21	.21	.065	12	5	.18	224	.01	<3	.46	.01	.02	<2
ICE98 2-30	4	17	137	475	.7	30	13	2299	4.46	39	<8	<2	3	83	2.5	6	3	20	7.84	.076	10	8	4.88	318	<.01	<3	.56	.02	.02	<2
ICE98 2-31	7	23	44	62	.3	20	5	66	1.45	8	<8	<2	<2	58	<.2	4	<3	31	.07	.100	12	5	.06	188	<.01	<3	.45	.01	.03	<2
ICE98 2-32	4	56	27	231	.4	58	12	203	2.75	14	<8	<2	6	29	.9	5	4	21	.12	.108	36	9	.25	61	<.01	<3	.63	.01	.04	<2
ICE98 2-33	4	33	10	25	.3	21	8	94	1.65	8	<8	<2	<2	4	<.2	4	<3	21	.01	.094	27	4	.03	46	.01	<3	.34	.01	.04	<2
ICE98 2-34	3	31	11	200	<.3	39	7	117	1.99	8	<8	<2	5	25	<.2	3	<3	23	.16	.098	32	11	.28	119	<.01	<3	.65	<.01	.04	<2
ICE98 2-35	2	13	6	87	.3	19	4	86	1.30	5	<8	<2	4	11	<.2	3	<3	19	.09	.079	34	7	.14	139	<.01	<3	.50	.01	.05	<2
ICE98 2-36	5	25	31	118	<.3	26	8	281	2.41	13	<8	<2	2	9	.3	6	3	37	.03	.107	26	24	.31	138	.01	<3	1.05	.01	.05	<2
ICE98 2-37	1	6	28	194	.3	<1	3	2819	4.43	10	<8	<2	2	16	1.8	<3	<3	12	3.85	.074	14	9	2.23	897	<.01	<3	.41	.02	.02	<2
ICE98 2-38	11	83	24	238	<.3	74	31	715	6.27	31	<8	<2	6	36	.7	<3	<3	72	.06	.106	31	26	1.84	229	<.01	<3	2.67	.01	.04	<2
ICE98 2-39	4	60	22	248	.5	49	16	335	3.70	14	<8	<2	4	20	.8	6	5	21	.07	.149	35	11	.16	74	<.01	<3	.63	.01	.04	<2
ICE98 2-40	3	21	13	94	<.3	13	15	901	3.99	8	<8	<2	2	9	1.1	<3	3	40	.04	.227	18	9	.35	141	<.01	<3	1.16	.01	.04	<2
ICE98 2-41	3	37	34	205	<.3	26	9	317	3.32	11	<8	<2	2	9	1.0	5	4	34	.05	.190	16	11	.12	94	<.01	<3	.53	.01	.05	<2
RE ICE98 2-41	3	39	38	208	<.3	28	9	300	3.32	12	<8	<2	2	10	1.3	5	<3	35	.05	.203	16	12	.12	94	<.01	<3	.55	.01	.06	<2
ICE98 2-42	2	38	17	170	.3	39	16	816	3.51	16	<8	<2	<2	22	1.2	<3	3	82	.19	.111	22	76	.63	379	.02	<3	1.39	.01	.16	<2
ICE98 2-43	3	35	14	164	<.3	28	9	396	2.64	9	<8	<2	<2	14	1.0	4	<3	47	.16	.161	20	36	.23	248	<.01	<3	.89	.01	.09	<2
ICE98 2-44	3	47	14	86	<.3	27	8	122	2.64	15	<8	<2	<2	4	<.2	3	4	28	.02	.132	19	11	.04	65	<.01	<3	.50	.01	.03	<2
ICE98 2-45	4	70	28	246	.3	55	16	240	3.70	28	<8	<2	2	5	.8	5	<3	19	.03	.133	24	7	.10	168	<.01	<3	.41	.01	.04	<2
ICE L5+00N 2+50E	9	26	90	101	1.7	2	2	407	3.22	24	<8	<2	12	19	.8	11	<3	7	.11	.039	98	3	.10	469	.01	<3	.92	.02	.15	<2
ICE L5+00N 3+00E	10	9	72	228	.3	3	3	731	4.00	62	<8	<2	6	19	2.2	<3	<3	6	.08	.088	98	2	.15	187	.01	<3	1.11	.02	.17	<2
ICE L5+00N 4+00E	22	9	57	286	<.3	2	7	1633	5.34	469	<8	<2	101	60	1.8	<3	6	1	.20	.027	187	1	.12	603	<.01	<3	.93	.02	.22	<2
ICE L5+00N 4+50E	11	29	443	331	2.7	2	6	503	4.78	84	<8	<2	47	47	1.0	9	3	2	.10	.048	188	3	.09	347	<.01	<3	.84	.01	.36	<2
ICE L5+00N 5+00E	12	17	128	116	1.9	<1	2	98	6.55	99	<8	<2	16	73	.6	9	3	3	<.01	.070	84	4	.02	131	<.01	<3	.29	.03	.69	<2
ICE L5+00N 5+50E	7	16	136	72	2.0	3	2	97	4.64	62	<8	<2	10	17	.6	10	<3	15	.02	.062	66	4	.03	554	.01	<3	.50	.01	.16	<2
ICE L4+00N 3+00E	13	15	87	129	.5	9	3	110	7.23	94	<8	<2	7	47	1.4	4	<3	13	.04	.055	41	9	.12	135	.01	<3	.51	.03	.76	<2
ICE L4+00N 3+50E	5	25	97	439	.4	22	14	503	4.18	33	<8	<2	3	16	3.5	3	<3	22	.26	.060	30	13	.28	903	.01	<3	.85	.01	.09	<2
ICE L4+00N 4+00E	6	37	99	397	.3	18	11	401	5.53	36	<8	<2	6	9	2.3	6	5	33	.02	.058	35	17	.34	300	.01	<3	1.32	.01	.10	<2
ICE L4+00N 4+50E	5	108	115	181	1.1	18	38	1243	5.52	56	<8	<2	4	24	1.4	7	3	15	.07	.089	36	10	.12	667	<.01	<3	.66	.02	.17	<2
ICE L4+00N 5+00E	4	49	84	255	1.5	24	10	414	3.67	21	<8	<2	7	32	1.8	6	6	21	.33	.083	34	12	.26	1473	.01	<3	.86	.01	.13	<2
ICE L4+00N 5+50E	5	56	113	315	.5	33	15	519	3.97	28	<8	<2	7	28	2.0	7	<3	22	.49	.064	32	16	.32	903	.01	<3	.83	.02	.13	<2
ICE L3+00N 2+25E	2	19	30	82	.3	9	6	233	1.91	12	<8	<2	<2	6	3.9	<3	<3	23	.02	.036	20	7	.08	205	.01	<3	.64	.02	.04	<2
ICE L3+00N 2+75E	5	48	51	225	.8	17	7	223	2.91	18	<8	<2	3	10	.7	6	<3	29	.02	.070	29	12	.23	176	.01	<3	1.32	.01	.10	<2
ICE L3+00N 3+25E	5	37	38	84	.8	10	4	100	2.13	18	<8	<2	<2	9	.6	5	<3	21	.02	.054	25	9	.14	423	.01	<3	.74	.02	.06	<2
ICE L3+00N 3+75E	7	59	104	184	1.0	20	11	390	3.33	27	<8	<2	4	31	1.2	8	<3	23	.28	.066	39	13	.24	1140	.01	<3	.85	.01	.14	<2
ICE L3+00N 4+25E	5	29	144	310	1.3	27	17	743	3.87	23	<8	<2	5	33	1.4	7	<3	22	.55	.075	33	13	.39	1315	.01	<3	.93	.02	.15	<2
STANDARD C3	24	63	36	162	5.3	33	12	739	3.18	55	23	3	21	29	22.8	17	19	77	.52	.084	18	168	.57	150	.08	19	1.85	.04	.17	15
STANDARD G-2	1	4	<3	40	<.3	7	4	503	1.83	2	<8	<2	4	75	<.2	<3	<3	38	.59	.089	8	73	.56	221	.12	<3	.99	.09	.48	2

Sample type: SOIL. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data___ FA ____

ACME ANALYTICAL

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE L3+00N 4+75E	3	48	82	362	.4	24	12	492	2.48	11	<8	<2	<2	48	1.7	5	<3	16	.96	.110	18	11	.23	1190	.01	<3	.88	.02	.06	<2
ICE L3+00N 5+25E	3	66	113	271	.9	23	14	396	2.54	14	<8	<2	2	25	2.6	4	<3	16	.44	.058	25	9	.15	1054	.01	<3	.80	.02	.06	<2
ICE L3+00N 14+00E	22	57	845	145	.7	62	23	1291	5.91	38	<8	<2	3	20	1.8	15	4	56	.59	.147	20	17	.14	874	.01	<3	.65	.01	.04	2
ICE L3+00N 14+50E	8	92	59	94	<.3	32	28	839	3.61	63	<8	<2	<2	19	1.2	7	14	39	.38	.139	39	10	.18	291	.01	<3	.72	.02	.04	2
ICE L3+00N 15+00E	3	30	7	14	<.3	14	5	37	1.00	4	8	<2	<2	11	.3	4	3	39	.09	.043	19	12	.27	192	<.01	<3	.83	.01	.02	7
ICE L3+00N 15+50E	1	7	11	21	<.3	14	3	31	.72	4	8	<2	<2	6	<.2	3	<3	18	.03	.083	13	8	.18	99	<.01	<3	.58	.01	.03	2
ICE L3+00N 16+50E	2	12	6	22	<.3	10	2	99	.44	<2	<8	<2	<2	12	.5	<3	<3	13	.14	.087	10	6	.08	192	<.01	<3	.42	.02	.04	<2
ICE L3+00N 17+00E	2	15	9	31	<.3	9	2	31	.69	4	<8	<2	<2	7	.3	<3	<3	19	.06	.107	15	6	.06	137	<.01	<3	.56	.01	.04	<2
ICE L3+00N 17+50E	3	21	21	79	<.3	15	6	241	1.15	8	<8	<2	<2	15	.8	4	<3	22	.26	.071	14	7	.11	133	<.01	<3	.41	.01	.05	<2
ICE L3+00N 18+00E	6	17	19	34	<.3	12	4	90	1.37	5	<8	<2	<2	6	.4	4	<3	25	.05	.090	22	6	.11	149	<.01	<3	.62	.02	.04	<2
ICE L3+00N 18+50E	9	30	10	21	.3	16	3	56	1.06	11	<8	<2	<2	6	<.2	3	4	19	.02	.090	16	4	.02	64	<.01	<3	.52	.02	.03	<2
RE ICE L3+00N 18+50E	9	30	10	20	.3	18	2	58	1.09	9	8	<2	<2	6	.2	3	<3	19	.02	.093	16	4	.02	67	<.01	<3	.54	.01	.03	<2
ICE L3+00N 19+00E	21	91	51	97	.4	73	18	372	3.60	20	<8	<2	<2	6	.5	4	<3	31	.05	.108	20	14	.27	108	<.01	<3	.82	.01	.06	2
ICE L2+00N 2+25E	2	11	17	66	.3	8	3	144	1.41	6	<8	<2	<2	9	1.9	<3	<3	26	.11	.027	22	9	.14	204	.02	<3	.58	.01	.05	<2
ICE L2+00N 2+75E	1	21	17	40	<.3	4	3	88	.91	3	<8	<2	<2	6	.5	<3	<3	13	.02	.041	10	4	.05	217	.01	<3	.53	.03	.02	<2
ICE L2+00N 3+25E	6	62	110	245	.4	29	11	320	4.35	30	<8	<2	7	17	1.0	6	5	28	.03	.076	41	18	.31	940	.01	<3	1.26	.01	.14	<2
ICE L2+00N 3+75E	2	20	64	138	.4	11	4	170	2.20	12	<8	<2	<2	16	.7	3	<3	22	.19	.057	17	11	.22	389	.01	<3	.84	.02	.11	<2
ICE L2+00N 4+25E	4	20	65	123	<.3	14	5	163	2.34	18	<8	<2	3	15	.6	4	<3	20	.11	.047	30	11	.22	570	.01	<3	.70	.02	.09	<2
ICE L2+00N 4+75E	4	41	110	267	.8	27	13	244	3.77	21	<8	<2	4	28	1.2	4	<3	24	.34	.080	32	15	.28	1336	.01	<3	1.06	.01	.09	<2
ICE L2+00N 5+25E	5	30	105	141	.3	21	7	118	3.71	25	<8	<2	2	12	.7	4	<3	21	.04	.065	31	14	.24	656	.01	<3	.90	.01	.09	<2
ICE L2+00N 14+00E	5	19	86	299	<.3	13	7	469	1.85	11	<8	<2	<2	18	2.0	5	<3	28	.73	.090	15	9	.16	159	.01	<3	.86	.02	.03	<2
ICE L2+00N 14+50E	3	19	69	130	.3	13	4	965	1.87	6	<8	<2	<2	16	1.0	3	<3	25	.54	.052	15	7	.11	309	.01	<3	.70	.03	.03	<2
ICE L2+00N 15+00E	31	127	70	89	<.3	64	11	132	2.92	53	<8	<2	<2	4	.5	14	7	36	.04	.050	22	4	.02	51	.01	<3	.23	.01	.02	3
ICE L2+00N 15+50E	4	23	18	36	<.3	6	3	62	.97	6	<8	<2	<2	14	.5	<3	3	28	.11	.038	11	8	.07	95	.01	<3	.41	.02	.03	<2
ICE L2+00N 16+00E	<1	6	6	18	<.3	11	1	16	.35	<2	<8	<2	<2	11	.3	<3	<3	16	.13	.062	5	7	.26	106	<.01	<3	.61	.01	.03	<2
ICE L2+00N 16+50E	2	14	19	54	<.3	12	3	123	1.00	5	<8	<2	<2	15	.3	3	3	29	.15	.057	14	11	.19	252	.01	<3	.68	.02	.06	2
ICE L2+00N 17+00E	7	13	22	68	<.3	26	4	125	1.05	6	<8	<2	<2	10	.4	5	<3	17	.04	.069	10	5	.04	235	<.01	<3	.44	.01	.03	<2
ICE L2+00N 17+50E	15	25	43	115	<.3	62	7	150	1.92	31	<8	<2	<2	5	.3	10	<3	6	.12	.056	13	2	.02	54	<.01	<3	.09	<.01	.02	<2
ICE L2+00N 18+00E	8	13	17	39	<.3	13	3	41	1.14	8	<8	<2	<2	6	.4	3	<3	30	.02	.077	22	6	.02	71	.01	<3	.36	.01	.03	<2
ICE L2+00N 18+50E	25	32	9	39	.4	35	4	100	1.58	5	<8	<2	<2	5	.3	4	3	25	.02	.043	26	4	.01	54	.01	<3	.35	.01	.02	<2
ICE L2+00N 19+00E	26	38	63	96	.7	59	8	136	2.48	18	<8	<2	<2	8	.5	8	<3	27	.02	.108	20	7	.04	68	<.01	<3	.40	.01	.03	<2
ICE L1+00N 2+50E	4	130	75	297	.4	32	24	1089	3.95	17	<8	<2	5	18	1.6	<3	<3	25	.13	.091	41	13	.30	698	.01	<3	1.54	.01	.11	<2
ICE L1+00N 3+00E	4	48	84	250	<.3	21	12	250	3.97	18	<8	<2	5	19	1.0	3	5	25	.12	.083	34	14	.29	1084	.01	<3	1.15	.01	.10	<2
ICE L1+00N 3+50E	5	59	84	275	.6	24	12	380	5.63	23	<8	<2	6	21	1.8	3	<3	26	.23	.101	34	14	.33	781	.01	<3	1.22	.01	.13	<2
ICE L1+00N 4+00E	5	68	99	385	.7	28	23	895	4.12	27	<8	<2	7	24	3.2	<3	<3	22	.25	.083	46	14	.28	1266	.01	<3	1.32	.01	.12	<2
STANDARD C3	24	63	36	157	5.1	40	11	730	3.08	55	29	3	19	28	21.1	16	22	75	.51	.081	18	163	.55	146	.08	21	1.78	.04	.16	15
STANDARD G-2	1	2	<3	41	<.3	7	5	504	1.86	<2	<8	<2	4	73	<.2	<3	<3	39	.60	.089	8	74	.56	218	.12	4	.96	.08	.47	3

Sample type: SOIL. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data / FA ___

ACME ANALYTICAL

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE L1+00N 4+50E	4	37	117	187	<.3	26	8	210	3.70	23	<8	<2	3	23	1.8	6	<3	27	.12	.080	32	15	.29	1263	.01	<3	1.13	.01	.15	<2
ICE L1+00N 5+00E	4	31	90	207	.3	16	7	135	2.65	12	<8	<2	3	13	.5	3	3	27	.02	.051	30	11	.24	420	.01	<3	1.28	.02	.14	<2
ICE L1+00N 5+50E	5	46	182	324	.4	28	11	223	4.24	22	<8	<2	7	20	2.0	5	<3	28	.05	.091	36	18	.35	677	.01	<3	1.49	.01	.19	<2
ICE L1+00N 6+00E	4	54	101	412	.5	56	16	336	3.97	21	<8	<2	4	36	2.7	<3	<3	25	.47	.081	32	16	.33	1260	.01	<3	1.12	.01	.12	<2
ICE L1+00N 6+50E	3	41	108	271	.7	57	11	337	3.37	19	<8	<2	3	56	2.0	3	<3	25	.85	.094	24	18	.33	1623	<.01	<3	1.19	.01	.12	<2
ICE L1+00N 7+50E	5	36	228	319	.5	28	14	516	4.15	31	<8	<2	4	37	1.9	5	<3	26	.40	.069	31	22	.48	1016	.01	<3	1.06	.01	.21	<2
ICE L1+00N 7+50E A	5	38	88	193	<.3	30	17	420	4.57	29	<8	<2	5	14	1.6	5	<3	22	.12	.069	31	12	.27	771	.01	<3	.88	<.01	.07	<2
ICE L1+00N 8+00E	2	25	84	96	<.3	14	13	340	2.51	11	<8	<2	<2	20	.7	<3	<3	21	.30	.063	20	12	.19	1054	.01	<3	.87	.01	.05	<2
ICE L1+00N 8+50E	4	47	94	237	.5	47	22	666	3.63	18	<8	<2	7	28	1.1	<3	<3	22	.28	.086	35	15	.35	1184	.01	<3	1.03	.01	.10	<2
ICE L1+00N 9+00E	4	47	49	165	<.3	28	11	221	2.93	21	<8	<2	3	29	.7	3	3	19	.27	.062	27	10	.21	999	.01	<3	1.09	.02	.06	<2
ICE L1+00N 9+50E	4	64	66	285	.4	39	15	427	3.93	27	<8	<2	3	30	1.1	3	<3	22	.32	.113	30	13	.23	1386	.01	<3	1.23	.01	.08	<2
ICE L1+00N 10+00E	4	29	46	233	<.3	29	10	262	3.22	18	<8	<2	2	13	1.4	3	<3	24	.10	.053	27	13	.24	432	.01	<3	.96	.01	.06	<2
ICE L1+00N 10+50E	4	32	36	145	.3	14	6	167	2.09	12	<8	<2	<2	13	.7	4	<3	17	.09	.072	18	6	.12	556	<.01	<3	.82	.02	.04	<2
ICE L1+00N 11+00E	8	57	64	261	<.3	31	13	252	3.92	29	<8	<2	6	21	2.2	6	<3	24	.14	.094	35	9	.23	956	<.01	<3	.82	.01	.06	<2
ICE L1+00N 11+50E	8	36	64	166	<.3	22	12	245	3.59	25	<8	<2	8	19	1.1	4	<3	23	.17	.069	47	13	.41	1285	.01	<3	.98	.01	.08	<2
ICE L1+00N 12+00E	4	67	45	214	.3	30	9	210	3.26	17	<8	<2	5	19	1.3	4	4	23	.32	.084	26	13	.35	539	<.01	<3	1.36	.01	.05	<2
ICE L1+00N 12+50E	5	38	39	170	<.3	22	10	269	3.74	23	<8	<2	6	15	.8	<3	<3	22	.24	.076	32	14	.44	272	<.01	<3	1.20	.01	.06	<2
ICE L1+00N 13+00E	4	28	28	97	<.3	15	7	205	3.20	17	<8	<2	4	21	.8	<3	<3	20	.34	.082	27	11	.40	402	<.01	<3	.99	.01	.05	<2
ICE L1+00N 13+50E	2	23	24	857	<.3	12	5	195	1.67	8	<8	<2	<2	18	2.7	<3	<3	17	.62	.061	12	8	.23	266	.01	<3	.79	.02	.04	<2
ICE L1+00N 14+00E	13	330	155	1099	.8	65	27	786	3.67	69	<8	<2	<2	17	4.0	12	23	34	.77	.059	187	10	.26	239	<.01	<3	.53	.01	.04	3
RE ICE L1+00N 14+00E	12	311	139	1046	.8	59	25	726	3.50	65	<8	<2	<2	16	4.1	13	24	33	.73	.059	182	10	.26	227	<.01	<3	.50	.02	.04	3
ICE L1+00N 14+50E	5	88	1798	1399	2.5	40	15	1376	5.27	47	<8	<2	<2	46	4.5	11	9	25	7.19	.043	21	11	3.94	170	.01	<3	.42	.02	.02	<2
ICE L1+00N 15+00E	10	76	158	45	<.3	31	14	111	3.48	64	<8	<2	2	18	.5	7	5	26	.61	.131	76	7	.21	275	<.01	<3	.60	.01	.03	2
ICE L1+00N 15+50E	11	60	9	25	<.3	44	20	140	3.41	10	<8	<2	3	14	.7	<3	<3	34	.36	.071	26	14	.36	128	<.01	<3	1.03	<.01	.02	<2
ICE L1+00N 16+00E	8	52	33	59	<.3	29	13	423	2.26	16	<8	<2	<2	15	.2	<3	3	48	.23	.081	25	12	.22	381	.01	<3	1.11	.02	.04	3
ICE L1+00N 16+50E	5	10	17	34	<.3	34	10	320	3.44	71	<8	<2	18	10	.7	<3	<3	86	.21	.134	12	26	.86	106	<.01	<3	2.09	<.01	.04	39
ICE L1+00N 17+00E	17	77	300	104	<.3	35	9	173	1.83	20	<8	<2	<2	19	.3	5	4	33	.25	.100	21	10	.17	234	<.01	<3	.74	.01	.05	2
ICE L1+00N 17+50E	2	13	6	25	<.3	9	2	32	.59	<2	<8	<2	<2	5	.3	<3	<3	14	.05	.034	10	4	.09	84	.01	<3	.34	.02	.03	<2
ICE L1+00N 18+00E	4	24	43	70	<.3	26	7	446	1.94	11	<8	<2	<2	13	.2	5	<3	23	.39	.079	17	10	.21	847	.01	<3	.75	.01	.05	<2
ICE L1+00N 18+50E	5	24	68	126	<.3	25	7	784	2.24	12	<8	<2	2	11	1.2	3	<3	26	.26	.065	17	10	.18	344	.01	<3	.74	.01	.04	<2
ICE L1+00N 19+00E	6	17	157	197	.4	24	8	1326	3.50	19	<8	<2	<2	13	1.4	5	<3	34	.28	.081	18	15	.15	587	.01	<3	.81	.01	.04	<2
ICE L0+00N 2+25E	4	101	100	234	1.0	24	10	313	4.08	26	<8	<2	4	20	1.7	6	<3	24	.12	.091	36	13	.25	1366	.01	<3	1.43	.01	.10	<2
ICE L0+00N 2+75E	2	72	55	136	.9	22	5	99	2.06	9	<8	<2	<2	10	1.1	3	<3	19	.10	.072	25	8	.17	292	.01	<3	.98	.01	.08	<2
ICE L0+00N 3+25E	5	73	74	445	.7	29	13	314	4.82	35	<8	<2	7	25	5.8	3	5	18	.24	.080	47	12	.21	1007	.01	<3	.97	.01	.08	<2
ICE L0+00N 3+75E	4	58	88	290	.7	45	19	556	3.84	18	<8	<2	4	21	1.7	3	3	27	.19	.081	35	14	.33	907	.01	<3	1.32	.01	.14	<2
STANDARD C3	24	63	33	159	5.3	38	12	742	3.17	56	23	3	20	28	22.7	20	21	76	.51	.083	18	166	.56	142	.08	17	1.80	.04	.17	15
STANDARD G-2	1	4	<3	42	<.3	5	4	516	1.91	<2	<8	<2	4	79	<.2	<3	<3	39	.61	.090	7	77	.57	238	.13	<3	1.05	.10	.51	2

Sample type: SOIL. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ___ FA ___

ACME ANALYTICAL

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE L0+00N 4+25E	4	42	102	297	.5	38	25	925	3.59	21	<8	<2	5	18	3.5	4	6	27	.16	.098	38	13	.34	516	.01	<3	1.25	.01	.14	<2
ICE L0+00N 4+75E	3	43	115	299	1.3	40	12	459	2.91	18	9	<2	4	40	3.5	4	4	23	.57	.070	31	13	.36	990	.01	<3	1.28	.01	.15	<2
ICE L0+00N 5+25E	3	29	131	306	.3	33	17	553	3.38	19	<8	<2	6	18	1.9	4	<3	25	.22	.072	37	14	.36	493	.01	<3	1.11	.01	.13	<2
ICE L0+00N 5+50E	4	31	27	180	<.3	45	11	214	1.97	9	<8	<2	5	20	.7	3	3	19	.17	.087	26	9	.20	198	.01	<3	.71	.01	.06	<2
ICE L0+00N 6+00E	3	29	99	235	.3	31	13	579	3.16	21	<8	<2	5	24	1.2	3	3	25	.30	.090	31	15	.37	889	.01	<3	1.02	.01	.12	<2
ICE L0+00N 6+50E	4	12	48	102	.3	19	8	239	3.57	24	<8	<2	6	8	.6	4	<3	31	.08	.083	28	11	.17	111	.02	<3	.61	.01	.06	<2
ICE L0+00N 7+00E	3	12	37	134	<.3	22	8	346	3.35	19	<8	<2	7	9	.6	<3	<3	33	.12	.029	32	22	.50	199	.01	<3	1.19	.01	.10	<2
ICE L0+00N 7+50E	3	26	117	232	.3	23	12	364	2.97	18	<8	<2	4	19	.7	5	<3	24	.14	.081	31	16	.32	1055	.01	<3	.99	.01	.12	<2
ICE L0+00N 8+00E	3	27	72	219	.5	29	13	431	3.04	18	<8	<2	5	28	.3	3	<3	21	.46	.092	27	13	.30	871	.01	<3	.96	.01	.07	<2
ICE L0+00N 8+50E	4	34	62	223	.4	28	15	485	3.12	21	<8	<2	5	31	1.1	3	<3	20	.45	.080	30	11	.26	1154	.01	<3	.93	.01	.07	<2
ICE L0+00N 9+50E	4	23	77	215	<.3	21	12	491	3.16	15	<8	<2	5	31	1.0	3	<3	21	.62	.095	24	14	.32	752	.01	<3	.85	.01	.07	<2
ICE L0+00N 10+00E	5	71	100	526	.7	172	104	11191	5.05	21	<8	<2	5	24	8.8	<3	3	29	.29	.115	32	17	.29	1414	<.01	<3	1.75	.02	.10	<2
ICE L0+00N 10+50E	3	41	97	361	.7	56	17	291	3.76	18	<8	<2	6	32	4.6	4	4	22	1.16	.088	29	14	.59	863	.01	<3	1.00	<.01	.10	<2
ICE L0+00N 11+00E	5	29	54	202	.3	25	12	416	2.61	18	<8	<2	3	29	2.1	<3	4	19	.48	.106	22	8	.26	1162	<.01	<3	.80	.01	.07	<2
RE ICE L0+00N 11+00E	5	27	51	193	<.3	22	12	397	2.48	16	<8	<2	3	28	2.0	5	<3	18	.46	.103	22	8	.25	1143	<.01	<3	.77	.01	.07	<2
ICE L0+00N 11+50E	7	27	71	126	.3	18	8	157	2.92	19	<8	<2	3	26	.7	3	<3	18	.60	.103	26	9	.38	1139	<.01	<3	.83	.01	.08	<2
ICE L0+00N 12+00E	4	38	41	226	.3	21	13	481	3.16	18	<8	<2	5	28	1.9	3	5	19	.57	.116	25	12	.36	914	<.01	<3	1.07	.01	.10	<2
ICE L0+00N 12+50E	4	28	51	123	<.3	19	10	193	3.52	25	<8	<2	6	35	.9	3	3	22	.69	.075	29	14	.43	1200	.01	<3	1.14	.01	.08	<2
ICE L0+00N 13+00E	4	38	40	524	.3	21	7	258	2.66	20	<8	<2	3	28	3.3	<3	<3	19	1.73	.107	11	12	.46	348	<.01	<3	.81	.01	.05	<2
ICE L0+00N 13+50E	8	110	65	1162	.6	52	22	2101	3.64	32	<8	<2	5	20	3.9	5	4	28	.96	.094	63	15	.64	474	<.01	<3	.89	.01	.07	<2
ICE L0+00N 14+00E	5	55	85	1447	.4	31	10	471	2.80	24	<8	<2	4	27	3.1	4	4	21	1.36	.085	19	12	.39	233	<.01	<3	1.00	.01	.05	<2
ICE L0+00N 14+50E	7	30	16	131	<.3	50	12	1159	2.44	13	8	<2	2	36	1.0	3	<3	19	1.39	.088	15	10	.40	384	<.01	<3	1.21	.02	.05	<2
ICE L0+00N 15+00E	6	50	63	104	.4	37	8	348	2.58	15	14	<2	3	32	.5	4	<3	21	1.16	.080	21	13	.33	299	<.01	<3	.98	.02	.05	<2
ICE L0+00N 15+50E	4	43	27	36	<.3	23	6	210	1.34	9	11	<2	<2	43	.3	<3	<3	18	1.40	.074	16	7	.14	678	.01	<3	.76	.02	.02	<2
ICE L0+00N 16+00E	11	56	50	106	<.3	37	16	416	4.44	31	<8	<2	7	28	.9	4	6	47	.59	.104	23	24	.43	434	<.01	<3	1.65	.02	.08	3
ICE L0+00N 16+50E	4	65	23	53	<.3	50	6	119	1.73	11	14	<2	2	44	<.2	3	4	27	1.25	.090	11	10	.26	354	<.01	<3	1.08	.02	.05	7
ICE L0+00N 17+00E	13	43	38	91	<.3	34	8	210	3.01	23	<8	<2	5	3	<.2	4	<3	56	.03	.046	31	14	.24	102	<.01	<3	.86	.01	.08	<2
ICE L0+00N 17+50E	7	37	44	142	<.3	33	10	430	2.07	13	<8	<2	3	15	.6	5	<3	43	.40	.083	20	12	.46	318	<.01	<3	1.09	.01	.07	4
ICE L0+00N 18+00E	3	23	93	72	<.3	21	7	321	1.78	12	<8	<2	3	12	<.2	4	<3	22	.41	.068	15	8	.17	632	.01	<3	.60	.02	.05	<2
ICE L0+00N 18+50E	3	13	26	42	<.3	18	5	99	1.19	6	<8	<2	2	7	<.2	4	3	23	.15	.045	20	7	.20	350	.01	<3	.56	.01	.04	<2
ICE L0+00N 19+00E	3	17	19	71	<.3	21	6	168	1.36	6	<8	<2	3	13	<.2	3	4	23	.42	.080	17	11	.31	263	.01	<3	.69	.01	.05	<2
ICE L1+00S 2+00E	3	35	93	317	.6	23	21	989	3.66	21	<8	<2	4	15	1.5	3	3	23	.14	.082	29	13	.27	1154	.01	<3	1.18	.01	.08	<2
ICE L1+00S 2+50E	5	57	139	248	<.3	15	11	364	5.09	33	<8	<2	5	19	.6	6	4	28	.07	.088	42	16	.30	1352	.01	<3	1.18	<.01	.14	<2
ICE L1+00S 3+00E	4	70	79	259	.5	24	13	346	4.14	20	<8	<2	6	24	1.2	4	4	26	.18	.115	39	13	.30	1229	.01	<3	1.13	.01	.10	<2
ICE L1+00S 3+50E	2	17	26	99	<.3	16	6	305	2.31	14	<8	<2	5	10	.4	3	5	22	.17	.044	25	11	.32	132	.02	<3	.75	.01	.05	<2
STANDARD C3	24	62	35	159	5.1	32	11	737	3.08	54	21	3	21	28	20.8	16	26	76	.51	.082	17	162	.56	152	.08	21	1.76	.04	.17	15
STANDARD G-2	1	2	3	40	<.3	5	4	486	1.78	2	<8	<2	4	72	<.2	<3	<3	37	.58	.087	7	72	.54	215	.12	<3	.90	.08	.46	3

Sample type: SOIL. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ___ FA ___

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm
ICE L1+00S 4+00E	4	63	68	323	.4	49	16	833	3.43	20	<8	<2	6	34	5.5	3	3	26	.73	.091	32	14	.47	526	.01	<3	1.20	.01	.11	<2
ICE L1+00S 4+50E	5	65	102	584	.6	73	104	3391	4.43	23	<8	<2	7	28	6.9	5	3	23	.49	.112	35	14	.33	704	<.01	<3	2.50	.01	.10	<2
ICE L1+00S 5+00E	1	9	11	88	.3	7	2	83	.71	2	<8	<2	<2	11	.8	<3	<3	13	.14	.018	6	4	.07	138	.01	<3	.34	.03	.04	<2
ICE L1+00S 5+50E	3	34	86	256	.3	28	10	244	2.90	14	<8	<2	5	21	1.5	5	<3	27	.26	.075	26	13	.30	640	.01	<3	1.23	.01	.10	<2
ICE L1+00S 6+00E	3	37	42	330	<.3	42	9	481	2.82	11	<8	<2	4	45	4.8	4	4	24	.78	.113	23	12	.38	473	<.01	<3	1.11	.01	.11	<2
ICE L1+00S 6+50E	1	19	26	52	.4	12	4	113	1.16	7	<8	<2	<2	26	.4	<3	<3	10	.55	.043	13	5	.15	1019	.01	<3	.56	.03	.03	<2
ICE L1+00S 7+00E	3	13	26	80	<.3	9	6	103	2.24	18	<8	<2	3	4	.7	3	3	21	.02	.034	21	5	.07	133	.01	<3	.37	.01	.03	<2
ICE L1+00S 7+50E	5	26	82	115	.4	16	10	272	4.02	36	<8	<2	3	7	1.3	6	5	20	.06	.051	17	7	.22	237	.01	<3	.57	.01	.04	<2
ICE L1+00S 8+00E	2	23	29	74	<.3	17	8	610	1.39	2	<8	<2	<2	39	<.2	4	5	12	.72	.080	11	6	.15	607	.01	<3	.82	.02	.03	<2
ICE L1+00S 8+50E	1	15	18	57	.3	10	3	95	.88	4	<8	<2	<2	25	<.2	<3	4	10	.51	.054	7	4	.10	331	.01	3	.43	.02	.04	<2
ICE L1+00S 9+00E	3	35	87	162	.4	28	11	520	2.80	16	<8	<2	4	26	.2	6	5	22	.47	.075	23	12	.25	903	.01	<3	1.02	.01	.07	<2
ICE L1+00S 9+50E	2	15	36	162	<.3	24	9	354	1.78	9	<8	<2	2	32	<.2	3	<3	14	.72	.065	12	8	.19	391	.01	<3	.67	.03	.05	<2
ICE L1+00S 10+00E	3	32	57	237	<.3	30	11	357	3.08	17	<8	<2	4	30	.5	3	6	22	.51	.101	25	13	.30	916	.01	<3	.93	.01	.07	<2
ICE L1+00S 10+50E	4	35	57	344	.6	39	17	607	3.34	16	<8	<2	5	40	3.7	4	4	20	1.08	.081	26	12	.39	1142	.01	<3	1.04	.01	.07	<2
ICE L1+00S 11+00E	6	30	66	265	<.3	26	16	734	3.35	19	<8	<2	4	27	2.1	4	<3	22	.46	.121	25	12	.34	973	<.01	<3	.99	.01	.09	<2
ICE L1+00S 11+50E	6	25	54	115	<.3	14	10	413	2.64	18	<8	<2	3	30	<.2	4	<3	18	.48	.072	24	9	.29	1437	.01	<3	.83	.02	.05	<2
ICE L1+00S 12+00E	7	44	57	204	<.3	21	14	554	4.10	26	<8	<2	6	29	.9	5	6	26	.48	.094	29	14	.43	1111	<.01	3	1.39	.01	.06	<2
ICE L1+00S 12+50E	2	7	9	38	<.3	6	4	296	.95	2	<8	<2	<2	14	<.2	<3	<3	10	.22	.043	6	3	.09	320	.02	<3	.38	.04	.03	<2
ICE L1+00S 13+00E	5	39	73	226	.3	27	12	634	3.59	23	<8	<2	5	22	1.6	3	<3	22	.74	.088	28	14	.54	868	.01	3	1.05	.01	.08	<2
ICE L1+00S 13+50E	2	24	36	122	<.3	15	5	133	1.98	11	<8	<2	2	23	<.2	<3	<3	18	.77	.062	14	8	.26	756	.01	<3	.74	.02	.05	<2
ICE L1+00S 14+00E	6	48	59	680	.3	33	11	219	3.02	24	10	<2	4	30	.4	6	4	22	.88	.077	23	12	.40	706	<.01	<3	1.06	.01	.07	<2
ICE L1+00S 14+50E	3	24	21	92	<.3	12	5	117	1.35	4	<8	<2	2	17	<.2	3	4	15	.34	.050	12	5	.14	524	.01	<3	.56	.03	.04	<2
ICE L1+00S 15+00E	6	67	90	309	<.3	31	32	420	4.88	19	<8	<2	4	19	.8	5	6	38	.38	.085	37	15	.43	275	.01	<3	1.28	.01	.04	<2
ICE L1+00S 15+50E	2	32	17	40	.3	18	7	149	1.20	5	<8	<2	3	25	<.2	3	4	16	.49	.062	9	8	.22	355	<.01	<3	.77	.02	.03	<2
RE ICE L1+00S 15+50E	2	29	16	37	.3	20	7	140	1.20	5	<8	<2	2	25	<.2	<3	3	17	.47	.063	9	7	.23	328	<.01	<3	.76	.01	.04	<2
ICE L1+00S 16+00E	12	29	31	87	<.3	26	11	147	3.15	21	<8	<2	4	15	.5	6	3	27	.30	.078	23	14	.32	154	.01	<3	.74	.01	.04	2
ICE L1+00S 16+50E	10	37	36	116	.4	27	8	192	2.32	16	15	<2	2	34	.4	<3	3	24	1.09	.087	17	13	.33	205	.01	<3	.81	.02	.06	3
ICE L1+00S 17+00E	9	42	33	74	.4	34	9	156	3.33	25	<8	<2	7	16	.2	6	5	33	.30	.052	35	23	.45	172	<.01	<3	.95	<.01	.05	<2
ICE L1+00S 17+50E	9	28	35	76	.3	27	8	288	2.23	17	10	<2	3	31	<.2	5	<3	28	.79	.081	18	13	.28	236	.01	<3	.83	.02	.04	2
ICE L1+00S 18+00E	5	23	16	74	.3	21	4	143	1.36	6	<8	<2	2	22	<.2	3	3	24	.73	.086	15	8	.23	297	<.01	<3	.58	.02	.05	<2
ICE L1+00S 18+50E	2	19	22	82	.4	13	3	88	.82	5	<8	<2	<2	16	<.2	<3	<3	16	.81	.049	6	5	.16	521	.01	<3	.57	.03	.05	2
ICE L1+00S 19+00E	3	18	22	54	<.3	24	4	78	1.24	6	<8	<2	5	10	<.2	3	4	21	.23	.097	27	9	.26	252	<.01	<3	.62	<.01	.06	<2
STANDARD C3	24	64	34	163	5.6	34	12	756	3.20	54	21	2	20	29	22.5	19	21	78	.53	.086	18	168	.58	152	.09	21	1.83	.04	.17	15
STANDARD G-2	1	5	5	41	<.3	5	5	517	1.87	4	<8	<2	4	73	<.2	<3	3	39	.60	.091	8	74	.57	226	.12	<3	.95	.08	.46	2

Sample type: SOIL. Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ___ FA ___

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
(ISO 9002 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

Atna Resources Ltd. PROJECT ICE File # 9802891

1550 - 409 Granville St., Vancouver BC V6C 1T2 Submitted by: Peter DeLancey

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Tl ppm	Hg ppm	Au* ppb
98-ICE-98-1	<1	30	15477	14429	1.1	<1	<1	202	.32	2	<8	<2	<2	123	56.4	18	<3	<1	.62	.002	2	2	.27	105	<.01	<3	<.01	<.01	<.01	<2	<5	13	2
98-ICE-98-1A	<1	104	3643	65057	.3	2	2	649	.93	4	<8	<2	<2	59	235.6	64	<3	1	2.45	.003	3	2	.95	58	<.01	<3	.01	.01	.01	<2	<5	43	3
RE 98-ICE-98-1A	<1	98	3673	65622	<.3	1	2	656	.93	2	<8	<2	<2	59	237.4	57	<3	<1	2.49	.003	3	3	.96	67	<.01	<3	.01	<.01	<.01	<2	<5	44	4

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 2-2-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND MASSIVE SULFIDE AND LIMTED FOR NA K AND AL.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
- SAMPLE TYPE: ROCK AU* - IGNITED, AQUA-REGIA/MIBK EXTRACT, GF/AA FINISHED.(10 GM)
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: JUL 16 1998 **DATE REPORT MAILED:** July 27/98 **SIGNED BY**.......... D. TOYE, C.LEONG, J. WANG; CERTIFIED B.C. ASSAYERS

 Data___ FA ____

APPENDIX II

HORIZONTAL COPLANAR LOOP EM

(MAX MIN)

GEOPHYSICAL REPORT

ICE GRID

YUKON TERRITORY

FOR

ATNA RESOURCES LTD

BY

DELTA GEOSCIENCE LTD

DECEMBER 14, 1998. **GRANT A. HENDRICKSON, P.GEO.**

TABLE OF CONTENTS

INTRODUCTION

At the request of Atna Resources Ltd., Delta Geoscience Ltd has conducted horizontal co-planar loop electromagnetic surveys over the Ice Grid.

The Ice property is located in the centre of the Yukon, close to the dormant Ketza River mine. As this brief report is to be appended to Atna's geological reports, no location, claim maps or geological discussion will be included.

The Maxmin electromagnetic system developed by Apex Parametrics Ltd was used for this survey. The system utilised was the much improved 1-9 model introduced in the spring of 1998.

Access to the grid was by helicopter from the base camp Atna established at the Ketza mine site.

During the period July 26-27th, Delta Geoscience conducted five kilometers of multi-frequency horizontal coplanar loop E.M. survey. To ensure a good depth of investigation a large coil separation was employed for all the basic coverage. Productivity was typically 2.5 km per day.

The topography of the survey area is quite typical of the Yukon, with rugged alpine terrain. Fortunately most of the survey work was conducted above the tree line. The topography itself presented no problems, however there were numerous significant scree slopes.

PERSONNEL

Grant Hendrickson - Senior Geophysicist-Supervisor.

Kristian von Fersen - Senior Technician.

Jan Dobrescu - Junior Geophysicist.

EQUIPMENT

1 - Apex Parametrics 1998 1-9 Electromagnetic System.

1 - NEC Versa Field Computer.

1 - Hewlett Packard 250C Colour Plotter/Printer.

4 - Spare Coil Separation Cables.

DATA PRESENTATION AND EQUIPMENT DESCRIPTION

The horizontal coplanar loop E.M. data is presented as stacked profile plans of the inphase and quadrature components for each frequency. Basic E.M. coverage was carried out at a coil separation of 250 meters and six frequencies: 220Hz, 440Hz, 880Hz, 1760Hz, 3520Hz and 7040Hz.

All survey maps are presented at 1:5000 scale in this report.

Profile data is presented increasing to the top (north) from a base level (value at the line position). The inphase response is plotted as a solid line, whereas the dashed line shows the corresponding quadrature response.

The manufacturer's specifications and capability sheets for the new 1998 1-9 Maxmin system and related software package follow.

APEX MAXMIN I+9 EM SYSTEM

I+ designation, with improved transmitter efficiency and increased dipole moments, 1998

❑ Designed for groundwater and mineral exploration, and for geoengineering applications, continuing and expanding the concepts of the earlier and highly popular MaxMin models.

❑ Frequency span is extended to nine octavely spaced frequencies from 110 to 28160 Hz, with 11 coil separations from 12.5 to 400 or 10 to 320 metres. These and other developments result in greater performance, more applications and enhanced interpretation.

❑ Advanced spheric and powerline interference rejection is still further improved, resulting in faster and more accurate surveys, particularly at the larger coil separations.

❑ MaxMin Computer or MMC, which is described in a separate data sheet, is offered for digital data processing, display, storage and transfer. The MMC displays and stores the in-phase and quadrature readings, their standard deviations, and the corresponding apparent ground conductivity values. *Rough terrain surveys are also simplified with the MMC.*

❑ MaxMin Pro data interpretation and presentation software program is available for layered earth parametric soundings and discrete conductor surveys done with MaxMin.

TRANSMITTER | RECEIVER + MMC

MAXMIN I+9 ELECTROMAGNETIC SYSTEM SPECIFICATIONS:

FREQUENCIES: 110, 220, 440, 880, 1760, 3520, 7040, 14080 and 28160 Hz.

COIL SEPARATIONS: SET No. 1: 12.5, 25, 50, 75, 100, 125, 150, 200, 250, 300 and 400 metres (the standard set).
SET No. 2: 10, 20, 40, 60, 80, 100, 120, 160, 200, 240 and 320 metres (selected with grid switch inside the receiver).
SET No. 3: 50, 100, 200, 300, 400, 500, 600, 800, 1000, 1200 and 1600 feet (selected with grid switch inside the receiver).

TRANSMITTER DIPOLE MOMENTS:

110 Hz:	250 Atm²	3520 Hz:	120 Atm²
220 Hz:	245 Atm²	7040 Hz:	60 Atm²
440 Hz:	240 Atm²	14080 Hz:	30 Atm²
880 Hz:	230 Atm²	28160 Hz:	15 Atm²
1760 Hz:	220 Atm²		

MODES OF OPERATION: MAX 1: Horizontal loop or slingram - transmitter and receiver coil planes horizontal and coplanar.
MAX 2: Vertical coplanar loop mode - transmitter and receiver coil planes vertical and coplanar.
MIN 1: Perpendicular mode 1 - transmitter coil plane horizontal and receiver coil plane vertical.
MIN 2: Perpendicular mode 2 - transmitter coil plane vertical and receiver coil plane horizontal.

PARAMETERS MEASURED: In-phase and quadrature componets of the secondary magnetic field, in % of primary field.

READOUTS: Analog direct edgewise meter readouts for in-phase, quadrature and tilt. Additional digital LCD readouts provided in the optional MMC computer. Interfacing and controls are provided for ready plug-in of the MMC.

RANGES OF READOUTS: Switch activated analog in-phase and quadrature scales: 0±4%, 0±20% and 0±100%, and digital 0±199.9% autorange with optional MMC. Analog tilt 0±75% and 0±99% grade with MMC.

RESOLUTION: Analog in-phase and quadrature 0.1 to 1 % of primary field, depending on scale used, digital 0.01 % with autoranging MMC; tilt 1 % grade.

REPEATABILITY: 0.01 to 1 % of primary field, typical, depending on frequency, coil separation and conditions.

SIGNAL FILTERING: Powerline comb filter, continuous spheric noise clipping, autoadjusting time constant, and more.

WARNING LIGHTS: Receiver signal and reference warning lights to indicate potential error conditions.

SURVEY DEPTH PENETRATION: From surface down to 1.5 times coil separation for large horizontal target and 0.75 times coil separation for large vertical target, values typical.

REFERENCE CABLE: Lightweight unshielded 4/2 conductor teflon cable for maximum operating temperature range and for minimum pulling friction.

INTERCOM: Voice communication link provided for operators via the reference cable.

TEMP. RANGE: Minus 40 to plus 60 degrees Celsius, operating.

RECEIVER BATTERIES: Four standard 9 V - 0.6 Ah alkaline batteries. Life 20 hours continuous duty, less in cold weather. Optional 1.2 Ah extended life lithium batteries available (recommended for very cold weather).

TRANSMITTER BATTERIES: Rechargeable gel-type lead-acid 12 V - 14 Ah batteries (4 x 6 V - 7.2 Ah) in nylon belt pack.

TRANSMITTER BATTERY CHARGERS: 14.8 V - 2.5 A nominal output with automatic switching to 13.8 V float mode after battery pack is charged. Operation from 110 - 120 and 220 - 240 VAC, 50/60/400 Hz, and from 10 - 14 VDC supplies.

RECEIVER WEIGHT: 8 Kg carrying weight (including the two ferrite cored receiver coils), 9 Kg with MMC computer.

TRANSMITTER WT: 15 Kg carrying weight.

SHIPPING WEIGHT: 60 Kg plus reference cables at 3 Kg per 100 metre, plus optional items if any. Shipped in two aluminum lined field/shipping cases.

STANDARD SPARES: Spare transmitter battery pack, spare transmitter battery charger, two spare transmitter retractile connecting cords, spare set of receiver batteries.

OPTIONS AND ACCESSORIES, PLEASE SPECIFY:

- MMC, Optional MaxMin Computer
- Data interpretation and presentation programs
- Reference cables, lengths as required
- Reference cable extension adapter
- Handheld inclinometer for rough terrain
- Receiver extended life lithium batteries
- Transmitter ni-cad battery and charger option
- Receiver rechargeable battery & charger option
- Minimal, regular or extended spare parts kit

Specifications are subject to changes without prior notification.

1986 - 04 - 01

Telephone: 1 905 852 5875 Facsimile: 1 905 852 9688 P. O. Box 818, Uxbridge, Ontario, Canada L9P 1N2

APEX PARAMETRICS LIMITED

Airport: Toronto International

APEX MAXMIN COMPUTER MMC

❒ The MMC interfaces with MaxMin EM System receivers for digital data processing, display, storage and transfer, enhancing survey productivity and data accuracy.

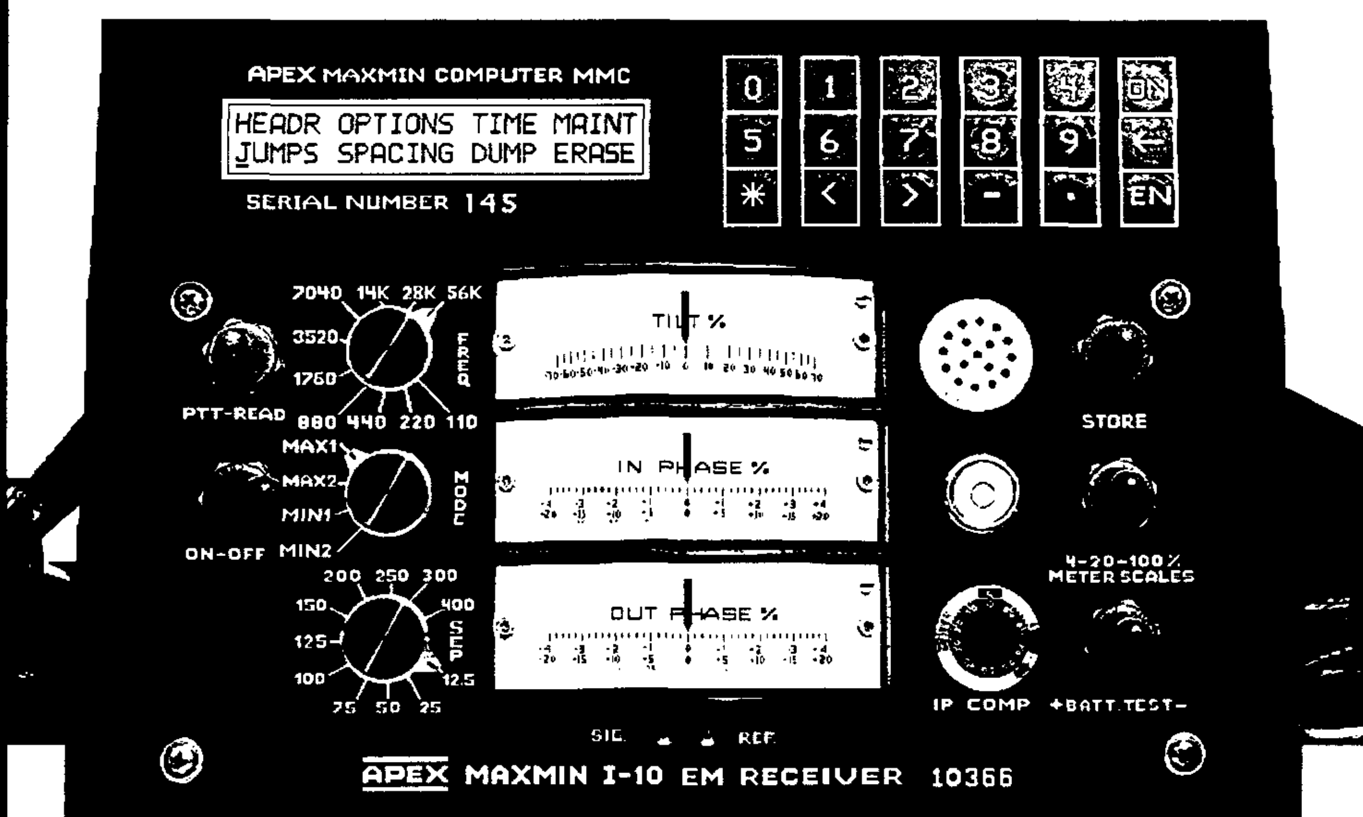
❒ Digital display and logging of in-phase (real) and quadrature (imaginary) readings with standard deviations, the corresponding apparent ground conductivity values, line, station, terrain slope and coil tilt information.

❒ Easy fingertip operation by read and store switches on MaxMin receiver front panel, with digital averaging for improved signal to noise ratio.

❒ Rough terrain surveys are simplified with the use of built-in tilt meter, slope entry and computed coil orientation and separation information.

❒ Data transfer, formatting, correcting and viewing programs are supplied for personal computers. Program for computing multi-frequency best-fit apparent conductivities and fit errors is provided.

❒ MaxMin Pro data interpretation and presentation software program is available for multi-layer parametric or geometric soundings and for discrete conductor surveys done with MaxMin EM and MMC.



MMC INSTALLED WITH MAXMIN I-10 RECEIVER IN THE LEATHER CARRYING CASE

MAXMIN COMPUTER MMC SPECIFICATIONS:

OPERATING SYSTEM:	Menu driven user-friendly hierarchial operating system, interfacing with MaxMin EM System receiver and with personal computers.
DISPLAY:	Extended temperature Liquid Crystal Display, with two lines of 24 alphanumeric characters each.
KEYBOARD:	18 tactile pushbutton keys
BEEPER:	To provide audible operator guidance and to speed up operations, especially in very cold weather.
CLOCK CALENDAR:	Date and Time (year, month, day, hour and minute).
COIL TILT:	Tilt display, with built in tilt sensor and measurement, with 0±99% topographic grade range and with 1% resolution.
IN-PHASE & QUADRATURE:	0±199.9% autoranging programmable gain system with 0.1% resolution for displayed data and 0.01% resolution for stored data.
APPARENT CONDUCTIVITY:	0.1 to 3276 milliSiemens (millimho) per metre available conductivity range, with conductivity arrived at using the quadrature, in-phase, frequency and coil separation data.
PROCESSOR:	16 bit low power CMOS CPU and bus at 6 MHz clock rate.
MEMORY:	ROM: 16 Kb, expandable to 64 Kb. RAM: 256 Kb, static CMOS.
PHYSICAL SIZE:	24.2 x 17.3 x 4.3 cm, to fit inside the MaxMin receiver leather case notebook pocket.
CARRYING WEIGHT:	1.0 Kilogram.
BATTERIES:	Two 9V-0.6Ah alkaline batteries. Battery life 28 hours continuous duty, less in cold weather. Optional 1.2 Ah lithium batteries recommended for very cold temperature operation. One lithium 3 Volt memory back-up battery, type 2032.
CONNECTIONS:	19 pin bayonet connector receptacle to connect to MaxMin receiver with the supplied tubular aluminum connectors. One each of DB25S and DB9S data transfer cords supplied for downloading data to personal computer serial ports.
TEMPERATURE RANGE:	Minus 30 to plus 60 degrees Celsius. Temperature sensing, measurement and display built-in.

Specifications are subject to changes without prior notification.

1996-04-01

Telephone: 1 905 852 5875 Facsimile: 1 905 852 9688

APEX PARAMETRICS LIMITED

P. O. Box 818, Uxbridge,
Ontario, Canada L9P 1N2
Airport: Toronto International

APEX MAXMIN PRO DATA INTERPRETATION PROGRAM

LAYERED EARTH INTERPRETATION.

THIN PLATE INTERPRETATION.

ACCEPTS APEX .MMD FILES, COMPATIBLE WITH MAXMIN COMPUTER.

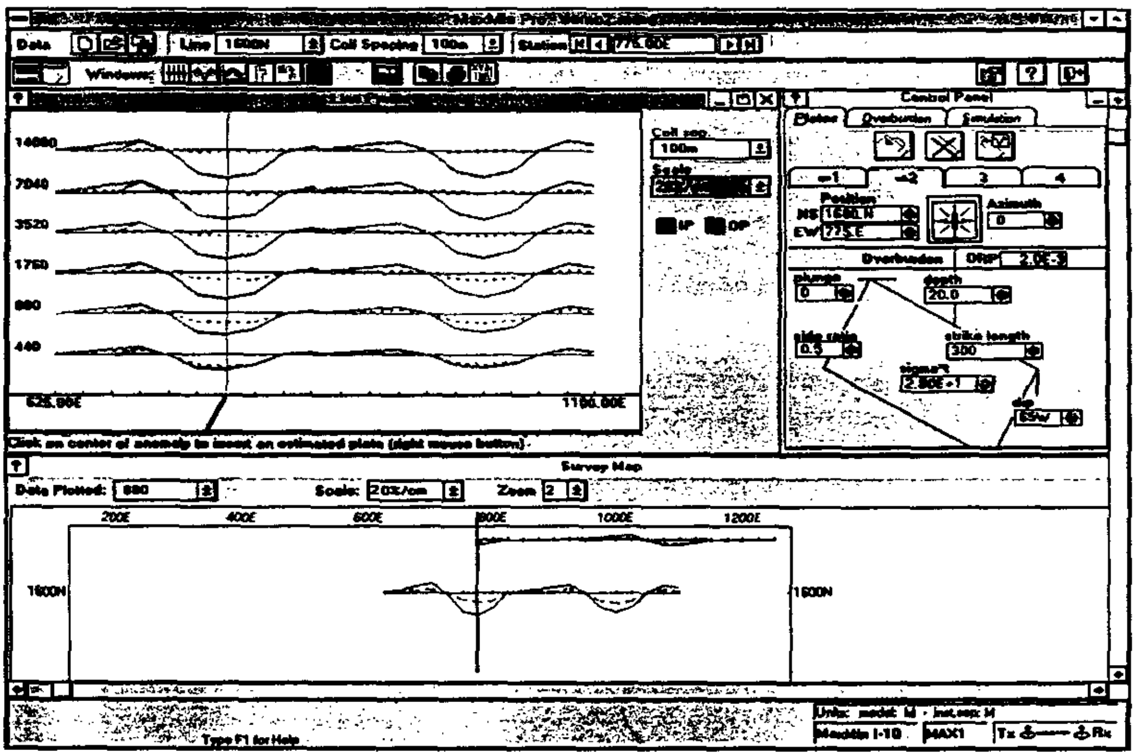
USER-FRIENDLY WINDOWS® BASED OPERATOR INTERFACE.

CLIPBOARD SUPPORT FOR DATA TRANSFER TO OTHER PROGRAMS.

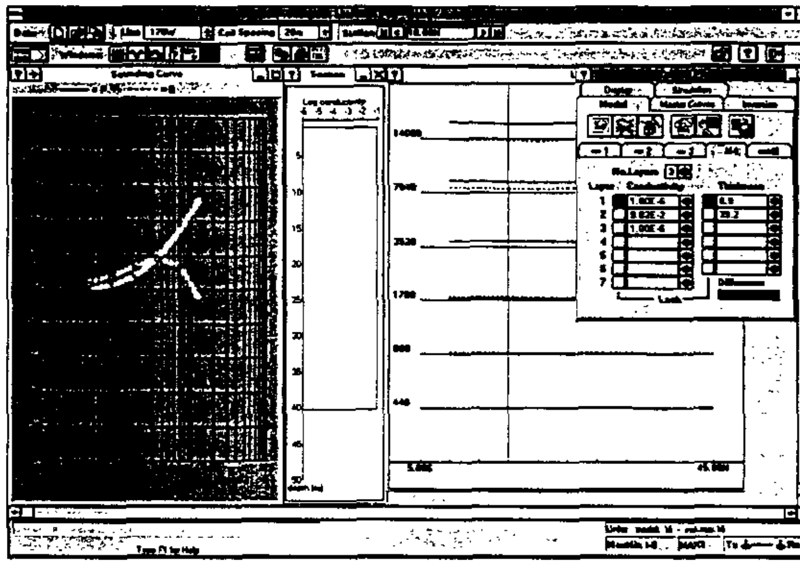
ON-LINE DOCUMENTATION.

PLATE INTERPRETATION:

- Computing engine derived and improved from classical U of Toronto PLATE program.
- Up to 4 plates.
- Graphical insertion of plates.
- Plates positioned in survey grid coordinates.
- Automated curve matching for quick preliminary anomaly interpretation.
- Corrects for overburden conductivity.
- Up to 4 overburden zones.
- Graphical entry of overburden zones.



Layered earth interpretation:



- Semi-automated curve matching with half-space, 2 and 3 layer models.
- Forward modeling and Inversion.
- Up to 7 layers models.
- Parameter locking or constrained range for inversion.
- Complete inversion statistics output.
- Parametric (frequency), geometric (spacing), or mixed mode sounding.
- Data masking: can reject bad data points or use only quadrature.
- Optional normalization to low frequency in-phase to correct for geometrical errors.

Additional MAXMIN PRO features:

Simplified data input:

- Automatically extracts data and survey information from the .MMD file.
- Graphical entry of plates.

Support for all of the MaxMin maximum coupled modes.

Versatile display and data views:

- In-phase and in-quad vs. frequency sounding.
- Phasor (Argand) diagram.
- Survey map (zoomable).
- Stacked line profile.
- Vertical conductivity section.
- Inversion statistics.
- Persistent display shows several models at once.
- User configurable window placement.

Easy data point selection:

- Tape deck style line and station selectors or
- Selection by mouse click on survey map.

Model data base:

- Automatic creation of a model data base.
- Allows for interpretation in multiple sessions as previous results are saved.

Versatile output capabilities:

- File output, including Geosoft .XYZ format.
- Printed report.
- Windows® clipboard for transfer to other applications.

On-line documentation:

- Full featured Windows® Help hypertext documentation.

Hardware protection:

- Uses a «dongle» rather than software protection.

System requirements: Any xx86 computer running Windows® 3.1 or later, Windows 95®, or Windows NT® 3.5 or later with 2MB of disk space. A mouse or other pointing device is essential. While not absolutely essential, a color monitor of at least SVGA resolution is highly recommended. VGA is the minimum supported resolution. Floating point support is very highly recommended. Printer port is essential for printing and for connecting the hardware protection key.

A DEMONSTRATION PROGRAM IS AVAILABLE ON REQUEST

1998 - 04 - 14

APEX PARAMETRICS LIMITED

Telephone: 1 905 - 852 5875 Fax: 1 905 - 852 9688

P. O. Box 818, Uxbridge, Ontario, Canada L9P 1N2

SURVEY PROCEDURE

Atna personnel ensured that a grid was established prior to the arrival of the Delta Geoscience crew. Survey lines and stations were established by slope chaining out from tie lines on the east and west sides of the properties. This procedure, while quite rapid, results in some significant mis-ties between lines, particularly when the topography is undulating and locally quite severe. The data was corrected by a procedure developed by Apex Parametrics for slope chained lines.

The depth of investigation of a horizontal coplanar loop E.M. system (like the Maxmin) is considered to be 1.5 times the coil separation for a large horizontal target and 0.75 times the coil separation for a large vertical target. These figures are for the typical conductivity values seen in Canadian massive sulphide deposits. The depth of investigation for smaller targets and/or poorer conductivity mineralization would of course be proportionally less.

Bear in mind that the response parameter of a horizontal co-planar loop E.M. system is due to the product of the following components: ($\mu_0 \omega l \sigma s$)

where μ_0 = permeability of free space = $4\pi \times 10^{-7}$ henry/m.

ω = 2π f = rotational frequency.

l = coil separation (meters)

σ = conductivity (Seimens/meter)

s = thickness of conductor (meters)

Note that increases in the coil separation have the same effect as increasing the frequency on the response parameter. With large coil separations the system became more sensitive to deep conductors, although the resolution ability for shallow, closely spaced conductors is lessened.

If the response parameter becomes too high, the system becomes unstable (overly sensitive) with large amplitude changes for very minor changes in conductivity. This high frequency problem will occur with large coil separations and weakly conductive host rocks, i.e. argillaceous metasediments. Clearly the conductive host problem limits the ability of any E.M. system to properly evaluate the response of a deep weak conductor. One is obliged to base the interpretation on the lower frequency data. As expected, there was a steady attenuation of the E.M. responses with lower frequencies throughout this survey.

The depth extent of conductors discussed in this report is listed as poor, moderate or good and is relative to the coil separation.

The quadrature response of the E.M. system is largely unaffected by coil separation and orientation errors due to bad grid chaining and does detect the poorer quality conductors better than the inphase. These two facts have proven useful in the evaluation and outlining of the moderate to weak strength conductivity targets detected in this survey. The inphase response will focus on the better conductivity zones within a conductive zone. Good inphase data does however require good quality grid chaining. In mountainous terrain some grid chaining problems are unavoidable. To further eliminate the noise due to chaining errors, the lowest frequency inphase data (220Hz) can be subtracted from the higher frequency in-phase data. This procedure can only be used when the conductors of interest are weak to moderate conductivity, i.e. virtually a zero response on the inphase at 220Hz. This procedure is technically correct since coil separation errors generally have the same amplitude regardless of the frequency. The subtraction process can largely eliminate chaining errors from the more important higher frequency inphase data, without adversely affecting the anomalous responses. This procedure was not used, nor necessary on the Ice data due to the slope correction procedures used by the Maxmin and significant inphase amplitudes at the lowest frequency.

The technical parameters and the areal extent of the conductors detected during the course of this survey are largely based on the 220Hz data. Note however that the estimation of the apparent width, depth and conductivity of the individual conductors is very frequency dependent. The 220Hz frequency did limit the host response, while still maintaining a significant amplitude response from the conductors of interest.

DISCUSSION OF THE DATA

Four main bedrock conductors were outlined by this survey, however only the eastern two have significant amplitude and strike length to be discussed further. The surface trace of these conductors is shown on the 220Hz data plan.

There is good evidence throughout the data for broad areas of weak conductivity, a fact which generally is indicative of argillaceous metasediments.

In the low frequency (220Hz) data, the two shallow conductors on the east side of the grid become quite discrete and this apparent focus to the best conductivity may be of exploration significance.

CONDUCTOR #1:

- centered at 1475E, 800N.
- strike length 500 meters, but open in both directions.
- depth to top 5 meters, good depth extent.
- conductivity thickness product 10 Seimens.
- dip uncertain due to flanking weak conductivity zones, however probably moderate dip to grid east.
- width at low frequency 20 meters, but much greater at the higher frequencies.

CONDUCTOR #2:

- centered at 1250E, 500N. Conductivity thickness product 11 Seimens.
- thin conductor, depth to top 15 meters.
- dip and depth extent uncertain due to flanking conductors.
- strike length 200 meters, but longer if much weaker conductivity is considered along strike.

CONCLUSIONS AND RECOMMENDATIONS

The very shallow nature of the main conductive horizon (#1) suggests it may be visible in outcrop and if mineralized should have produced a significant geochemical response. The 220Hz data helps focus on the best conductivity, which often is directly related to increased sulphide mineralization.

The exploration significance of the shallow conductors outlined will clearly depend on a review of the area's geology. There is ample evidence in the E.M. data for a large sedimentary component to the underlying geology, thus one should be cautious in the selection of a drill target.

Grant A. Hendrickson, P.Geo.

PROVINCE OF G. A. HENDRICKSON BRITISH COLUMBIA GEOSCIENTIST

REFERENCES

Apex Parametrics, 1998: Technical Manuals on the Maxmin System.

Ketola, M., and Puranan, M., 1967: Type Curves for the Interpretation of Horizontal Loop E.M. Anomalies over tabular bodies. Geological Survey of Finland, Report on Investigations, N:01.

STATEMENT OF QUALIFICATIONS

Grant A. Hendrickson

- B.Science, University of British Columbia, Canada, 1971. Geophysics option.

- For the past 27 years, I have been actively involved in mineral exploration projects throughout Canada, the United States, Europe, Central and South America and Asia.

- Registered as a Professional Geoscientist with the Association of Professional Engineers and Geoscientists of the Province of British Columbia, Canada.

- Registered as a Professional Geophysicist with the Association of Professional Engineers, Geologists and Geophysicists of Alberta, Canada.

- Active member of the Society of Exploration Geophysicists, European Association of Geoscientists and Engineers, and the British Columbia Geophysical Society.

Dated at Delta, British Columbia, Canada, this 16 day of DEC, 1998.

G. Hendrickson

Grant A. Hendrickson, P.Geo.

PROFESSIONAL
PROVINCE OF
G. A. HENDRICKSON
BRITISH COLUMBIA
GEOSCIENTIST

APPENDIX III

STATEMENT OF EXPENDITURES

Statement of Expenditures

Ice Project 1998

Field-work: Between July 1 - August 31, 1998

Geology	
Geologist 2 days @ $350.00/day	$ 700.00
Grid Preparation & Sample Collection	
13 man days @ $160.00/day	$ 2080.00
Geochemical Analysis	
235 samples: @ $9.54/sample	$ 2241.90
Geophysical Survey	
2 days @ $1860.00/day (incl. mob/demob (Yukon) & reporting)	$ 3016.00
Transportation	
Helicopter: 5.1 hrs @ $725.00/hr	$ 3697.50
Camp (all costs)	
Pro-rated costs: 21 man days @ $200.00/day	$ 4200.00
Report Preparation:	
	$ 800.00
	=======
	$16735.40

APPENDIX IV

GEOLOGIST'S CERTIFICATES

GEOLOGIST'S CERTIFICATE

I, Robert G. Wilson, of 3328 West 15th Ave. Vancouver, in the Province of British Columbia, DO HEREBY CERTIFY:

1. THAT I am employed by Atna Resources Ltd. of 1550 - 409 Granville St., Vancouver B.C.

2. THAT I am a graduate of the University of British Columbia with a Bachelor of Science degree in Geology.

3. THAT I am a Professional Geoscientist registered in good standing with the Association of Professional Engineers and Geoscientists of the Province of British Columbia.

4. THAT this report is based in part on property work I directly supervised between June 1 and September 3, 1998.

DATED at Vancouver, British Columbia, this 1 st day of March, 1999.

Robert G. Wilson, P.Geo.

Certificate of Qualifications

I, Peter M. Holbek with a business address of 1550 - 409 Granville Street, Vancouver, British Columbia, V6C 1T2, do hereby certify that:

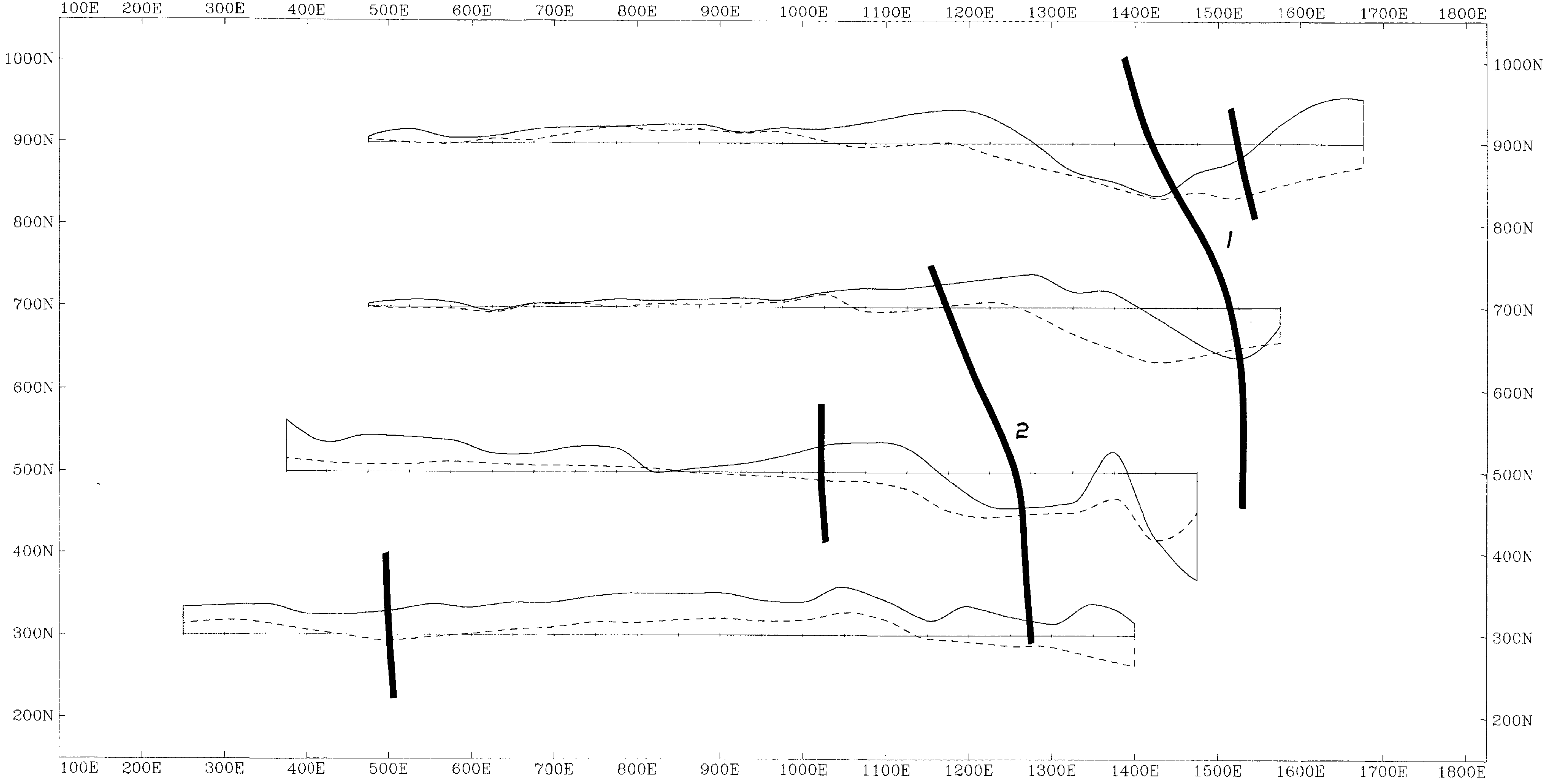
1. I am a professional geologist registered under the Professional Engineers and Geoscientists Act of the Province of British Columbia and a member in good standing with the Association of Professional Engineers and Geoscientists of British Columbia.
2. I am a graduate of The University of British Columbia with a B.Sc. in geology 1980 and an M.Sc. in geology, 1988.
3. I have practiced my profession continuously since 1980.
4. I am Vice President of Atna Resources having a business address as given above.
5. I conducted and supervised the work program completed on the Ice property as described in this report.

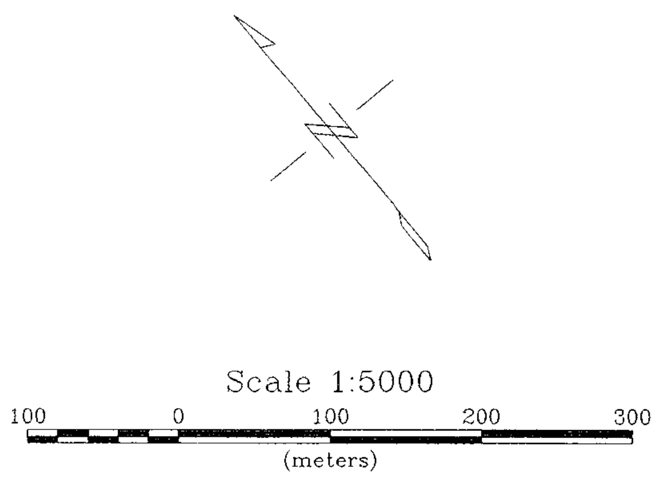
DATED at Vancouver, British Columbia, this ________ day of ______________, 1999.

____

Peter Holbek, M.Sc., P.Geo.

093958





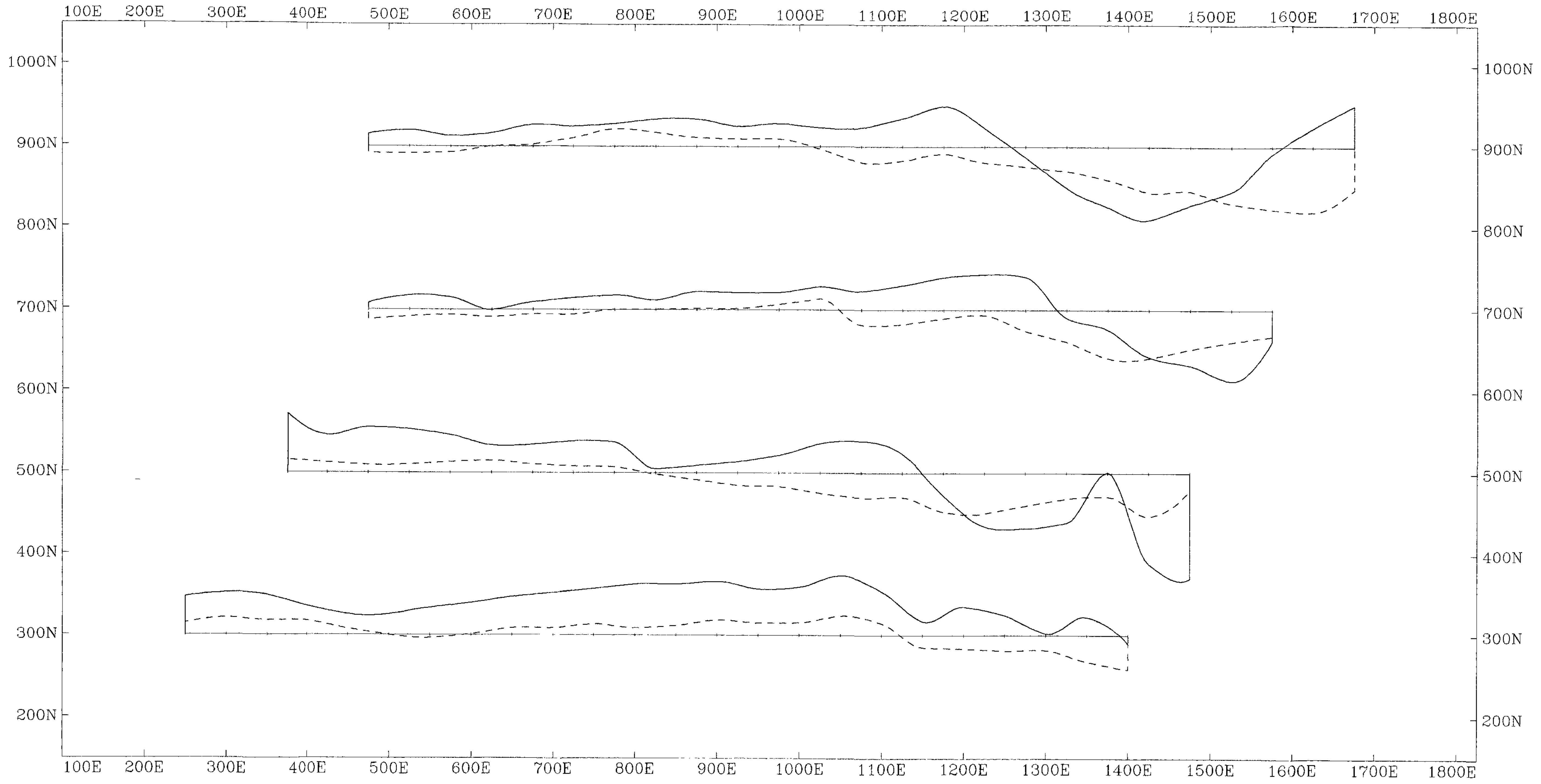
DWG ①

ATNA RESOURCES LTD.

ICE PROJECT
YUKON TERRITORY, CANADA
HORIZONTAL COPLANAR LOOP EM, FREQ. 220 Hz

In-phase solid, Quadrature dashed, 1cm=30%
Coil separation 250m + to top
Apex Parametrics Maxmin instrument 98 1-9
July, 1998

DELTA GEOSCIENCE LTD, *Fig #4.1*



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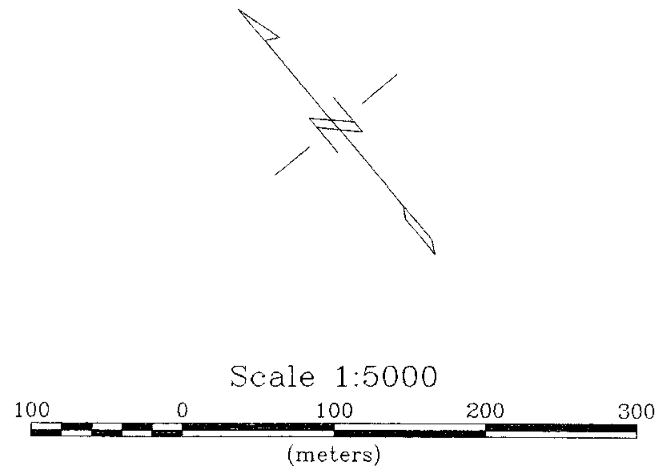


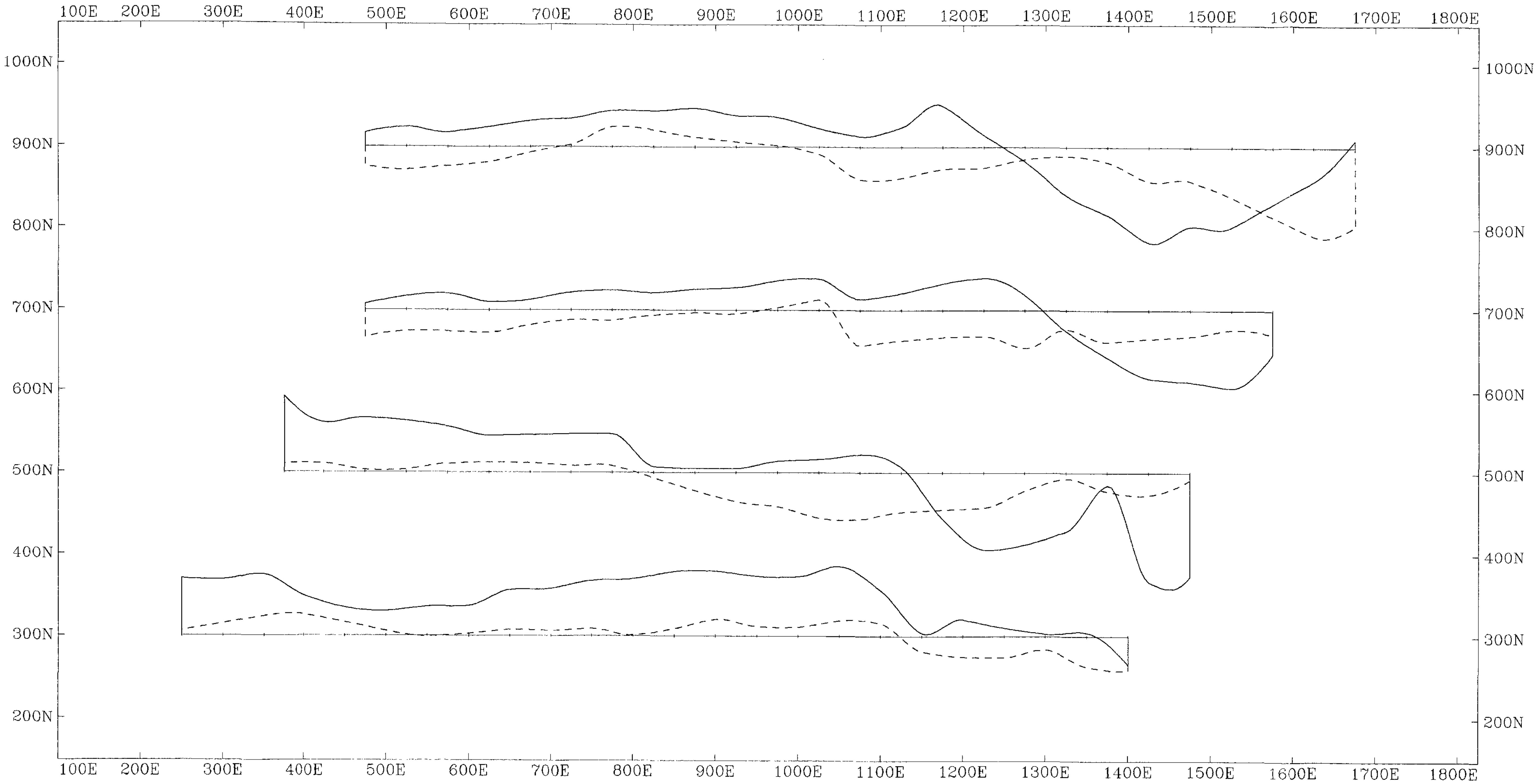
DWG (2)

ATNA RESOURCES LTD.

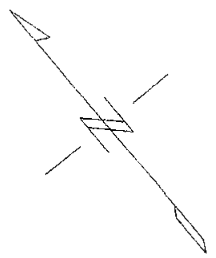
ICE PROJECT
YUKON TERRITORY, CANADA
HORIZONTAL COPLANAR LOOP EM, FREQ. 440 Hz

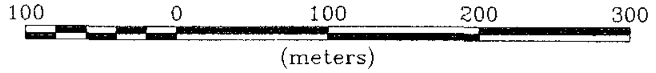
In-phase solid, Quadrature dashed, 1cm=30%
Coil separation 250m + to top
Apex Parametrics Maxmin instrument 98 1-9
July, 1998

DELTA GEOSCIENCE LTD, *Fig # 4.2*



093958





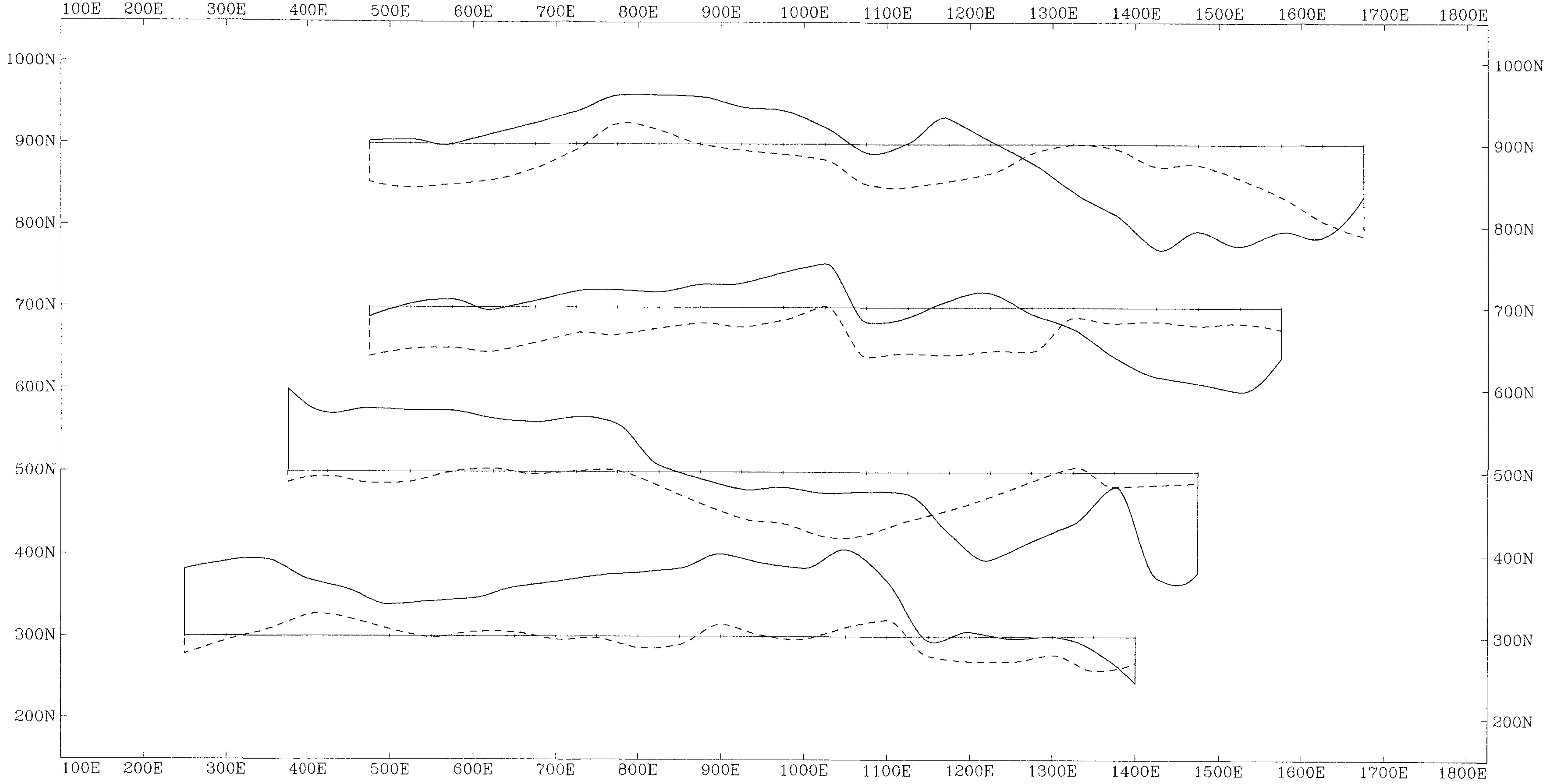
DWG (2)

ATNA RESOURCES LTD.

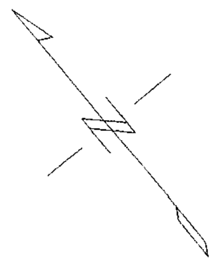
ICE PROJECT
YUKON TERRITORY, CANADA
HORIZONTAL COPLANAR LOOP EM, FREQ. 880 Hz

In-phase solid, Quadrature dashed, 1cm=30%
Coil separation 250m + to top
Apex Parametrics Maxmin instrument 98 1-9
July, 1998

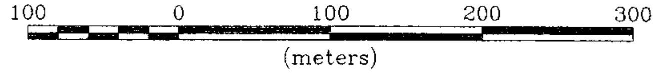
DELTA GEOSCIENCE LTD, *Fig #4.3*



093958



Scale 1:5000



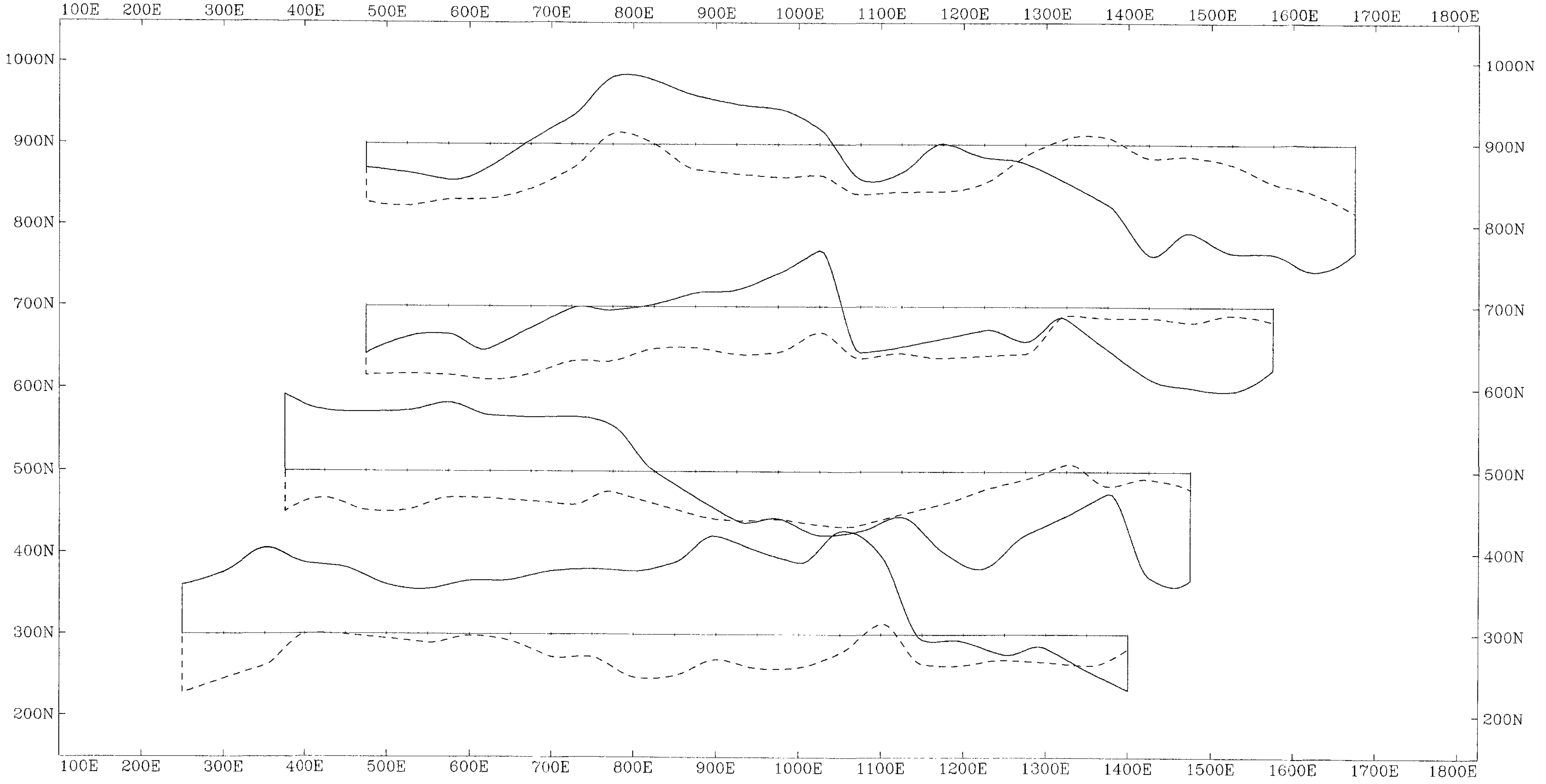
DWG 4

ATNA RESOURCES LTD.

ICE PROJECT
YUKON TERRITORY, CANADA
HORIZONTAL COPLANAR LOOP EM, FREQ. 1760 Hz

In-phase solid, Quadrature dashed, 1cm=30%
Coil separation 250m + to top
Apex Parametrics Maxmin instrument 98 1-9
July, 1998

DELTA GEOSCIENCE LTD, *Fig # 4.4*



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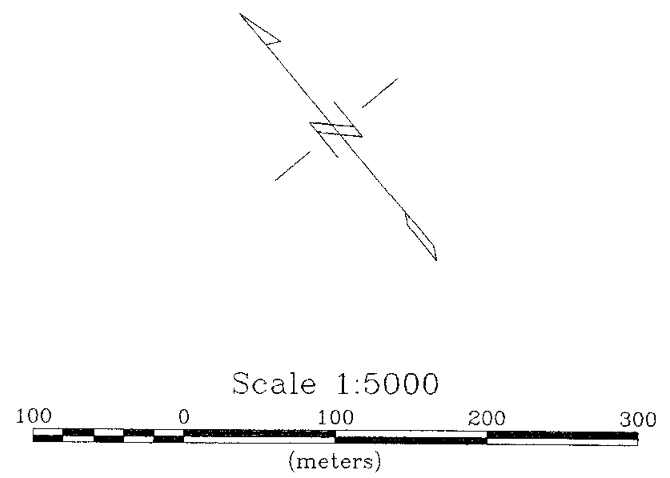

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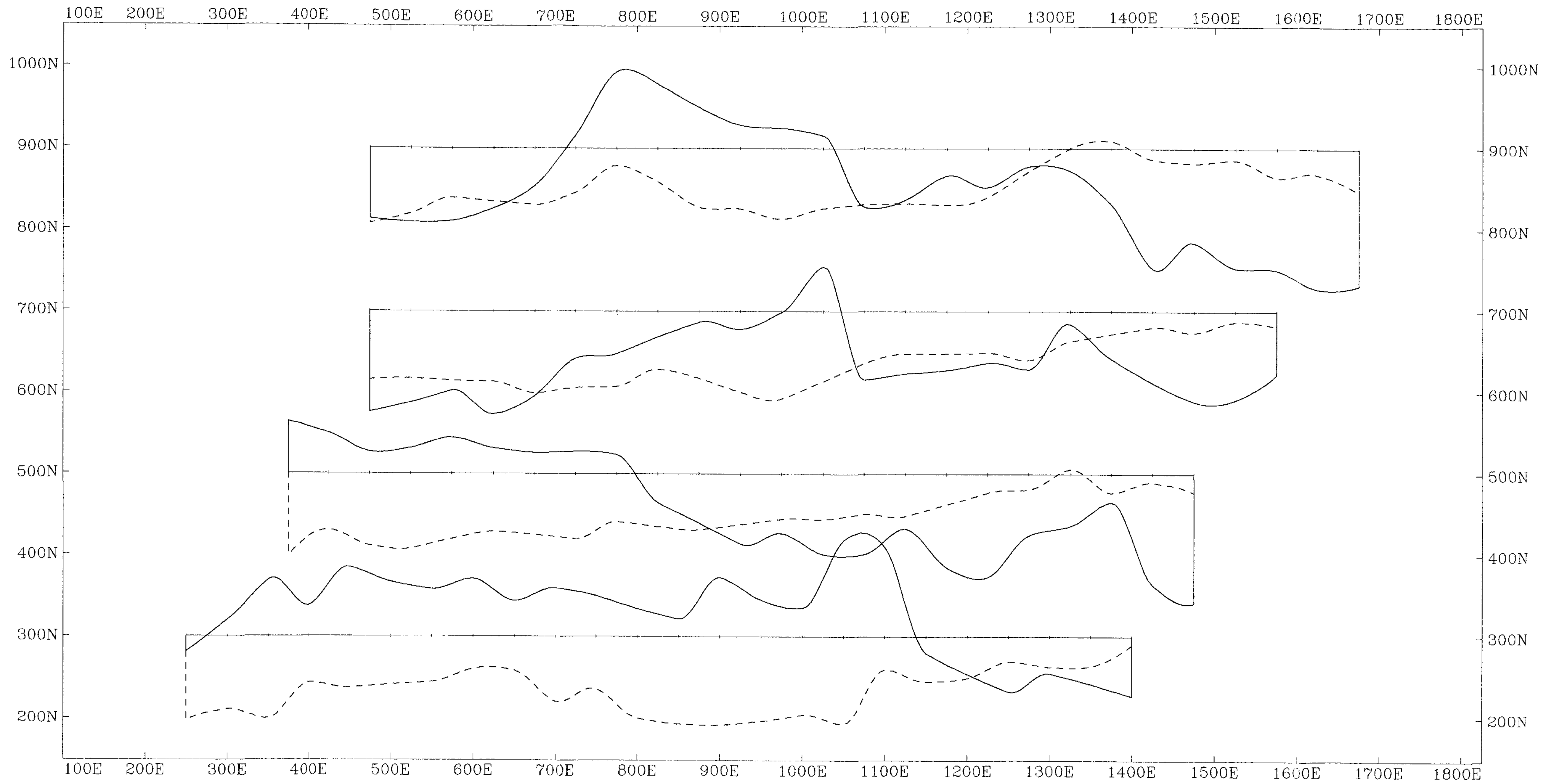
ATNA RESOURCES LTD.

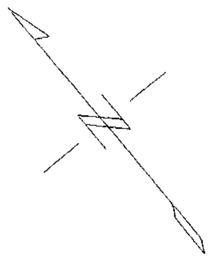
ICE PROJECT
YUKON TERRITORY, CANADA
HORIZONTAL COPLANAR LOOP EM, FREQ. 3520 Hz

In-phase solid, Quadrature dashed, 1cm=30%
Coil separation 250m + to top
Apex Parametrics Maxmin instrument 98 1-9
July, 1998

DELTA GEOSCIENCE LTD, *Fig # 4.5*

093958





Scale 1:5000

100 0 100 200 300

(meters)

DWG 6

ATNA RESOURCES LTD.

ICE PROJECT
YUKON TERRITORY, CANADA
HORIZONTAL COPLANAR LOOP EM, FREQ. 7040 Hz

In-phase solid, Quadrature dashed, 1cm=30%
Coil separation 250m + to top
Apex Parametrics Maxmin instrument 98 1-9
July, 1998

DELTA GEOSCIENCE LTD, *Fig # 4.6*