Assessment Report
On
Airborne Geophysical Survey

Dee 1-2 341274-341312

Port 22, 23, 24 324521-324523

Klag 341273

Statements Of Exploration

#3095781

located
16 Km Southeast Of
Stewart, British Columbia
Skeena Mining Division

55 degrees 48 minutes latitude
129 degrees 47 minutes longitude

N.T.S. 103P/13W
Project Period: May 15 to June, 1996

On Behalf Of
Teuton Resources Corp.
Vancouver, B. C.

Report By
E. R. Kruchkowski, B.Sc., P. Geol.
December 30, 1996

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SUMMARY

The Clone project claim area, owned by Teuton Resources Corp. and Minvita Enterprises Ltd is located about 16 kilometers southeast of Stewart, British Columbia in the Skeena Mining Division. The property covers an area of Hazelton pyroclastic volcanic rocks in contact with a variety of intrusive plutons associated with the main Coast Range Batholith.

The property lies within a belt of Jurassic volcanic rocks extending from the Kitsault area, south of Stewart, to north of the Stikine River. This belt is host to numerous gold deposits, in a variety of geological settings, including the producing Snip, Eskay Creek and Premier-Big Missouri properties. Reserves have been reported from a number of other properties including Red Mountain, the Brucejack Lake area and Georgia River. In addition numerous gold-silver showings have been reported by exploration companies along this belt of rocks. At least three porphyry type deposits with either Cu-Mo, Cu-Mo-Au or Cu-Au mineralization are also present. Of particular interest is the Red Mountain gold deposit hosted in a hornblende porphyry (Goldslide Intrusive) in association with massive pyrite and zinc and molybdenum mineralization, approximately 15 km to the north.

During the period May 17 to 19, 1996, an airborne geophysical survey (VLF EM and magnetics) was flown over two areas (a smaller close spaced survey inside a larger more widely spaced survey) centered approximately 12 km SE of Stewart, B.C. A total of 72.3 line kilometers and 524.5 line kilometers were surveyed in Zone 1 and Zone 2 respectively. The survey lines were orientated in a NE-SW direction, approximately at right angles to the overall NW geological trend for the Stewart area.

The program was conducted in order to evaluate any possible extensions to gold-magnetite-hematite and/or gold-pyrite-arsenopyrite bearing shear zones outlined in 1995 programs. In addition, the program was conducted to evaluate the surrounding claim areas peripheral to the gold discovery.

Results of the survey indicate numerous VLF anomalies throughout the surveyed area. Results for the magnetic survey show a close correlation between the underlying geology and magnetism. Unfortunately, the presence of highly magnetic mafic volcanic rocks just southwest of the gold-magnetite-hematite shears masks any trends for the shear zone.

Further work consisting of ground follow-up surveys should be conducted in order to evaluate the VIF anomalies. A ground magnetic survey is recommended in the area masked by the mafic volcanic rocks to further define the gold-magnetite-hematite bearing shear zones.

INTRODUCTION

An airborne geophysical survey, designed to test for extensions of gold-magnetite-hematite and/or gold-pyrite-arsenopyrite mineralization along shear zones, was conducted during the period May to June 1996. The survey was flown, along the southwest portions of Teuton's claim holdings in the Stewart area. The survey was orientated in a NE-SW direction, approximately at right angles to the overall NW geological trend in the Stewart area.

The survey was conducted by Scintrex Ltd. based in Concord, Ontario. All personnel were accommodated in either a hotel and/or a rented house in Stewart.

The survey was part of a contract with Teuton Resources Corp. to evaluate a number of targets in the general Stewart area. A total of 596.8 line kilometers in an area totaling 110.1 square kilometers was completed over the area of the Clone gold discovery.

Data processing involved the data compilation, gridding and contouring of the geophysical data collected, using the processing center at Scintrex Limited, Toronto. EM anomaly identification was undertaken using a semi-automated process for picking and determination of the conductance using the response from a vertical plate model in free space with 300 x 600 m dimensions.

Location and Access

The center of the surveyed area is located about 12 kilometers southeast of Stewart, British Columbia. The area of interest is approximately 55 degrees 48 minutes latitude and 129 degrees 47 minutes longitude on NTS sheet 103P/13W.

Access to the claim at the present time is by helicopter from Stewart. Nearest road to the area is a non- maintained logging road running east along the south side of the Marmot River to a point about 9 km northwest of the property. Total length of the road from tidewater to its termination point is approximately 4 km.

Physiography and Topography

The survey area is situated along the southwestern portion of the Cambria Icefield at the head of Sutton, Marmot and Kshwan Glacier. The terrain is typical of the Coast Range Mountains of British Columbia with permanent snow and ice covering up to 50% of the land surface. Much of the southern portions of the area are only recently exposed by rapidly retreating ice. Elevations vary from approximately 2134 m ASL on Mount Treble to a low of 305 m ASL along the Marmot River.

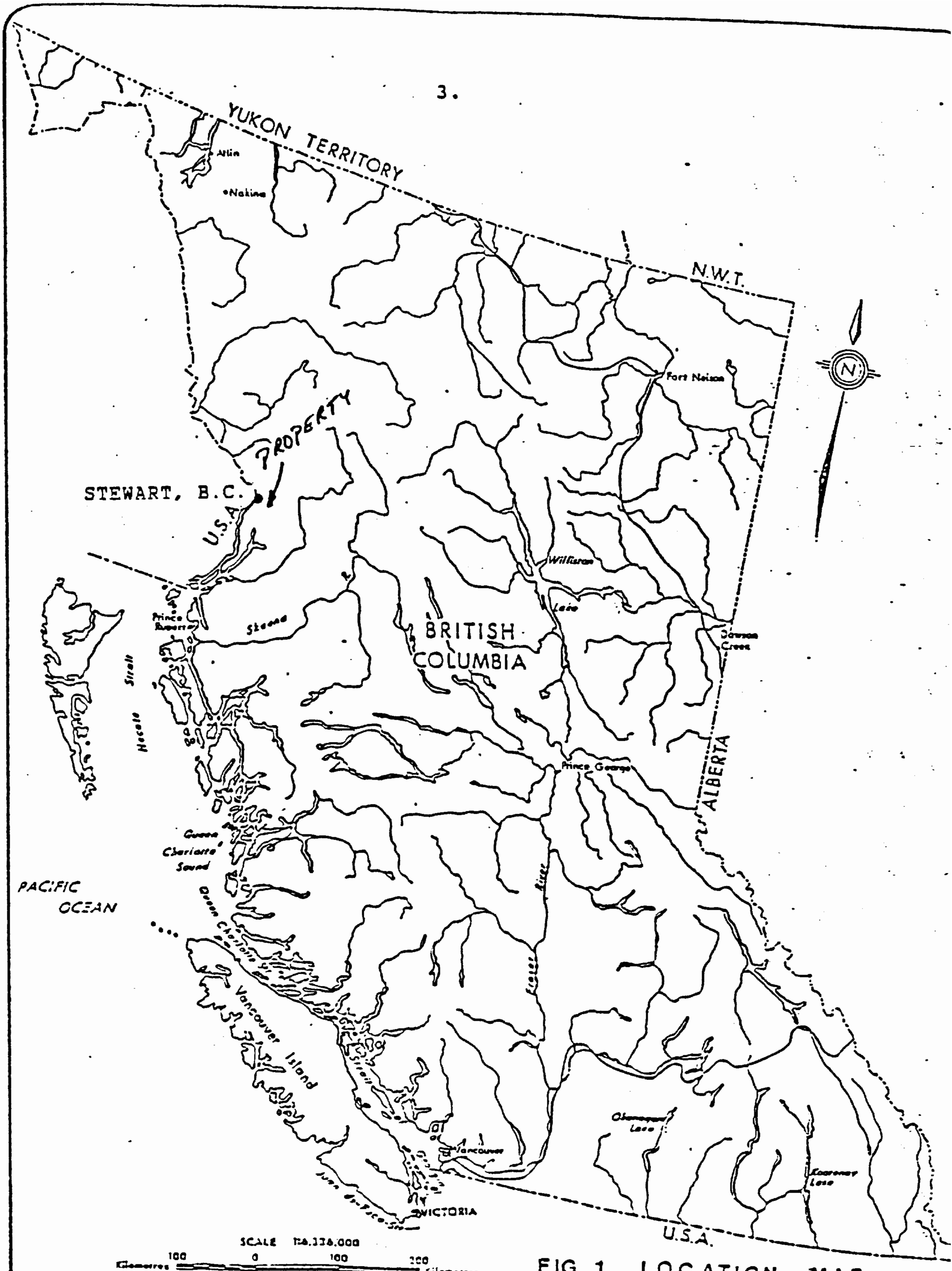


FIG 1 LOCATION MAP

BRITISH COLUMBIA

Except for the portions of the claims covered by permanent snow or ice, most of the upper ground is outcrop or talus cover with little vegetation. Just above the glaciers, thick morainal debris obscures the underlying geology. Small ponds occupy depressions in relatively flat areas. Maximum rock exposure occurs in early October when most of the annual snowfall has melted. The surface exploration is restricted to late summer and early fall.

Small patches of tag spruce are present along the lower slopes of the nunatak, particularly the south facing edge. Alpine grasses, heather and arctic willows grow in patches along the talus, moraine and outcrops. Along Marmot River, dense alder is present along the valley bottom.

Personnel and Operations

Personnel involved in the program are listed below:

E. R. Kruchkowski - geologist	May and December 1996
J. E. Wyder - geophysicist	December 1996

Scintrex field crew:

Dave Hayward - project manager	May 1996
Damir Jamakosmanovic - systems operator	May 1996
Cesar Perez-Castaneda - dataman\geophysicist	May 1996

The pilot and flight engineer were supplied by Northern Mountain Helicopters, out of Prince George, who provided a Astar 350 B1 helicopter for the survey.

General project management was under the responsibility of Terry McConnell, General Manager, Systems and Surveys Divisions, Scintrex Limited.

E. Kruchkowski represented Teuton during the field survey. A preliminary evaluation of results was completed by J. E. Wyder.

All field personnel involved in the program either from Teuton or Scintrex were accommodated in the local hotel and/or rented house.

Property Ownership

The area surveyed is part of a larger project known as the Clone project, originally part of the extensive Red property. Claims information for the portion of the area surveyed relevant to this report is summarized below:

Name	Tenure	No. of Units	Expiry Date
Port 22	324521	8	22 March 1998
Port 23	324522	20	22 March 1998
Port 24	324523	6	22 March 1998
Klag	341273	1	10 October 1999
Dee #1	341274	18	10 October 1999
Dee #2	341312	18	10 October 1999

The claims are registered in the name of Teuton Resources Corp. Sister company Minvita Enterprises Ltd. owns a 50% beneficial interest in the claims.

The author did not examine the claim posts and cannot verify the quality and accuracy of the staking. The exact location of these claims would be subject to further surveys.

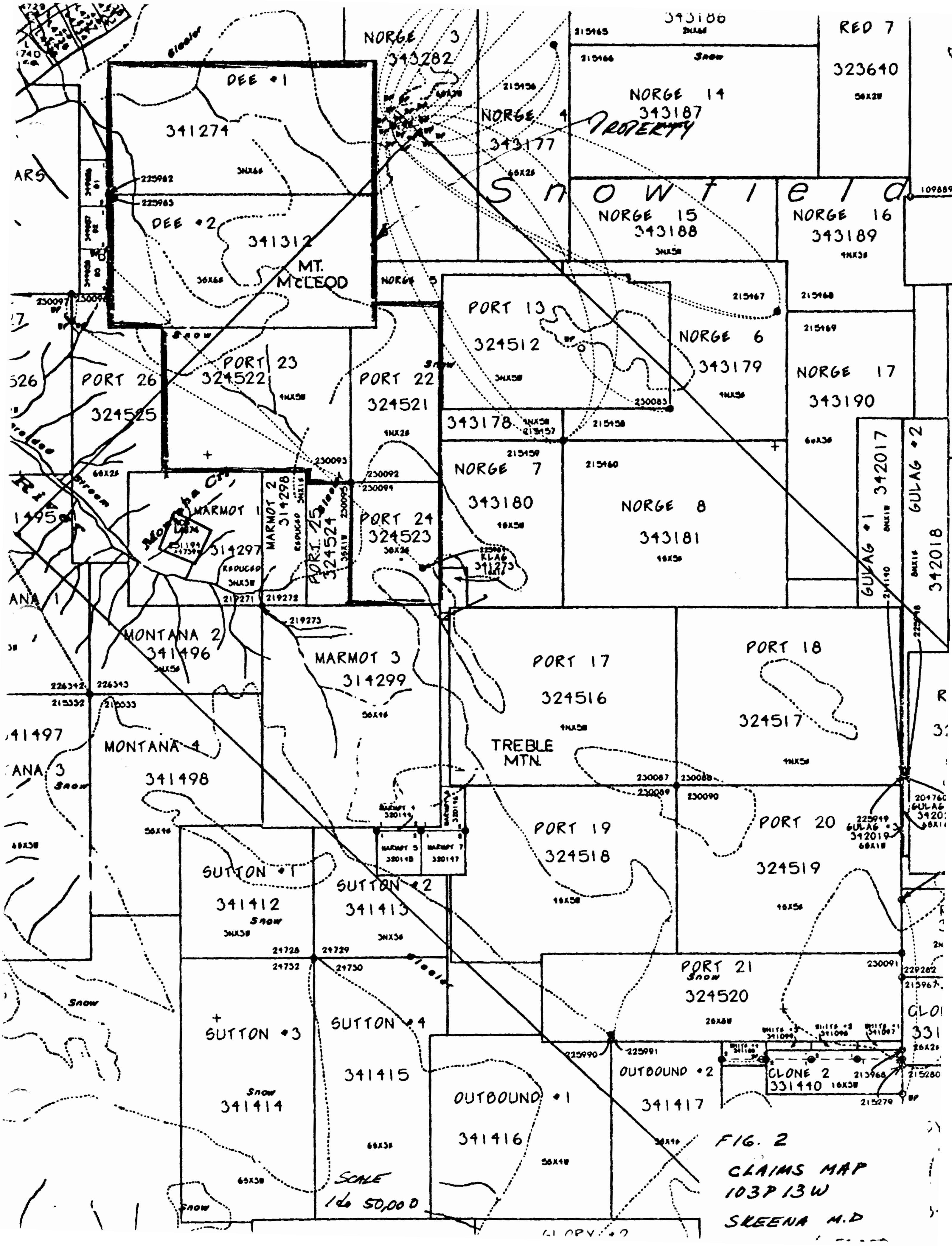


FIG. 2

CLAIMS MAP
103P 13W
SKEENA M.D

Previous Work

The section on previous work has been excerpted from an assessment report prepared by Dino Cremonese in 1994.

"Exploration for metals began in the Stewart region about 1898 after the discovery of mineralized float by a party of placer miners. Sites which could be easily reached from Stewart were the first to be explored among which was the lower Marmot River area. This early phase of exploration culminated in 1910 when both Stewart and the neighboring town of Hyder, Alaska boasted a population of around 10,000 people. Another boom period began in the early 1920's after the discovery of the very rich Premier gold-silver-lead-zinc mine in the Salmon River area, northwest of Stewart.

Although a number of gold and silver prospects were sporadically worked in the Marmot River region up to the early 1930's, only the Prosperity-Porter Idaho mine (at the head of Kate Ryan Creek, a tributary of the Marmot River) saw limited production. The prospect closest to the Port 20-21/Red 17 claims is the old Ficklin-Harder prospect located at the head of the Marmot River on the southern flank of Treble Mountain. It was explored by a few tunnels attempting to intersect high-grade quartz-sulfide mineralization intermittently exposed on surface. Also exploration activities by Teuton crews have located large open cuts across sulfide bearing quartz stockworks along the upper east slopes of Treble Mountain. At this time the area covered by the property was probably mostly under snow and ice and hence unavailable for exploration by the "old-timers".

From 1940 to 1979 there was little activity in the region due to lackluster precious metal prices. However when silver and gold prices skyrocketed in the early 1980's, many of the old properties were re-examined by both small and large exploration companies. Success by a number of exploration companies, particularly in the Unuk River has led to continued exploration in the general area. The relatively recent discovery and ongoing development of the promising intrusive-related gold deposits at Red Mountain (1,000,000 ounces gold), located approximately 16 km east of Stewart, has again rekindled interest in the surrounding area."

During July to October 1994, an exploration program conducted by Teuton on the area of the present Clone property, consisted of reconnaissance geochemical rock and silt sampling in conjunction with prospecting and reconnaissance geological mapping.

Geological observations noted during sampling indicated that the property is underlain by a sequence of augite porphyry basalts, maroon clastic volcanics and argillites intruded by dykes of granodiorite and hornblende porphyry. These dykes which strike in a northwesterly direction vary from 2-10 metres in width.

Mineralization in the form of pyrite, plus/minus chalcopyrite, plus/minus magnetite and plus/minus molybdenite was observed in four different geological settings of potential economic significance.

Results of the geochemical program indicated highly anomalous gold, silver, copper, arsenic, molybdenum, tungsten, bismuth and cobalt values widespread throughout the area explored. Values as high as 1.786 opt Au, 8.32 opt Ag, 9.51% Cu, 0.75% As, 0.686% Mo, 0.144% W, greater than 1% Bi and 0.29% Co were obtained from different zones within a square kilometer of partially explored ground. Several anomalous lead and zinc values associated with pyrite bearing float rocks were located in an area of northerly trending shears.

During the period July to December 1995, Teuton conducted a follow - up program consisting of reconnaissance geochemical rock sampling, trenching and geological mapping on the port 21 claim. This work led to the discovery of high grade gold values in parallel shears on the adjoining Clone 1 claim. In the period September to December 1995, work on the new discovery consisted of reconnaissance geochemical rock sampling, geological mapping, trenching, VLF and magnetometer surveys, diamond drilling and petrographic studies.

A total of 604 rock samples (218 grab and chip samples as well as 386 trench samples) were collected in the surveys and analyzed for metal content by ICP analysis (29 element package) and for gold using automatic absorption methods.

Results of the geochemical program indicate highly anomalous gold, silver, copper, arsenic and cobalt values throughout the Port 20, 21, and Clone 1 claim areas. Values as high as 8.66 opt Au, 15.71 opt Ag, 11.5 % Cu, 15.75 % As and 0.98 % Co were obtained from different zones within the explored areas.

A total of 50.63 meters of trenching was completed in 13 trenches in the South Grid area. Results of the trenching indicated significant gold veins (0.1 - 0.2 opt) over widths of 2 meters with locally higher grade zones across 1-2 meters. The best trench result in the above area included 1.6 meters of 1.433 opt Au (trench 13).

A total of 463.2 meters of trenching was completed in 81 trenches in the North Grid area. Results of the trenching indicated significant gold values over significant widths and lengths. The best trench result was from Trench 4 which yielded 3.59 opt gold across 5.5 meters. Based on the trench results in conjunction with the geological mapping, four main gold bearing structures were outlined as follows:

Structure	**Mineralization Type**	**Width(m)**	**Length(m)**	**Grade(opt Au)**
S-1	**Sulfide**	**3.0**	**100**	**0.74**
S-2A	**Sulfide/minor hematite**	**2.3**	**365**	**0.71**
H-1	**Hematite**	**5.2**	**191**	**0.74**
H-2	**Hematite**	**1.5**	**18**	**2.62**

In addition, trenching and geochemical sampling indicated an increase in cobalt values in the southeast portion of the above zones tested. Highest cobalt value in a trench was 0.71 % across 1.5 meters in trench 9, the most southerly trench.

A magnetometer and VLF EM survey were conducted over a portion of the established North Grid area. The contoured magnetic date shows a definite northeasterly orientation coincident with the general geological trend. One significant magnetite mineralization present within the zone. A second anomaly is along the eastern edge of the survey area and is entirely underlain by ice. The plotted VLF EM data shows a general high coinciding with the general geology in the survey area.

A total of 1070.16 meters of drilling was completed in 13 drill holes located from a single pad east of trench 47. The holes tested a 40 meter strike length of the H-1 structure along four different azimuths.

The most significant intersections were returned from the two southeastern drill sections which tested the downdip extent of mineralization exposed in trenches 4 (5.5 meters of 3.5 opt gold), 14 (3.11 meters of 3.77 opt gold) and 15 (7.5 meters of 0.76 opt gold). Hole 95-8 intersected 1.7 meters true width grading 1.67 opt gold at a drilled depth of 14 meters (beneath trench 4) while hole 95-10 (beneath trench 14) intersected 4.21 meters true width grading 1.85 opt gold at a 15 meter depth.

GEOLOGICAL SURVEYS

Regional Geology

The Clone 1 claim lies in the Stewart area, east of the Coast Crystalline Complex and within the western boundary of the Bowser Basin. Rocks in the area belong to the Mesozoic Stuhini Group, Hazelton Group and Bowser Lake Group that have been intruded by plugs of both Cenozoic and Mesozoic age.

According to C.F. Greig, in G.S.C. Open File 2931, portions of the general Stewart area as well as to the north of the claim are underlain by Triassic age Stuhini Group. The Stuhini Group rocks are either underlying or in fault contact with the Hazelton Group. These Triassic age rocks consist of dark grey, laminated to thickly bedded silty mudstone, and fine to medium grained and locally coarse grained sandstone. Local heterolitic pebble to cobble conglomerate, massive tuffaceous mudstone and thick bedded sedimentary breccia and conglomerate also form part of the Stuhini Group.

At the base of the Hazelton Group is the lower Lower Jurassic Marine (submergent) and non-marine (emergent) volcaniclastic Unuk River Formation. This is overlain at steep discordant angles by a second, lithologically similar, middle Lower Jurassic volcanic cycle (Betty Creek Formation), in turn overlain by an upper Lower Jurassic tuff horizon (Mt. Dilworth Formation). Middle Jurassic non-marine sediments with minor volcanics of the Salmon River Formation unconformably overlie the above sequence.

The lower Lower Jurassic Unuk River Formation forms a north-northwesterly trending belt extending from Alice Arm to the Iskut River. It consists of green, red and purple volcanic breccia, volcanic conglomerate, sandstone and siltstone with minor crystal and lithic tuff, limestone, chert and coal. Also included in the sequence are pillow lavas and volcanic flows.

In the property area, the Unuk River Formation is unconformably overlain by middle Lower Jurassic rocks from the Betty Creek Formation. The Betty Creek Formation is another cycle of troughfilling sub-marine pillow lavas, broken pillow breccias, andesitic and basaltic flows, green, red, purple and black volcanic breccia, with self erosional conglomerate, sandstone and siltstone and minor crystal and lithic tuffs, chert, limestone and lava.

The upper Lower Jurassic Mt. Dilworth Formation consists of a thin sequence varying from black carbonaceous tuffs to siliceous massive tuffs and felsic ash flows. Minor sediments and limestone are present in the sequence. Locally pyritic varieties form strong gossans.

The Middle Jurassic Salmon River Formation is a late to post volcanic episode of banded, predominantly dark colored siltstone, greywacke, sandstone, intercalated calcarenite rocks minor limestone, argillite, conglomerate, littoral deposits, volcanic sediments and minor flows.

Overlying the above sequences are the Upper Jurassic Bowser Lake Group rocks. These rocks mark the western edge of the Bowser Basin and are also located as remnants on mountain tops in the Stewart area. These rocks consist of dark grey to black clastic rocks including silty mudstone and thick beds of massive, dark green to dark grey, fine to medium grained arkosic litharenite.

According to E.W. Grove, the majority of the rocks from the Hazelton Group were derived from the erosion of andesitic volcanoes subsequently deposited as overlapping lenticular beds varying laterally in grain size from breccia to siltstone.

D. Aldrick's work to the north of Stewart has shown several volcanic centers in the surveyed area. Lower Jurassic volcanic centers in the Unuk River Formation are located in the Big Missouri Premier area and in the Brucejack Lake area. Volcanic centers within the Lower Jurassic Betty Creek Formation are in the Mitchell Glacier and Knipple Glacier areas.

There are various intrusives in the area. The granodiorites of the Coast Plutonic Complex largely engulf the Mesozoic volcanic terrain to the west. East of these (in the property area), smaller intrusive plugs range from quartz monzonite to granite to highly felsic. Some are likely related to the late phase offshoots of the Coast plutonism, other are synvolcanic and tertiary. Double plunging, northwesterly - trending synclinal folds of the Salmon River and underlying Betty Creek Formations dominate the structural setting of the area. These folds are locally disrupted by small east-overthrusts on strikes parallel to the major fold axis, cross-axis steep wrench faults which locally turn beds, selective tectonization of tuff units and major northwest faults which turn beds.

Geophysical Surveys

On May 17 and May 18, 1996, Scintrex Limited flew an airborne geophysical survey over two areas, Zones 1 & 2 (Fig. 3 and 4), of Teuton Resources Corp.'s Stewart Properties centered about 12 km SE of Stewart, B.C.. Both areas are elongate along a NW-SE axis and are separated from but parallel to each other. The larger area measures about 15 km by 6.5 km and the smaller area measures about 6 km by 3 km.

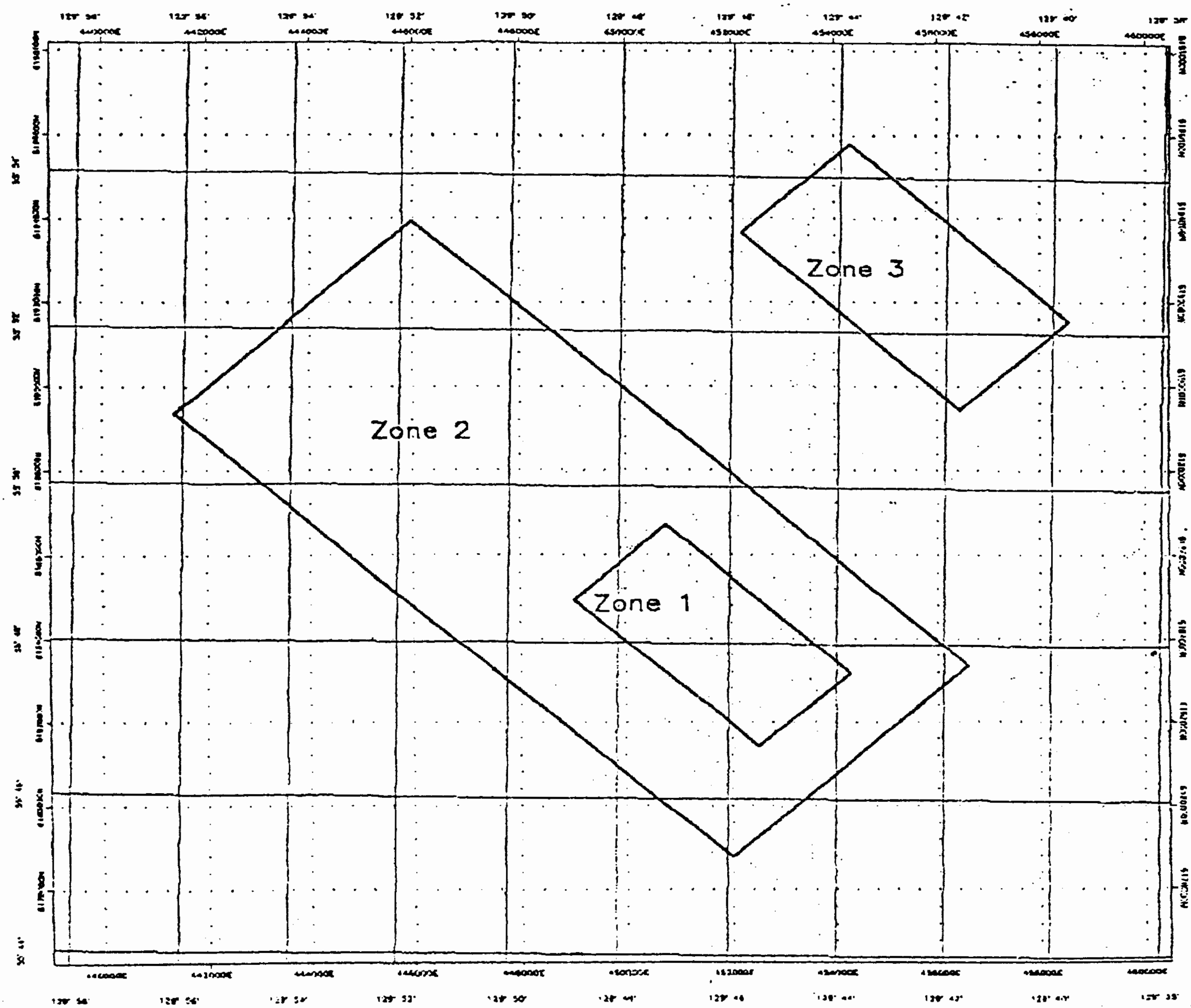
The survey was flown using an Astar 350 B1 helicopter using the registration number CF-EHS.

The mean terrain clearance was a nominal 60 meters. Traverse line spacing was approximately 200 m with orthogonal check lines flown close to the outer edges of the survey area.

A second survey approximately 5 km by 2.5 km, Zone 1, was flown at about 100 m spacing inside the larger area (Zone 2). A single tie line was run orthogonal to the main NE-SW orientated survey lines.

The navigation system utilized for the survey was a PNAV-486 (PICODAS) using a Bendix-King KRA-10A Radar Altimeter and a GPS sample interval of 1 reading per second.

The processed survey results have been presented as coloured maps for the survey areas at the scales of 1:20,000 and 1:10,000 for a detail area; total field and total field reduced to pole magnetic contour maps, apparent resistivity for two frequencies (Cp-930 and 4170 Hz), anomaly symbols map in two different versions, VLF of the summed residual field, and finally base maps



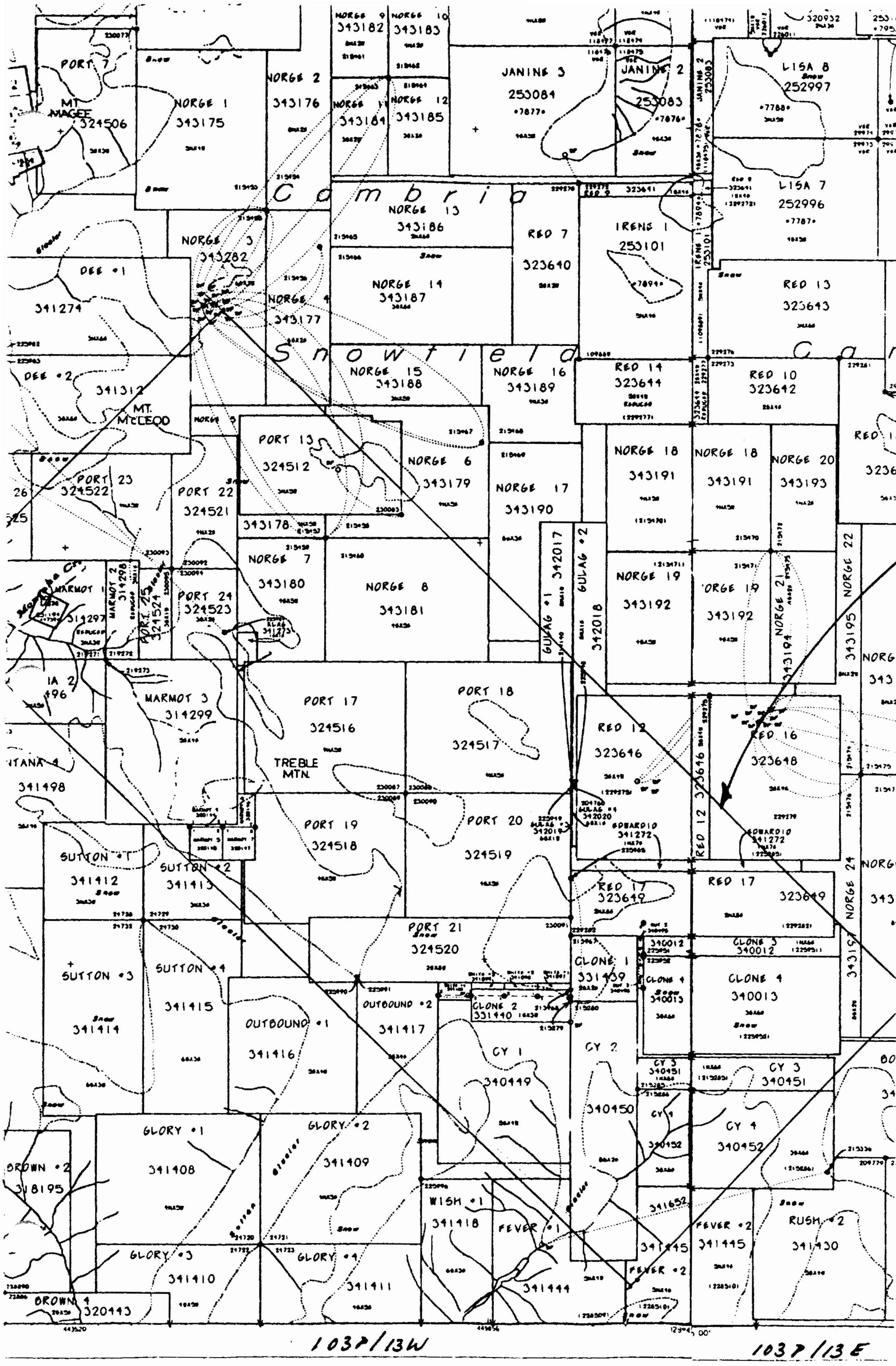
2500 0
(meters)

TEUTON RESOURCES CORP.

STEWART PROPERTIES

Figure 3

SEE ALSO
FIG 3B, OVERLEAF



EDGE OF SURVEY

FIG. 36. SURVEY BOUNDARY RELATIVE TO CLAIM LOCATIONS

with total magnetic contours and EM symbols. For the purposes of this report, black line copies are presented in Figures 4-15.

VLF EM Survey

The VLF data was obtained using a Totem 2A Airborne VLF system. Two stations: Seattle (NLK) as line station and Maine (NAA) as the orthogonal station were simultaneously recorded at a sample rate of 10 readings per second. The receiver height was about 44 meters above ground level (agl). The data is presented in Figure 6 and 7 as summed field strength maps.

The two VLF maps (Figs. 6 & 7) do not provide any detailed correlation with known geology (Fig. 1) other than verification of regional geologic formation trend NW-SE, particularly in Figure 6.

In Figure 6 there appear to be a number of roughly linear features running approximately east-west (eg. lines 6182000N and 6188000N). There is not any known geological basis for these lineaments.

The data in Figure 7 is a repeat of a portion of the data in Figure 6, but at a flight line separation of 100 m instead of 200 m. Highs and lows are not correlative although the regional trend, NW-SE, is apparent in both sets of data.

There does not appear to be any correlation between either known mineral occurrences or known ice field configuration (Fig. 4).

EM Surveys

The EM system utilized was a Scintrex HEM-5 Frequency EM system. The system had two sets of coils:

- vertical coaxial coils using frequencies of 875 and 4800 Hz,

and - horizontal coplanar coils using frequencies of 930, 4170, and 35000 Hz.

The EM "bird" height was about 30 m agl. Readings were recorded at the rate of 10 samples per second.

Vertical Coaxial Coils

The coaxial coil EM results are presented as a number of anomalies on topographic maps (Figures 8, Zone 2, and 9, Zone 1).

Minor anomalies of unknown meaning are seen in both Figures 8 and 9. It is interesting to note the anomalies seen in the detail area (Zone 1 in Figure 9) occur only on flight paths flown between the flight paths flown at approximately 200 m separation as shown in Figure 5. The anomalies are not coincident with any known mineralized showings (Figure 4). They also do not appear to have any relationship to either known topography (Figures 8 and 9) or to the proximity of boundaries of ice (glaciers) with topography.

Horizontal Coplanar Coils

The results of the Horizontal Coplanar Coil surveys are presented in Figures 9 and 11 (4170 Hz) and Figures 10 and 12 (930 Hz).

The Zone 1 results are compatible with Zone 2 results when they cover common ground.

The high (4170 Hz) frequency results appear to approximately map the presence of surface (higher resistivities) as well as the bedrock surface exposures and assumed near surface (thin ice) subcrops.

The 930 Hz frequency map is deeper probing and while tracking the 4170 Hz frequency data it also reveals the presence of low (50 ohm-m) resistivity zones with two trends. The major trend is NW-SE roughly parallel with known surface geological contacts. A secondary NE-SW trend (parallel to flight paths) occurs in several areas. It is possible the resistivities are a reflection of varying thickness of ice. However, the variation in resistivity from less than 10 ohm-m to greater than 1,000 ohm-m coupled with the close correlation with total magnetic field and the alignment of resistivity anomalies parallel to the regional strike of geochemical formations suggest the 930 Hz resistivity survey may be of significant value in mapping formations and/or altered zones within the formation.

Many of the resistivity anomalies are shifted to either the SE or the SW of the "corresponding" magnetic anomalies.

The low resistivity zones could represent areas of high rock alteration caused by thermal water, intrusions and/or mineralized fluids. If this is the case the EM Horizontal Coplanar data might prove useful for locating economic targets both off and on the ice fields that occur in the project area.

EM anomalies detected during the survey are listed as follows:

CLONE PROJECT

STEWART PROPERTIES, ANOMALY LISTINGS

ZONE 1

Line	X	Y		Fiducial	Conductance	
	Frequency	Ref.				
				(Mhos)	(Hz)	
535	451381.0400	6184680.1689	1236.8000	0.9	4800	A
545	451929.7600	6184676.5800	1427.8000	0.9	4800	A
605	452916.2234	6184142.7566	2111.8999	8.6	875	A
615	452258.4503	6183173.1817	2208.3999	5.0	875	A
625	452199.4110	6182860.2099	2262.7000	6.1	875	B

ZONE 2

10	445298.6000	6193240.0000	3275.2000	5.0	875	A
20	443327.2336	6191043.5432	3026.3999	0.8	4800	A
30	443475.3400	6190932.3000	2750.3999	1.5	4800	A
60	444020.8100	6190599.2100	1839.3000	3.7	875	A
	444489.6300	6190993.6466	1863.1000	3.9	875	B
	444617.9200	6191197.0389	1881.2000	3.9	875	C
80	444617.1804	6190665.1617	1322.3000	1.9	875	A
	444782.4664	6190830.1818	1334.2000	3.0	875	B
90	444723.4556	6190573.5722	1043.2000	2.9	4800	A
100	444487.6934	6190075.3027	785.2000	4.1	4800	A
120	445356.5703	6190339.8856	243.7000	3.4	4800	A
	445384.2094	6190360.2689	245.9000	2.7	4800	B
130	445698.7800	6190246.3800	4113.2002	9.8	4800	A
	445591.3200	6190141.3400	4122.3999	1.3	4800	B
	445353.1200	6189923.8600	4139.7998	4.5	4800	C
170	448183.6900	6191488.8400	2871.8999	1.1	4800	B
180	448244.3900	6191472.7200	2835.8999	1.1	4800	A
	448332.8400	6191540.7000	2840.3000	0.9	4800	B
190	444270.2600	6187144.6400	2545.2000	4.4	875	A
	443909.6506	6186875.8000	2589.3000	7.2	875	B
230	446554.9700	6188373.0300	1341.7000	1.6	4800	A
420	450047.3400	6186450.9300	2386.8999	2.5	4800	A
580	454044.3300	6185881.3600	2787.8999	6.4	875	A

Total Field Magnetics

The total field magnetic survey was done with a Scintrex MAC-3 Cesium Magnetometer at a sensor height of abut 44 m agl. The data was recorded at the rate of 10 readings per second with a sensitivity of 0.01 nT.

Total magnetic field maps for Zone 2 (which includes Zone 1) and Zone 3 are given in their correct relative positions to each other in Figure 5. The higher total field values over all of Zone 3 as opposed to only a portion of Zone 2 may reflect a higher magnetic content (eg. magnetite) in Zone 3 rocks to that of the Zone 2 rocks. It may also represent a different type of rock coming closer to the surface than in Zone 2.

The Total Field Magnetics for Zones 2 and 1 are plotted on topography in Figure 14 and 15. As can be seen the magnetics tend to be highly anomalous in areas of topographic highs. As the survey was flown at a constant ground clearance of about 44 m it can be safely assumed that much of the magnetic data anomalies are associated with the magnetic mineral content of the rock formations and not due to fluctuations in the height of the helicopter above the ground.

Again it should be noted that there appears to be a SW or SE offset of the EM resistivity anomalies relative to the magnetic anomalies. The economic implications, if any, of this observation is not understood at this time.

The magnetic data does appear to delineate the regional direction of the rock formations and therefore may be helpful in mapping geological units covered by the glaciers and ice sheets in the project area.

Geophysical Discussion

It appears that a flight path separation of approximately 200 m is adequate in the project area. The attempt to fly at 100 m spacing (ie. in between the 200 m line spacing) does not appear to either significantly improve the quality of the data or to give uniformly better coverage. The plotted flight paths strongly point out the problems associated with temperature changes on ice fields and the steepness of some of the terrain. It might be better to conduct surface geophysical surveys to provide data on line spacing of less than 200 m in the project area.

The Total Field Magnetics and Horizontal Coplanar Coil surveys appear to have provided the most useful and trustworthy data. However, any conclusions on this subject matter should be made only with ground truth surveys completed over anomalies and trends of geologic and/or economic interest. Also some ground truth surveys should be done in areas of little or no anomalous results so as to provide meaningful comparison of anomalous and background results.

The ground truth surveys should include a geologist with the geophysical team which should also have an experienced geophysicist on site. First-time field surveys should include geologic mapping as well as magnetic, Horizontal Loop EM (Coplanar Horizontal Coils) and Frequency Domain Induced Polarization capability. The results of this type of operation should be jointly evaluated by the field geologist and geophysicist.

Once a ground truth survey has been completed a more detailed analysis of the airborne data collected in 1996 can be attempted in areas of interest.

CONCLUSIONS

1. The property which lies within a belt of Jurassic volcanic rocks extending from the Kitsault area, south of Stewart, to north of the Stikine River is host to numerous gold deposits.

2. During the period May 17 to 19, 1996, an airborne geophysical survey (VlF EM and Magnetics) was flown over two areas (a closer spaced survey inside a larger more widely spaced survey) centered approximately 12 km SE of Stewart, B.C..

3. A total of 72.3 line kilometers and 524.5 line kilometers were surveyed in Zone 1 and Zone 2 respectively.

4. Results of the survey indicate numerous VlF anomalies throughout the surveyed area.

5. Results for the magnetic survey show strong correlation between magnetic highs and intrusive and mafic volcanic rocks.

6. Further work consisting of ground follow-up work recommended to further test the VlF-EM anomalies as well as any magnetic anomalies.

RECOMMENDATIONS

Further ground geophysics consisting of magnetic surveys is recommended in the area of the gold bearing shears. Spacing should be on 25 m centers on line spaced 25 m apart.

REFERENCES

1. GREIG, C. J., ET AL (1994); "Geology of the Cambria Icefield: Regional Setting for Red Mountain Gold Deport, Northwestern British Columbia", p. 45, Current Research 1994-A, Cordillera and Pacific Margin, Geological Survey of Canada.

2. KRUCHKOWSKI, E. R. (1996); Report on the Clone Property

3. SCINTREX LTD. (1996); Report on Airborne Geophysical Survey, Stewart, British Columbia.

4. WYDER, J .E. (1996); Interpretation of Airborne Results (previous votes).

CERTIFICATE

I, Edward R. Kruchkowski, geologist, residing at 23 Templeside Bay, N.E., in the City of Calgary, in the Province of Alberta, hereby certify that:

1. I received a Bachelor of Science degree in Geology from the University of Alberta in 1972.

2. I have been practicing my profession continuously since graduation.

3. I am a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta.

4. I am a consulting geologist working on behalf of Teuton Resources Corp.

5. This report is based on a review of reports, documents, maps and other technical data on the property area and on my experience and knowledge of the area obtained during programs in 1974 - 1996 and work done by myself on the property during 1994,1995 and 1996.

6. I authorize Teuton Resources Corp. to use information in this report or portions of it in any brochures, promotional material or company reports.

Dec 3/96

Date:

E. R. Kruchkowski, B.Sc.

Statement of Expenditures

Field Personnel--Period May to December 1996:	
E. R. Kruchkowski, Geologist	
7 field days @ $300/day	$ 2,100
J. E. Wyder, Geophysicist	
3 days @ $450/day	$ 1,350
Food and Accommodation	
E. R. Kruchkowski	
7 days @ $50/day	$ 350
Report Costs	
Report and Map preparation, compilation and research	
E. Kruchkowski, P. Geol. 4 days @ $300	1,200
Secretarial/word processing	300
Copies, reports, jackets, data entry, etc.	500
Vehicle Rental	
E. R. Kruchkowski	
1 week @ $300/week including mileage	$ 300
Supplies	$ 300
Airborne Geophysics	
Mobilization - prorated	$ 4913.28
596.8 line kilometers @ $95	$ 56,696.00
	61,609.28
G.S.T.	4312.64
	$ 65,921.92
Total:	**$ 72,321.92**

Of this amount, $11,100 is to be allocated to Statement of Exploration #3095781

The balance will be applied against Statements of Exploration yet to be filed (at which time another assessment report will be submitted).

APPENDIX II

REPORT ON THE AIRBORNE GEOPHYSICAL SURVEY
SCINTREX LIMITED

APPENDIX I

EQUIPMENT AND PARAMETERS OF AIRBORNE SURVEY

TEUTON RESOURCE CORPORATION

COST QUOTATION FOR AIRBORNE GEOPHYSICAL SURVEY

STEWART, B.C.

Quote #113

Scintrex Limited
Airborne Systems & Surveys Division
222 Snidercroft Road
Concord, Ontario
L4K 1B5
Canada

COST QUOTATION # 113

CLIENT: Teuton Resource Corporation

AREA: Stewart, B.C.

TYPE OF SURVEY:	Helicopter-borne EM/Mag/VLF/GPS
AIRCRAFT:	Aerospatiale SA-350 (ASTAR) or equivalent
EQUIPMENT:	As in Appendix 2
LINE SPACING:	Traverse lines 100 meters over center Traverse lines 200 meters on outside Tie lines at 500 meters
SURVEY SIZE:	Area One 297 km Area Two 144 km **Total 441 km approximately**
TERRAIN CLEARANCE:	60 meter nominal helicopter altitude in keeping with normal safety considerations. Speed 90 - 100 km/hour.

FEE SCHEDULE:

Mobilization / demobilization	**$ 6,000.00**
Data acquisition & processing	**$ 95.00 per km**
Standby after 5 days (For mag diurnal, weather)	**$ 1,750.00 per day**

ESTIMATED PROJECT COST:

For 441 line kilometers	**$ 47,895.00**

TIMING: **Survey would be flown in April, 1996**

TERMS OF PAYMENT:

On signing - 30 % of estimated cost
On completion of flying - 50% of estimated cost
On delivery of final products - balance owing

NOTES: QUOTATION 113

1. Standby charges will apply on a pro-rated basis only when production is not possible due to circumstances beyond Scintrex' reasonable control, such as magnetic disturbances, weather, government interference, etc. No standby will charged on days where more than 100 km are flown and accepted.

2. Gaps in excess of 150% of the nominal line spacing for a distance greater than 1,000 meters will be reflown at the contractor's expense.

3. Scintrex will make every effort, consistent with safety, to maintain the aircraft at a ground clearance permitted by normal safety considerations.

4. Magnetometer noise shall be less than +/-0.1 nT.

5. Magnetic diurnal: Scintrex will resurvey lines or portions of lines of which the trace of the ground magnetometer shows either a departure exceeding 20 nt from any chord 5 minutes long or the slope of the diurnal exceeds +/- 40 nt during any chord 5 minutes long.

6. EM noise level not to exceed 5ppm on the in-phase and quadrature channels over a distance of 1 km excluding geological and cultural noise.

7. The survey will not commence until approval has been given by the Client.

8. A post flight differential GPS system will be used. The flight path of the aircraft will be recovered in the field using the in field processing center. Any gaps or deviations that exceed specifications will be reflown or filled in at Scintrex expense.

9. All quoted fees are in Canadian Dollars payable directly to Scintrex's bank in Toronto.

10. All fees at NET of any withholding taxes, value added taxes, state or local taxes, duties, customs, etc. that may apply.

11. Occupational Health and Safety is a fundamental issue at Scintrex. Scintrex will comply with all applicable health and safety regulations while under contract to our clients.

APPENDIX 1

DELIVERABLE PRODUCTS QUOTE 113

1. **Digital Data:**

   a) The digital data will be supplied on magneto-optical disk @ 1.0 Gb or 0.5 Gb format, or as specified by the client.

   b) Line-Located-Levelled data will be provided as follows:

   - Raw EM data
   - Raw compensated magnetic data
   - Raw diurnal magnetic data
   - Raw VLF-EM data
   - Levelled EM data (horizontal coils)
   - Levelled magnetic data
   - Barometric Altimeter data
   - Radar Altimeter data
   - Positioned data based on the WGS 84 spheroid, UTM, or as specified by the Company

2. **Maps:** Preliminary - P
   Final - F

   a) EM Symbol Map, Scale 1:20,000 (P,F)
   b) EM Resistivity Map (for two selected frequencies), Scale 1:20,000 (F)
   c) VLF Total Field Map (summed residual of field strength), Scale 1:20,000 (F)
   d) Total Magnetic Intensity (TMI) blackline contours, Scale 1:20,000 (P,F)
   e) TMI Reduced-to-the-Pole (RTP) blackline contours, Scale 1:20,000 (F)
   f) Flight Path superimposed on base with EM symbols, Scale 1:20,000 (F)
   g) Flight Path superimposed on base with mag contours, Scale 1:20,000 (F)
   h) Total Magnetic Intensity colour contours, Scale 1:50,000 (F)

   Three (3) copies of each map to be provided.

   Filtered (vertical gradient or "enhanced") magnetic contours can be provided.

3. **Final Image Processing Products (Complimentary Service):**

   Image processing will be carried out by Scintrex using an in-house geophysical image processing system.

   Scintrex will provide a montage of different images produced in hardcopy by an HP 650C Ink Jet plotter.

4. **Delivery Schedules:**

   Final maps will be delivered by May 15, 1996.

APPENDIX 2

HELICOPTER-BORNE EM/VLF/MAGNETICS

TABLE OF CONTENTS

APPENDIX TWO

1. SCINTREX LIMITED

Scintrex is a major supplier of instruments for the world's mineral and groundwater exploration market, security market, analytical and atmospheric environmental market and the nucleonics market. Each year, Scintrex exports its products to an average of 70 different countries. Of our approximately 160 employees, approximately 30 are continuously working to research and develop new products for the above mentioned markets.

Scintrex has four major divisions; Airborne Systems and Surveys, Earth Sciences, Security and Analytical Products and Nucleonics.

The Airborne Systems and Surveys Division provides airborne geophysical data acquisition and processing services to the minerals and oil exploration industries. Surveys are conducted using both fixed-wing and helicopter survey aircraft.

The Airborne Division is also responsible for the research and development, design, manufacture and sale of equipment to the mineral and oil exploration market, for applications in the air. Scintrex is the world's foremost supplier of airborne geophysical exploration equipment. Our Airborne Cesium Magnetometers are the industry standard, and are in use with more than 50 organisations involved in airborne remote sensing applications.

Scintrex Limited is located at:

222 Snidercroft Road
Concord, Ontario
L4K 1B5
Canada

Tel: (905) 669-2280
Fax: (905) 669-9334

The Company is a registered Ontario Corporation.

2. SURVEY AIRCRAFT

Type	Aerospatiale SA-350B - ASTAR (or equivalent)
Endurance - hours	2.5
Optimum Survey Speed Range-km/hr	90 - 120

It is anticipated that Canadian Helicopters out of Terrace will provide the helicopter for use on this project. An experienced "bird" pilot will also be provided.

3. SURVEY EQUIPMENT

Installed On The Aircraft

- Scintrex HEM-V Electronic Console
- Totem 2A VLF Processing Console
- Scintrex MEP-1010 Magnetic Cesium Magnetometer Signal Processor Module.
- Picodas PDAS-1000 Digital Data Acquisition System.
- Picodas PNAV-2001 Navigation system.
- Scintrex VFPR-3 Flight Path Recorder.
- NovAtel GPSCard Differential Navigation System.
- Terra TRA 3500 Radar Altimeter. Or King KRA-10A
- Rosemount Digital Barometric Altimeter.
- RMS GR-33 Analogue Recorder.

Installed in Towed Bird

- Scintrex HEM-V five frequency transmitting and receiving coils
- Scintrex CS-2 split beam Cesium Vapour Magnetometer
- Herz Totem IIA VLF-EM Receiver

Ground Support Equipment

- Scintrex CBS-2 Base Station Cesium Magnetometer.
- NovAtel GPSCard Base Station.
- Pentium PC based Field Computer.

Scintrex Airborne System Sampling Rates and Resolutions

SYSTEM/No. of CHANNELS	SAMPLING RATES/SEC	RESOLUTION
Total Field Magnetics	0.1 sec	0.001 nT
E.M. - 870, 920 Hz (4 channels)	0.1 sec	0.10 ppm
E.M. - 4184, 4784 Hz (4 channels)	0.1 sec	0.20 ppm
E.M. - 35,500 Hz (2 channels)	0.1 sec	0.50 ppm
VLF - 2 frequencies (4 channels)	0.1 sec	0.3%
Radiometrics Up/U, Down/(K, U, Th, TC), Cosmic, dead-time (7-channels)	1.0 sec	1 cps
Radar Altimeter (1 channel)	0.1 sec	1.0 ft
Barometric Altimeter (1 channel)	0.1 sec	1.0 ft
GPS Navigation	1.0 sec	1 m

3.0 The Scintrex Multi-Sensor Electromagnetic Survey System

3.0.1 HEM System

The Scintrex system is a multi-coil electromagnetic system which measures the inphase and quadrature responses from a number of coil-pairs installed in a tubular bird, towed beneath a helicopter. These responses are then passed to the EM Receiver Console where they are processed into their inphase and quadrature components. This data is then recorded by an on-board data acquisition system.

A Scintrex HEM-V system consists of a towed-bird airfoil containing a number of transmit and receive coils and an electronic control console which includes a number of signal analyzer modules, transmitter control modules and system monitors.

The HEM-V Electromagnetic system is comprised of the following sub-systems:

* an 7-metre long towed bird Kevlar airfoil sensor/drag skirt assembly, complete with five transmitting and five receiving coils, frequencies of 900 Hz (coaxial and coplanar) and 35 kHz (coplanar)
* Tow cable with weak link mechanism
* Kevlar spreader bar and drag skirt assembly
* a rack-mountable electronic console with 5 signal analyzer modules
* minor spare parts kit
* cabling and connectors

HEM-V SYSTEM SPECIFICATIONS

Type:	Towed-bird, symmetric dipole configuration operated at a nominal survey altitude of 30 metres.
Coil Orientation:	Two vertical co-axial transmitter/receiver coil-pairs and three horizontal coplanar transmitter/receiver coil-pairs.
Measured Parameters:	In-phase and out-of-phase components in parts per million (ppm) of the secondary field with respect to the primary field.
Coil Separation:	6.7 metres.
Dipole Moment:	225 ampere-turns-m2 at 900 Hz.
Time Constant:	0.1 seconds
Noise Levels:	Typically 2 ppm with base level drift negligible due to operational procedures. Computer processing reduces this noise to below 1 ppm.

Coil Frequency	Coil Orientation	Coil Separation	Channels	Resolution
870 Hz	Vertical coaxial	6.7 m	I, Q	0.10 ppm
920 Hz	Horizontal coplanar	6.7 m	I, Q	0.10 ppm
4,784 Hz	Vertical coaxial	6.7 m	I, Q	0.20 ppm
4,184 Hz	Horizontal coplanar	6.7 m	I, Q	0.20 ppm
35,000 Hz	Horizontal coplanar	6.7 m	I, Q	0.50 ppm

The internal noise of the EM system is less than 2 ppm of the transmitted field. A total of ten EM channels of information will be sampled at 0.1 sec. intervals or approximately every 3 metres along the survey line, with a time constant of 0.2 seconds. Additionally, there is a 60 Hz power-line channel for noise monitoring.

The EM system will be calibrated with an external coil at the start and end of the survey, and with an internal coil approximately three times per hour during survey flights.

The EM system will be phased with an external ferrite rod before each survey flight.

Most sferic activity or noise is limited to 2.0 ppm or less.

Scintrex HEM-V systems are excellent tools for the exploration of conductive targets in conductive to highly resistive environments, mapping earth materials for engineering and hydrological applications, and identifying bedrock conductors in conductively complex environments. These systems are capable of detecting conductive bodies in excess of 175 metres beneath the bird in resistive terrain. The system's symmetry results in data that is easily interpretable, yielding peaks over conductors, and also lends itself well to computer processing techniques.

The applications for which Scintrex HEM-V systems can and have been employed are:

* base metal surveys
* diamondiferous kimberlite exploration
* mapping of fault zones for engineering and mining applications
* mineral exploration
* precious metals exploration
* sand and gravel mapping
* geothermal mapping
* shallow sea bathymetric mapping
* mapping of fresh water/salt water interfaces
* permafrost mapping
* sea ice thickness mapping

The HEM-V system finds general application in helicopter-borne EM exploration for the mapping of geological structures and lithology, as well as classifying bedrock conductors as part of a wide conductive structure or a potential ore body. Many materials lie within the resistivity range of the HEM system. This includes disseminated sulfides, kimberlites, sand and gravel, hydrothermal alteration zones and rock units having resistivities as high as 8,000 Ohm-m.

THE SCINTREX HEM-V HELICOPTER-BORNE ELECTROMAGNETIC SYSTEM	
RESOLUTION	Scintrex' HEM-V system defines structures very well, due to the high spatial resolution of approximately 3m along the flight line. Small, possibly important features, such as faults and alteration zones are easily detected.
RESISTIVITY	Data acquired by Scintrex' HEM-V system can be inverted to make excellent, high quality resistivity maps, which is one of the main parameters of an EM survey.
DEPTH	Depth of penetration with a Scintrex HEM-V system is typically 100m to 200m. A wide ore body (highly conducting half-space) may be detected quite easily to depths of 200 metres or more, while a narrow ore body (thin vertical conductor) can be detected at depths of 100 metres or more.
MAGNETICS	Scintrex' MAC-3 cesium magnetometer system has a sensitivity of 0.001 nT, *sampling at 10 times per second. This permits very high-*resolution magnetic mapping.
INTERPRETABILITY	Interpretability *of Scintrex' HEM-V system data is very good. Thin* conductors are easy to differentiate.
EPITHERMAL GOLD	The target in the prospecting for epithermal gold are alteration zones. These targets are best located using high frequency EM preferably in the 30 kHz to 40 kHz range. Scintrex' HEM-V system features a 35 kHz frequency, which makes it ideal for this kind of survey.
POSITIONING	Scintrex' HEM-V system uses a real time differential GPS navigation system, providing an "in-flight" accuracy of better than +/- 5 m.
RADIOMETRICS	Scintrex' HEM-V system also features, as an option, a multi-channel gamma-ray spectrometer system, with sensor volumes ranging from 16.8 litres to 50.4 litres of NaI crystal. The data from this system is an excellent geological mapping tool, providing high quality data suitable for creating three-colour ternary (U, Th and K) maps. Radiometric data is also an excellent tool for exploration when used in conjunction with HEM and Magnetic data. Potassium enrichment in *gold mining and /or base metal areas is often an indicator of gold.* Potassium (K) anomalies are common in the area of porphyry copper deposits.

3.0.2 THE HERZ TOTEM 2A AIRBORNE VLF ELECTROMAGNETIC SYSTEM

3.0.2.1 GENERAL DESCRIPTION

The TOTEM 2A is a two frequency system. It can receive signals from two VLF transmitters in the 15 to 25 KHz range, simultaneously. The transmitters are located worldwide. The parameters normally measured are the change in total field and the vertical quadrature field. The sign of the quadrature polarity is also recorded.
The simultaneous dual frequency operation ensures that transmitters can be selected to provide good coupling with conductors of any orientation. Because of its small size, light weight, easy installation and ease of operation, the TOTEM 2A is an ideal add-on to any airborne geophysical survey system.

The TOTEM 2A Airborne VLF-EM System would consist of the following items:

1. one processing console
2. one set of receiving coils
3. one pre-amplifier
4. onboard cables

Airborne VLF data are mainly used for the interpretation of large scale geological features such as faults and conducting rock units. Under favourable circumstances, smaller conductors, due to sulphide mineralization (as an example) may be revealed. Other applications include groundwater exploration and the measurement of overburden conductivity and thickness.

3.1 The Scintrex Airborne Cesium Magnetometer

3.1.1 General Description

Scintrex' magnetometers are the most advanced, high-sensitivity, airborne magnetometers commercially available, and may be utilized with the sensor installed in a towed bird airfoil (for towing beneath a helicopter or fixed-wing aircraft), or in an airfoil, commonly called a "stinger" attached to the tail, wingtip or even the nose of a fixed-wing aircraft.

Several versions of this magnetometer are now available, utilizing up to as many as four sensors, with either passive compensation or automatic software compensation, all with 0.001 nT resolution, sampling as fast as 10 times each second.

Scintrex airborne cesium magnetometers and gradiometers have become the industry standard, and are in everyday use, worldwide, by many government agencies, oil and mining companies and contracting companies.

The Scintrex MAC-3 Airborne Cesium Magnetometer for use in helicopter, towed-bird installations is provided complete with the following:

a) one Scintrex CS-2 cesium magnetometer sensor
b) a Scintrex MEP-1010 real-time software magnetometer processor module
c) a Scintrex AAM-1 towed-bird airfoil
d) a 30 to 35 meter tow-cable complete with weak-link mechanism
d) a Scintrex PDAS-1000A magnetometer power supply/ booster console with two 28 VDC to 32 VDC booster modules for the CS-2 sensor
e) on-board cabling
f) manuals

3.1.2 The CS-2 Cesium Magnetometer Sensor

In simplest terms, a cesium magnetometer sensor comprises a miniature atomic absorption unit from which a signal proportional to the intensity of the ambient magnetic fields is derived. An electronic console converts this signal (called a larmor signal) into magnetic field strength in nanoTeslas(nT) for display and recording by a data acquisition system. The constant of proportionality which relates the larmor Signal to the intensity of the magnetic field is called the "gyromagnetic ratio of electrons". For the Cesium-133 atom, this is very accurately known to be 3.49856 Hz/nT. This is about 82 times higher than the common proton precession magnetometer, and is the reason that the cesium magnetometer has a better sensitivity.

The three main elements of the CS-2 cesium sensor are a cesium lamp, an absorption cell containing cesium vapour and a photosensitive diode, all mounted in a common optical axis within a cylinder 63 mm in diameter by 173 mm in length. This sensor element of the CS-2 is then typically connected by a 3 meter long multi-conductor coaxial cable to another cylinder, which contains the electronics for the sensor.

3.1.3 The Scintrex MEP-1010 Total-Field Cesium Magnetometer Processor Module

Despite the high inherent sensitivity of Scintrex cesium magnetometer sensors, the reading resolution and cycling rates of previous cesium magnetometer were limited by the ability of essentially analog electronic circuitry to process the Larmor signal. Typical performance was 0.01 nT twice per second or 0.1 nT eleven times per second. With the new Scintrex MEP magnetometer and gradiometer processor modules and console, it is normal to achieve 0.001 nT ten times each second.

Digital signal processing has long been used to enhance satellite imagery and to boost the efficiency of radar and sonar systems. What is new is the advent of low cost, high speed microprocessors designed to handle real time digital data. Thus it is feasible to apply advanced signal processing to high sensitivity magnetometer using cesium sensors.

To achieve a resolution of 0.001 nT at rates of ten times per second, the microprocessor based MEP modules and consoles measure the Larmor Signals at high rates, controlled by a high stability clock. The measurement bandwidth is selectable from 0.5 to 2 Hz and constant time delay digital filters are applied for the selected bandwidth. The MEP-1010 is a module that installs inside the PDAS-1000 Data Acquisition System (described below), which is designed to accept the larmor frequency outputs of a single CS-2 cesium magnetometer sensor. The software resident in the MEP-1010 is capable of resolving the Larmor frequency outputs from this sensor to 0.001 nT (1pt), ten times per second, with very wide bandwidth.

3.1.4 The Scintrex AAM-1 Towed-Bird Airfoil and Tow Cable

The AAM-1 magnetometer towed-bird airfoil is basically a hollow Kevlar tube, 2.5 meters long, with a bulbous nose into which a CS-2 cesium sensor and hand-aligned gimbal mount are installed, and a hollow tail compartment into which the CS-2 sensor electronics and (optionally) a TOTEM 2A VLF receiver coils and preamplifier assembly are installed. Fins are also provided at the tail of the airfoil to stabilize the bird in flight.

The tow cable is constructed of a three conductor coaxial cable and a Kevlar strain member, enclosed in a meshed conduit. The length of this tow cable varies with each system, depending usually on the type of helicopter being utilized. If the helicopter is expected to be a medium sized model, such a Bell Jet Ranger, Aero Spatiale A-Star or Lama, a 30 to 35 meter tow cable should be sufficient. The tow cable will be attached to the helicopter by means of a weak link assembly.

The on-board section of the tow cable will consist of a coaxial cable. The length is customized to suit the helicopter. These cables will be attached to the tow cable outside the fuselage by means of low-disconnect force connectors.

3.3 The PDAS-1000 Data Acquisition System

The PDAS-1000 is the newest member of the Scintrex family of Data Acquisition Systems, and is most commonly used in airborne geophysical surveying. The three main functions fulfilled by the PDAS-1000 are: 1) system control and monitoring, 2) data acquisition and 3) data playback and analysis.

The PDAS-1000 is a fully IBM PC compatible micro-computer, built around an 80486 CPU board. All data collection routines, checking buffering, recording and verification are software controlled for maximum flexibility. A modular concept has been used for both the software and the hardware to allow for future expandability. The sensors used with the PDAS-1000 may include radiometric, magnetic and electro-magnetic. Other instruments such as navigation/positioning systems, altimeters, video or camera flight path recovery systems are also readily interfaced. Digital data may be recorded on a floppy disk or on the PDAS-1000's internal hard disk. Data being recorded may be monitored on the PDAS-1000's front panel mounted, LCD screen as analog traces.

Hard copy of any data recorded may be produced, in real-time or post flight, on an RMS-GR33 Graphic Recorder, or on any 9-pin or 24-pin dot-matrix printer. The PDAS-1000 is controlled and operated by a standard keyboard.

The PDAS-1000 is supplied with 6 free expansion slots, into which may be installed various processor modules. These modules include:

- a range of 0.001 nT/10 cps resolution MEP cesium magnetometer/gradiometer processors, that can accept Larmor inputs from up to 4 sensors
- an NovAtel 3951R GPSCard interface with survey grid flying software and a cockpit display for use with a variety of Doppler and Inertial (INS) navigation systems

The airborne survey data will be digitally recorded directly onto the PDAS-1000's internal hard disk. On completion of the days flying, the survey data which has been stored on the hard disk will be backed-up to the units built-in streaming tape cartridge recorder, or alternatively on to a floppy disk. This cartridge or disk would then be sent to the computer centre so that the data may be processed.

3.4 The GPS Satellite Navigation System

3.4.1 General Description

Global Positioning Systems, or GPS, are the ultimate in navigation and positioning system for aerial surveying. GPS is a system which provides accurate positional information, based on signals received from a constellation of 24 satellites. GPS is a system that has been developed by the U.S. Department of Defence for military use. The military version is called P-code GPS, however, a civil version exists, called C/A-Code, and it is this version which we discuss here.

Each satellite transmits on two frequencies simultaneously, to permit the measurement and correction of atmospheric refraction errors. By making time-of-arrival measurements on these signals from four or more NAVSTARs simultaneously, the GPS user is able to determine latitude, longitude and altitude (X, Y and Z).

GPS brings a number of important benefits to aerial surveying. Firstly, the coordinates of the survey aircraft (horizontal and vertical) are provided on a continuous basis. This not only improves the quality of survey navigation and reduces its cost, it also simplifies data compilation and presentation by eliminating, to a large degree, the tedious and error-prone manual steps of flight path recovery from film or video. Secondly, GPS provides a reusable positioning system. Surveys flown at different times in the same area may be precisely correlated in position, making it easy to repeat survey lines or to fly gap-filler lines, etc.

The Scintrex GPS system is based on the NovAtel 3951R GPSCard, 12-channel NAVSTAR GPS receiver, and includes a remote, 3951R GPSCard receiver installed in the aircraft, and a differential base station utilizing a second 3951R GPSCard set-up at the base of survey operations. This system is capable of providing "Real-time" or "Post-Survey" differential corrections. Accuracy of the differentially corrected positions is +/- 5 meters.

3.4.2 The Scintrex PNAV-2001 Navigation Interface/Display Computer

The PNAV-2001 is a navigation computer designed to utilize the outputs of navigation systems such as GPS or "range-range" radio location systems, for special navigation tasks, such as way-point navigation and survey grid navigation.

The three modes of operation are:

MAP MODE
This mode is used to display the area in "full view" to verify the shape and size of the area, and the number of survey lines covering the areas.

GRID MODE
The pilot/navigator will use the Grid Mode to fly the survey lines. The grid lines are always vertically oriented on the display and the map

will rotate 180 when the aircraft is turned around. The pilot/navigator can ZOOM IN or ZOOM OUT to view the survey area/lines in more detail.

WAYPOINTS MODE
This mode is used to navigate from point to point. The pilot/navigator can enter waypoints and use this mode to navigate to and from the survey area. The whole flight is displayed in "Real Time".

Other important features of the PNAV-2001 are:

- The PNAV-2001 has the ability to display the entire survey area, complete with the desired flight path grid, as a graphic display on the Moving Map display, with the position of the aircraft being continuously updated and displayed on the screen, as it proceeds along the flight line.

- The PNAV-2001 continuously updates and displays numeric information such as: heading, latitude and longitude or UTM coordinates, cross track, line number, ground speed, distance to go, GPS time, PDOP (data quality), altitude in meters, and more.

- The PNAV-2001 provides a steering or pilot indicator to assist the pilot/navigator to "steer" accurately along the proposed flight-line.

- The PNAV-2001, will output data via RS-232 to a data acquisition system for recording, or it will permit data to be recorded on its internal hard disk.

3.4.3 The NovAtel GPSCard Receiver and Accessories

The GPS receiver used in this system is a NovAtel 3951R GPSCard receiver, designed for use in a PC-compatible laptop or desktop computer. The GPSCard supports a host of unique functions and capabilities as standard features.

The 12 dedicated channels of the GPSCard independently track the code and carrier phase of 12 GPS satellites. The wide bandwidth RF front end, high rate multi-bit sampling and digital signal processing features yield precise code phase tracking capability with improved interference immunity. The dual serial data ports and the assorted input/output strobes provide support for integration with external systems, real-time differential positioning, remote receiver control, data logging and time transfer.

3.5 Radar Altimeter - Fixed wing

The Radar Altimeter employed in the aeromagnetic survey will be a Terra TRA 3500/TRI 40. This altimeter is a light-weight compact instrument designed for aircraft. The altimeter operates from 0 to 10,000 feet over all types of terrain. Leading edge tracking guarantees that the altitude indicated is the one to the nearest object.

The typical accuracy of the system is 2% of height. The analog output of 2.5 mV per foot is linear from 0 to 500 feet. Resolution is 15 cm.

The time constant of the altimeter is 0.1 second. All circuits are continuously monitored and a failing system's integrity is immediately indicated, should a malfunction occur. The analog voltage will be recorded digitally ten times per second. Analog recording on the RMS will also be included.

The sample rate will be set to once every 0.1 seconds, or nominally every 7 meters.

Radar Altimeter - Helicopter borne surveys

A King KRA-10A single horn radar altimeter is normally used. The unit operates from 50 to 2,500 feet providing a continuous analog output that is appropriately scaled and recorded by the data acquisition system.

Accuracy is typically 5 % as specified by the manufacturer.

The unit has a built in self test feature. Airborne operators and pilot check the reading of unit on every take off and landing by comparing the radar altimeter reading with the known length of the tow cable which is normally 100 feet.

3.6 Barometric Altimeter

Scintrex will provide a Rosemount 1241 M barometric pressure transducer adapted for high resolution airborne survey operations. The unit is interfaced to the aircraft static pressure system and to the acquisition computer which accepts its output, converts it to millibars and passes it to the analog and digital recorders. The barometric altimeter will be sampled instantaneously ten times per second, or 7.0 meters. Resolution is 1 part per million or 1.2 centimeters.

The sample rate will be set to one every 0.1 seconds, or nominally every 7 meters.

3.7 Airborne Analog Recorder

The RMS-GR33 Instruments Model GR33 Graphic Recorder is an instrument of advanced design incorporating a non-mechanical, thermal printing system generating a precise high quality record on a chart 321 mm (12.625 inch) wide.

This micro-computer based recorder is controlled by the Picodas PDAS-1000 Acquisition system which can provide selection and adjustment of recorded parameters as required by survey conditions. Parameters for all data recorded on the chart are printed at the start of each survey flight, in addition to this, line number and start fid are recorded at start of each line, line number, end fid as well as operators comments and time are recorded at the end of each line. Time from the digital clock is printed on one margin of the chart with fiducial numbers on the opposite side. Each trace has an identifier printed at regular intervals.

3.8 The Scintrex CBS-2 Base Station Cesium Magnetometer

3.8.1 General Description

The CBS-2 Base Station Cesium Magnetometer is a high-sensitivity cesium magnetometer designed for base station applications where a high resolution is required. The cesium sensor of the CBS-2 is mounted on a non-magnetic tripod and is connected to a processor and PC-Datalogger by a long sensor cable. The CBS-2 operates from a 12 VDC power source.

The CBS-2 features:

- 0.01 nT resolution over 20,000 nT to 100,000 nT range
- high gradient tolerance
- automatic tuning
- sampling rate of 10 times per second
- real-time RS-232C data output to an IBM-PC compatible datalogger for display and storage on either hard or floppy disk

- data displayed on LCD screen as traces in simulation of an analog chart recorder
- operates on 12 VDC power

The CBS-2 Cesium Base Station Magnetometer comprises the following:

- a magnetometer processor card
- a cesium sensor mounted on a nonmagnetic tripod
- a 30m long sensor cable
- a 12 VDC power supply
- an RS-232 cable and adapters
- Scintrex proprietary Base Station Magnetometer Software
- an PC-compatible Digital Datalogger

3.9 The Scintrex VFPR-3 Video Flight Path Recorder

3.9.1 General Description

So that the position of the helicopter/aircraft in relation to the recorded geophysical data can be verified, and to allow identification of cultural features, Scintrex includes a VFPR-3 Video Flight Path Recorder in this system. The VFPR-3 consists of the following items:

- a video camera with a wide-angle, auto-iris lens
- a rack-mountable console containing a VHS recorder, 5 ins. monitor, camera controls and power supply
- a CAM-1000 video flight path signal mixer module for installation in the PDAS-1000
- a ground playback system consisting of a 19 ins. colour monitor, a VHS recorder identical to the unit in the airborne recording sub-system
- a 110/220 V AC power supply
- all necessary interconnect cables and manuals.

The VFPR-3 is available in either PAL or NTSC operating system.

3.9.2 The Scintrex CAM-1000 Digital Video Mixer Module

The CAM-1000 is a module which is internally mounted in the PDAS-1000 and permits a camera to be employed with the survey system for the purposes of recording the aircraft's flight path track while on survey.

The CAM-1000 places referencing information on the recording tape overlaid on the video signal. This information can be as much or as little as the user requires, and could, for example, be fiducial, magnetometer total field value, latitude and longitude (assuming a navigation system is available in the aircraft) and time.

The position of the aircraft with respect to the ground can also be recorded with a moving cursor overlaid on the video signal. This feature requires either the presence of a GPS or doppler navigation system in the aircraft, or some inclinometers, to provide pitch and roll information. When operational, this feature will show the true aim of the video camera, regardless of the aircraft attitude.

3.10 *Field Office Computer*

All data, including both airborne and ground data will be verified daily using a PC field computer. The flight path for each flight will be plotted each day in a manner that will provide a continually updated flight path map of all flying done to date. This will allow infills for gaps in coverage to be flown in timely manner. Preliminary contours of the geophysical data will also be available for viewing using Geosoft software, running on a Pentium PC computer.

4. FIELD OPERATIONS

Assurance of a smooth running, fully coordinated field operations is gained through the selection of experienced crews using latest state-of-the-art equipment and software.

If successful with our proposal, preparations for mobilization will commence immediately upon receipt of such notification. For international operations it is normal to require assistance from the Company to obtain permits and visas, and to set up liaison with local services to prepare for the incoming aircraft and associated spare parts as well as geophysical and data processing equipment.

4.1 System Tests

Before starting, and continuing during the survey, the following system calibration checks will be performed.

4.0.1 EM System

The EM system will be calibrated with an external coil at the start and end of the survey, and will be phased with an external ferrite rod before each survey flight. In addition, calibration of the EM system to measure "out-of-ground-effect" zero levels, null and Q-coil calibrations will be flown at high altitude at the beginning and end of each survey flight and at least twice during each survey flight, and finally, Q-coil and zero level calibrations will be performed approximately four times per hour, allowing for the completion of lines.

4.1.1 Magnetometer - Fixed wing system

HEADING TESTS
At the start and end of the survey and following any maintenance work on the aircraft, test flights will be flown in a low gradient area over a prominent feature to demonstrate the level of the heading errors. These lines will be flown at 45 degree increments around the compass and the crossover point will be located from the GPS positioning data. The maximum total heading error between any two compass points will be 4 nT. However, heading errors for the nominated flight directions will be less than ±1 nT.

AIRCRAFT MANOEUVRE
Manoeuvre noise checks and compensation will be carried out in conjunction with the heading tests above. Manoeuvre noise will be compensated to less than +/- 0.10 nT peak to peak with normal rolls, yaws and pitches on the survey headings.

PARALLAX ERROR
System parallax will be determined by reciprocal flights at survey height and speed over a distinct magnetic feature. The results of the tests will be recorded in analog and digital mode and will demonstrate a parallax of less than 2 seconds. A more accurate determination of parallax error can be made by observation in the early stages of data processing.

The above tests are not required for helicopterborne systems since the sensor is beyond the influence of the ferromagnetic properties of the helicopter.

4.1.2 Spectrometer System Calibration

Before the start of, and at the completion of any survey requiring collection of spectrometer data, spectrum plots of a cesium test source will be done on each crystal detector to check resolution. This data will be collected in both analog and digital format.

Before and after each day of survey, the spectrometer will be checked for accuracy in the following manner:

- Cesium test source will be used to check individual crystal detector calibration.
- A background level will be recorded.
- Uranium hand samples will be placed in predetermined positions and the level will be recorded.
- Thorium hand samples will be placed in predetermined position and the level will be recorded.

All tests will be recorded for a minimum of one minute and annotated in a clear and unique way.

When in the air, a "low level test line" will be flown. This line will be a minimum of five kilometers long and flown over well defined features so that it can be accurately repeated. A "high-level" test line will also be flown. This line will be a minimum of five kilometers long and flown at a minimum height of five hundred meters above ground level, or if available, over a body of water at survey height and no closer than one kilometer from the shore. The same tests will be done (normally in the reverse order) at the end of the survey day.

The data from these tests will be checked and will remain within a range of +/- 10% over the course of the survey.

4.1.3 Altimeters

Radar altimeter calibration for linearity and accuracy will be checked on the terrain clearance data using electronic calibration procedures prior to survey commencement.

The barometric altimeter will be adjusted to the same datum prior to each flight and local pressure variations will be monitored and recorded after each flight.

4.1.4 Navigation Equipment

The GPS system will be tested for absolute positional accuracy using known points and test lines.

4.2 Quality Control Procedures

Strict quality control procedures will be adhered to throughout the survey involving statistical and graphical inspection of all data acquired.

Scintrex will provide the necessary personnel and computing equipment at the field base to enable data verification on a daily basis.

Aircraft data tapes will be read to confirm data recovery and tabulations will be provided of minimum, maximum, mean and standard deviation of all geophysical data. Noise levels will be checked using a 4^{th} difference operator. Profiles of all geophysical data can be plotted in the field. The flight path data will be plotted daily to check for data quality and navigational accuracy. Any data which does not conform to contract specifications will be discarded and reflown at the Contractor's expense.

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REPORT ON THE
AIRBORNE GEOPHYSICAL SURVEY
STEWART, BRITISH COLUMBIA

DATA ACQUISITION & PROCESSING

for

TEUTON RECOURCES CORP.

by

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June, 1996

AIRBORNE GEOPHYSICAL SURVEY IN STEWART, B.C.

FINAL REPORT

TEUTON RESOURCES CORP.

AIRBORNE GEOPHYSICAL SURVEY IN STEWART BRITISH COLUMBIA

FINAL REPORT

ABSTRACT

During the period of May 17 to 19, 1996, Scintrex carried out a multi-sensor high-resolution airborne geophysical survey, for Teuton Resources Corp., over three blocks located about 50 km south east of Stewart, British Columbia. The area was designated as Stewart Properties.

The survey was part of a service contract signed with **Teuton Resources Corp.**, Vancouver, B.C., to survey the exploration concessions in British Colombia, totaling approximately 128.1 km^2 for this region. A total of 698.8 line-km of geophysical data with about 13.2 helicopter flying hours were expended.

Data processing involved the data compilation, gridding and contouring of the geophysical data collected, using the processing center at Scintrex Limited, Toronto. EM anomaly identification was undertaken using a semi-automated process for picking and determination of the conductance using the response from a vertical plate model in free space with 300 X 600 m dimensions.

The processed survey results have been presented as 8 maps for the survey areas at the scales of 1:20,000 and 1:10,000 for a detail area; total field and total field reduced to pole magnetic contour maps, apparent resistivity for two frequencies (Cp-930 and 4170 Hz), anomaly symbols map in two different versions, VLF of the summed residual field, and finally base maps with total magnetic cotours and EM symbols.

1. INTRODUCTION

1.1. General Considerations

These services are the result of the Agreement made on **April 15, 1996** between **Teuton Resources Corp.**, and **Scintrex Limited** to perform an airborne geophysical survey over exploration concessions the company is exploring in British Colombia. The survey consisted of about 698.8 l-km of electromagnetic, magnetic and VLF data.

The data acquisition was carried out between May 17 to 19, 1996. The data processing started when the data was received at Scintrex's Toronto office on May 21 and was completed June 26, 1996.

1.2. Survey Specifications and Deliverable Products

The geophysical service as specified in the contract, was a helicopter-borne multi-parameter electromagnetic-magnetic-VLF geophysical survey, with flight lines 200 m and 100m apart, sensor flying height varying from 30 to 60 m, and sampling interval of 0.1 second except for GPS differential positioning at 1.0 second sample rate.

Data compilation and processing were carried out by the application of Geosoft and Scintrex computing programs to generate the colour contour maps and other products. 8 plots of the survey blocks were presented at a scale of 1:20,000, 1:10,000 and one map at 1:50,000. EM anomalies were picked for all flight lines and are presented in a special symbol map.

The survey report describes the procedures for data acquisition, processing, and final map presentation and the specifications for the digital data sets. A tabulation of the identified EM anomalies also forms part of this report (Appendix II). Detailed discussion and interpretation of the results were not part of this report.

1.3. Relief and Vegetation

The area consists of rugged relief with altitudes varying from 2500 to 7000 feet. The rugged areas extend from west to south-east of the largest surveyed zone.

The valleys are carved from glacial movements.

Vegetation in this region is composed of coniferous forests with trees varying in height from 10 to 15 metres.

2. DATA ACQUISITION

2.1 Survey Areas

The survey areas (see sketch Appendix I) and general flight specifications are outlined as follows:

AREA	LINE SPACING	LINE DIRECT.	TOTAL LINE KM	AREA
Zone 1	100/2300m	N45°E/N45°W	72.3 LKm	12.4 Km²
Zone 2	200/6200m	N45°E/N45°W	524.5 LKm	97.7 Km²
Zone 3	200/2600m	N45°E/N45°W	102.0 LKm	18.0 Km²

The airborne survey comprised a total of 698.8 l-km of geophysical data acquired from June 17 to 19, 1996 by surveying an area of 128.1 km^2. About 13.2 helicopter flying hours were required to complete the survey block.

The helicopter was based at the local airport in Stewart, British Colombia.

2.2 Operations Base

During the data acquisition the base station was located at the local airport in Stewart, British Colombia.

2.3 Flight Specifications

The flight line directions and spacings for the block were established by the client, following the principle of crossing the general geological structure with a normal angle. The block was surveyed in an north-east south-west direction. The line spacing was generally established at 200 m except for Zone 1 wich was 100 m. A flight was not accepted if a deviation from the intended flight path was more than one-half of the nominal line spacing over a distance of more than 2 kms.

The optimum terrain clearance adopted for the helicopter and instrumentation during normal survey flying was 60 m with sensors suspended below (mag at -15m, VLF at -15m, EM bird at -30m). Actual terrain clearance of the helicopter varied between 40 and 80 m and averaged 60 m because of the rugged topography.

Normal helicopter airspeed averaged around 100 km/h. In areas of rugged terrain and depending on wind intensity, more variations were encountered. Data was recorded using a 0.1 second sample rate resulting in geophysical measurements approximately every 2 to 3 meters along the survey lines. Sampling rates and resolutions for data in each channel are specified in the Table 2.1 below.

TABLE 2.1

SYSTEM/No. of CHANNELS	SAMPLING RATES/SEC.	RESOLUTION
Total Field Magnetics	0.1 sec	0.001 nT
E.M. - 875, 930 Hz (4 channels)	0.1 sec	0.10 ppm
E.M. - 4170, 4800 Hz (4 channels)	0.1 sec	0.20 ppm
E.M. - 35,000 Hz (2 channels)	0.1 sec	0.50 ppm
VLF - 2 frequencies (4 channels)	0.1 sec	0.3%
Radar Altimeter (1 channel)	0.1 sec	0.15 feet
GPS Navigation	1.0 sec	0.1 m

2.4. Helicopter and Survey Instruments

2.4.1. Helicopter

The helicopter employed was an A-STAR AS 350 - B1. It was rented from Northern Mountain Helicopters Inc. of Prince George, B.C..

2.4.2. Electromagnetic System

A Scintrex HEM-V System, with 5 frequencies and multi-coil geometry, installed in a 7 m bird, was used with the configuration specified in Table 2.2 below.

Table 2.2

COIL FREQUENCY	COIL ORIENTATION	COIL SEPARATION	CHANNELS	RESOLUTION
875 Hz	vertical coaxial	6.54 m	I, Q	0.10 ppm
930 Hz	horizontal coplanar	6.54 m	I, Q	0.10 ppm
4,800 Hz	vertical coaxial	6.54 m	I, Q	0.20 ppm
4,170 Hz	horizontal coplanar	6.54 m	I, Q	0.20 ppm
35,000 Hz	horizontal coplanar	6.54 m	I, Q	0.50 ppm

The internal noise for normal flight conditions was typically less than 1.5 ppm of the transmitted field. The EM data related to the ten EM channels were sampled at 0.1 second intervals or approximately every 3 m along the survey line. Additionally, the operator monitored the spheric events and the power-line noise levels as measured by the 60 Hz channel and output to the chart recorder. The EM sensor was towed by an external cable 30 m long, and was maintained at a nominal flight height of 30 m above the terrain.

2.4.3. Airborne Magnetometer

A Scintrex MAC - 3 Airborne Cesium Magnetometer was used on the survey. This system utilizes a split-beam, optically-pumped cesium vapor magnetic sensor, which is sampled at 0.1 seconds and which has an inflight sensitivity of 0.001 nT. The sensor capabilities guaranteed correct sampling of high magnetic gradient zones. The total field intensity range for this instrument is approximately 20,000 to 100,000 nT. The magnetometer sensor was transported and attached to a tow-cable 15 m below the helicopter. The noise rarely exceeded 0.1 nT for this contract.

2.4.4. VLF System

A Herz VLF system, Totem 2A model, was used to measure the total field and vertical quadrature components of both of the two VLF stations, operating in the range of 15 kHz - 30 kHz. VLF channels were also sampled at a 0.1 second interval. The sensor was transported in the same auxiliary bird used for the magnetic sensor.

The transmitters used in were chosen to be aligned with the main structural trends of the area geology. Those were as follows:

NAA, Cutler, Maine, USA - 24.0 kHz
NLK, Seattle, Wash., USA - 24.8 kHz

2.4.5. GPS Positioning System

A Scintrex Differential GPS system comprising; a PNAV-486 navigation computer and NovaTel 951 R GPS Card 10-channel reciever was employed to provide positioning and navigation control. The system determines the absolute position of the helicopter in three dimensions, resulting in a position sampling accuracy of about 5 m. As many as 7 to 10 satellites are monitored during all flight periods in order to provide continuous and actualized information to the pilot. This data is combined with base station GPS data in a post-flight correction procedure. The GPS positioning data were recorded at 1.0 second intervals. There were problems caused by the misplacement of the GPS antenna on the helicopter which amounted to haphazard blocking of the signal from the satellites.

2.4.6. Data Acquisition/Recording System

A Scintrex PDAS-1000 data acquisition system was used to record and monitor the geophysical data. Data were also simultaneously recorded on hard disk and then ported to a laptop hard drive and dumped to the field computers for post-flight computer processing.

2.4.7. Ancillary Equipment

A Scintrex VFPR-3 Video Flight Path Recorder System, comprising a Panasonic colour video camera and a Sony VCR operating in 8 mm format was used to record the flight path of the helicopter. Time and fiducial information were superimposed on the video recording along with the uncorrected GPS position.

A BENDIX-King KRA-10 radio altimeter system was used to record the terrain clearance with an accuracy of about 1 m.

The altimeter was interfaced to the data acquisition system with an output repetition rate of 0.1 second. Recording was carried out in both digital and analog format.

2.5. Ground Equipment

2.5.1. Magnetometer and GPS Base Station

A Scintrex CS-2 Cesium Magnetometer, with digital recording, was operated continuously throughout the airborne data acquisition phase. The instrument was set up with a sampling interval of 2 seconds and sensitivity of 0.1 nT, to monitor the diurnal variation and periodic magnetic storms. At the end of the days work, the data stored in the magnetometer was transferred to the field workstation but not used in the data reduction.

A ground base station GPS unit was also installed at the operations base to monitor GPS satellite correction data. The records from the base station GPS were used with the aircraft files to determine the differential correction (DGPS) of the flight path.

2.5.2. Field Computer Work Station

A dedicated PC-based field computer workstation was used for purposes of reproducing the geophysical data for quality control, plotting a corrected flight for navigation control and for copying and verifying the digital data. The data were then sent to Scintrex's Toronto office on magneto-optical disk.

2.6. Data Acquisition Procedures

Data is collected in a binary format with a header file in ASCII and one binary file per line. As well, a binary file of the remote positioning information accumulates while the aircraft is surveying.

The survey area in Stewart was initially planned by using the GPS Navtrain simulation program. For each block the coordinates as well as line spacing, direction, etc, were input in the program to compile the survey parameters and to generate the total line kilometers and the survey control files. These files were used by the operator for real time navigation purposes.

Daily routine involved a series of calibrations and set up procedures for the geophysical system:

a) An external coil was used to calibrate the EM system periodically and an internal coil was employed to check the system calibration by repeating the checking procedures at least twice per survey flight. The EM system was also phase adjusted with an external ferrite bar before each survey flight;

b) The VLF system was tuned to two of the VLF transmitters located in the United States, according to the survey area location and flight line direction. In all cases, NLK and NAA were used for this survey.

c) The magnetometer sensor performance was evaluated by the noise level showing up on the analog record (4th difference profile).

The field office routine comprised the compilation and data quality control, as follows:

a) Reproducing of data in a multi-channel profile including: ten EM channels related to inphase and quadrature components for each one of the five EM frequencies, and the four channels of VLF total field and vertical quadrature components;

b) Data quality control involved checking the EM noise levels and drift, identifying the presence and amplitude of spherics, as well as implementing correct calibration procedures. For magnetic data, the noise envelope was measured by 4th difference record; spikes due to cultural effects or sensor orientation were carefully monitored. VLF data was basically checked for data recording spikes and general noise levels;

c) Video tape flight path checking to confirm cultural sources affecting data and anomaly locations;

d) Plotting the base station magnetometer data files in order to reproduce the diurnal variation profile. For acceptance of magnetic data, the diurnal variations had to be less than 5 nT for a 5 minute period;

After the pre-processing, the data were organized in the Geosoft format data files. These files, including the geophysical and positioning information, were transferred to an optical disk for office processing purposes.

2.7. Field Personnel

The survey crew consisted of the following personnel:

Dave Hayward	Project Manager
Damir Jamakosmanovic	Systems Operator
Cesar Perez-Castañeda	Dataman/Geophysicist

The pilot and flight engineer were supplied by the Helicopter company (Northern Mountain Helicopters Inc.).

General project management was under responsibility of Terry McConnell, General Manager, Systems and Surveys Division, Scintrex Limited.

3. DATA PROCESSING

3.1. Considerations

Data processing involved applying the Scintrex Computer Mapping and Processing routines to the data. The data center at Scintrex is configured in a PC environment with workstations based on Pentium 90 series computers, with high capacity hard disks and E-size Hewlett-Packard Inkjet plotters.

Basically the processing consisted on four different steps, as follows:

a. Post-flight processing to generate a flight path derived from the GPS locations.
c. Generation of the Oasis database merging the position relative to the data.
b. Geophysical data reduction in Oasis by application of correction procedures.
d. Processing of the data and preparation of plot files by standard methods.

During post flight processing, the GPS corrected positions are reduced and the survey data is imported into an OASIS binary database. The OASIS system is used for all merging, corrections, editing functions and preconditioning. Once this segment of the work is completed, specific X,Y,Z files are exported from the binary database ready for processing with GEOSOFT software. This system permitted on-site monitoring of data quality during survey, and allows immediate preliminary map production and follow-up of exploration anomalies and mapping targets.

Different procedures were followed in order to process the data for map generation. According to the data character (i.e. magnetic, em or VLF), different correction procedures were applied and were standardized for all work in B.C. as outlined in the following section.

3.2. Data Compilation

3.2.1. Flight Path Generation

After importing each survey flight into the database, the corrected GPS positions were merged for each successive flight. At this point, an X,Y,Z file containing an Easting and Northing, together with a fiducial could be created in order to test the flight path.

3.2.2. Magnetic Data

No base station variation removal was carried out on the surveyed magnetic field because magnetic diurnal variation was minor at all times. The airborne total field data was leveled by the use of tie lines exclusively throughout the survey work.

Data quality check was accomplished by computing the fourth difference and plotting the unlevelled data with the difference function. This technique permitted tracking the performance and deterioration of the magnetometer sensor as well as the noise levels which were superimposed on the data during survey activities. The bad data was removed in a special column of the data base after copying the original data to a new channel, thus preserving the raw magnetic values. The manual editing consisted of occasional elimination of dropout spikes which were up to 1.5 seconds wide and were caused by the magnetometer loosing orientation while climbing up steep mountain faces.

The levelling was carried out by adjusting the intersection points on the traverse lines such that the differences were minimized with the control lines. First a leveling intersection network is established and intersections are weighted according to their magnetic differences. For example an intersection on a sharp magnetic high having a high gradient may be weighted much lower than the average point or simply may be eliminated from the network.

OASIS permitted visual examination of the intersections for each tie-line if manual editing was required. As well, the leveled line could be visually compared to the unleveled line at any time during the leveling process. The leveled data was then exported to an X,Y,Z file and a preliminary map was generated and inspected.

The data were gridded by linear interpolation between the survey lines and then prepared for contouring by applying a Hanning filter to the gridded values.

The IGRF field was not removed from the levelled total field because of large regional variations in the measured total field over relatively short distances. An FFT-based, two-dimensional operation was used to generate the Reduction-to-the-Pole version (RTP) of the total magnetic field map.

3.2.3. VLF Data

The processing applied to VLF data involved first correcting for a 2.0 second lag (caused by the internal acquisition of the instument). Then the field strengths from the two stations were summed. A regional field was calculated from the summed values and then subtracted from the summed values such that the resultant residual contained anomalous wavelengths shorter or equal to one thousand meters.

This filtering removes responses caused by long wavelength changes in signal strength and sharpens the short wavelength responses and produces a multi-directional image. However, all VLF maps can be very affected by terrain, resulting in anomalies displaying a high correlation with ridges that are parallel to the transmitter direction and that are moderately conductive.

3.2.4. Electromagnetic Data

Initially all channels of EM data were inspected for noise and noise characteristics on a flight by flight, line by line basis. Data falling within the allowable noise envelope were first treated with a non-linear filter (1.5 seconds width and 5% of tolerance) to reduce the amplitude of all spikes to within the acceptable noise envelope. Next, the data was treated with a lowpass, matched, recursive filter (0.3 second cutoff) to separate the signal from the remaining short period noise. This signal enhanced channel formed the basis for all further processing of the electromagnetic data in that channel. The procedure was then repeated for all EM channels. A visual inspection of the raw and filtered channels profiles at the same scale was carried out on every flight line.

The EM data were then subjected to a semi-automated anomaly picking using the low and mid frequency coaxial coil pairs (CX 875 Hz and 4,800 Hz) in order to ensure the highest resolution possible with respect to the anomalous zone nearest the surface. The technique was implemented by first calculating a residual for the inphase and quadrature components and plotting these at the same scale on the OASIS screen. As well, the original filtered component and the computed regional of the inphase component are plotted on the same screen to prevent the possibility of picking filter artifacts.

The picker then referred to the plots to pick the anticipated conductor locations and to the numerical window to check the digital values of the respective inphase and quadrature components. At this point the picker inserted an anomaly flag in the anomaly column such that he can export the amplitudes and location at the picked points only. The amplitudes are then used to interpret the conductance which could arise from a plate model (finite plate 600 X 300 m). The interpreted conductances were inserted into the database and an anomaly X,Y,Z file was re-exported and merged with the flight path in order to make an anomaly map.

Leveling of the EM channels was carried out on the coplanar coil pairs so that apparent resistivity map could be made. A table was constructed which consisted of averaged end point values of inphase and quadrature components of all sequential calibration flights along with their respective GPS times for each frequency. From this point a table file was made for each flight, for each component and for each frequency.

The required frequencies (CP 930 and 4,170 Hz) was leveled by assuming a linear drifting had occurred between the calibration lines. A resistivity value was then extracted from a lookup table of half space resistivity grid values for that frequency and component. If non-linear drifting had occurred (common in mountainous terrain) the zero levels was manually adjusted such that leveling errors in the data were minimized. Finally, the lower limit of values below the signal to noise threshold were clipped to a constant value. As well, those values above the approximate value of the respective frequency were also clipped to a constant value depending on the coherency of the resistivity data. This data was then exported in X,Y,Z format such that a resistivity map could be made.

3.3. Map Generation

3.3.1. General Characteristics

A standard grid cell size of 25 m for 1:20,000 scale (and 1;50,000) and 20 m for 1:10,000 scale was used. Computer generated contour maps of total field magnetics, vlf and resistivity were typically created from their respective grids. Colour maps were produced by interpolating the grid down to an appropriate pixel size. This data is then incremented with respect to specific amplitude ranges to provide solid colour "contour" maps. Black-line contours were also superimposed on the colour maps using GEOSOFT merging routines.

The UTM coordinate net was superimposed on the maps as well as the flight path. A colour pallet located at the right side of the map shows the different levels of intensity relative to the colour being mapped. Legend information identifying the client and the product is then added to the map surround.

The characteristics that have been produced and presented for these surveys are described below:

3.3.2. Magnetic Maps

Two different magnetic map sets were produced: Total **Intensity** and the **Total Magnetic Field Reduced to the Pole.** The magnetic data were contoured using 5,20 and 100 nT intervals.

3.3.3. Electromagnetic Maps

Contoured Apparent Resistivity Map at 930 and 4170 Hz - resistivity (in ohm-m), calculated using a half space formula for the horizontal co-planar frequencies of 930 and 4170 Hz.

EM Anomaly Symbol Maps - The symbols express conductance estimates for the anomalies detected by the vertical co-axial coils of 875 Hz and 4800 Hz. Each symbol shows the anomaly referenced by a letter, the frequency of the picked conductance and the conductance in Siemens based on a thin vertical plate 600 m X 300 m in dimension, separated in four different classes, as below:

Class I -	over 10 Siemens
Class II -	5 ≤ 10 Siemens
Class III-	1 ≤ 5 Siemens
Class IV -	≤ 1 Siemens

3.3.4. Other Contour Maps

The VLF data were presented in a colour version and tittled the **Summed Residual VLF Field Strength Map.** It was generated by processing of the total field measured by Line and Ortho stations. The VLF contouring information is presented in percent (%) of the primary field strength.

3.3.5. Base Map

A topographic base map was prepared for the survey areas at the scales of 1:20,000 and 1:10,000. The flight path and total magnetic intensity contours were superimposed on the base maps.

3.5. Digital Archives

One copy of digital grid archive was prepared.

3.6. Data Processing Personnel

Scintrex operations at the Data Center in Toronto was carried out by geophysicist Lily Manoukian.

4. DELIVERED PRODUCTS

4.1. Survey Report

The survey report describes the data acquisition, processing, and final presentation of the survey results. In addition to computed maps a tabulation of identified anomalies, anomaly sources and their characteristics forms part of the report.

4.2. Maps

The following maps were presented to Teuton Resources Corp. as results of the airborne geophysical survey carried out over concessions the company possesses in British Columbia.

4.2.1. Colour and Contour Maps

. Total Magnetic Field
. Reduced to the Pole Total Magnetic Field
. Summed VLF Field Strength
. Apparent Resistivity Cp-930 Hz

- Apparent Resistivity Cp-4180 Hz
- Total Magnetic Field of 2 zones combined

4.2.2. EM Anomaly Map

- EM Anomaly Symbols at Cx-875 and 4800 Hz

4.2.3. Base Maps

- Base Map with Em symbols path
- Base Map with Total magnetic field contours

4.3. Digital Archives

One copy of the digital archived was supplied to Teuton Resources Corp..

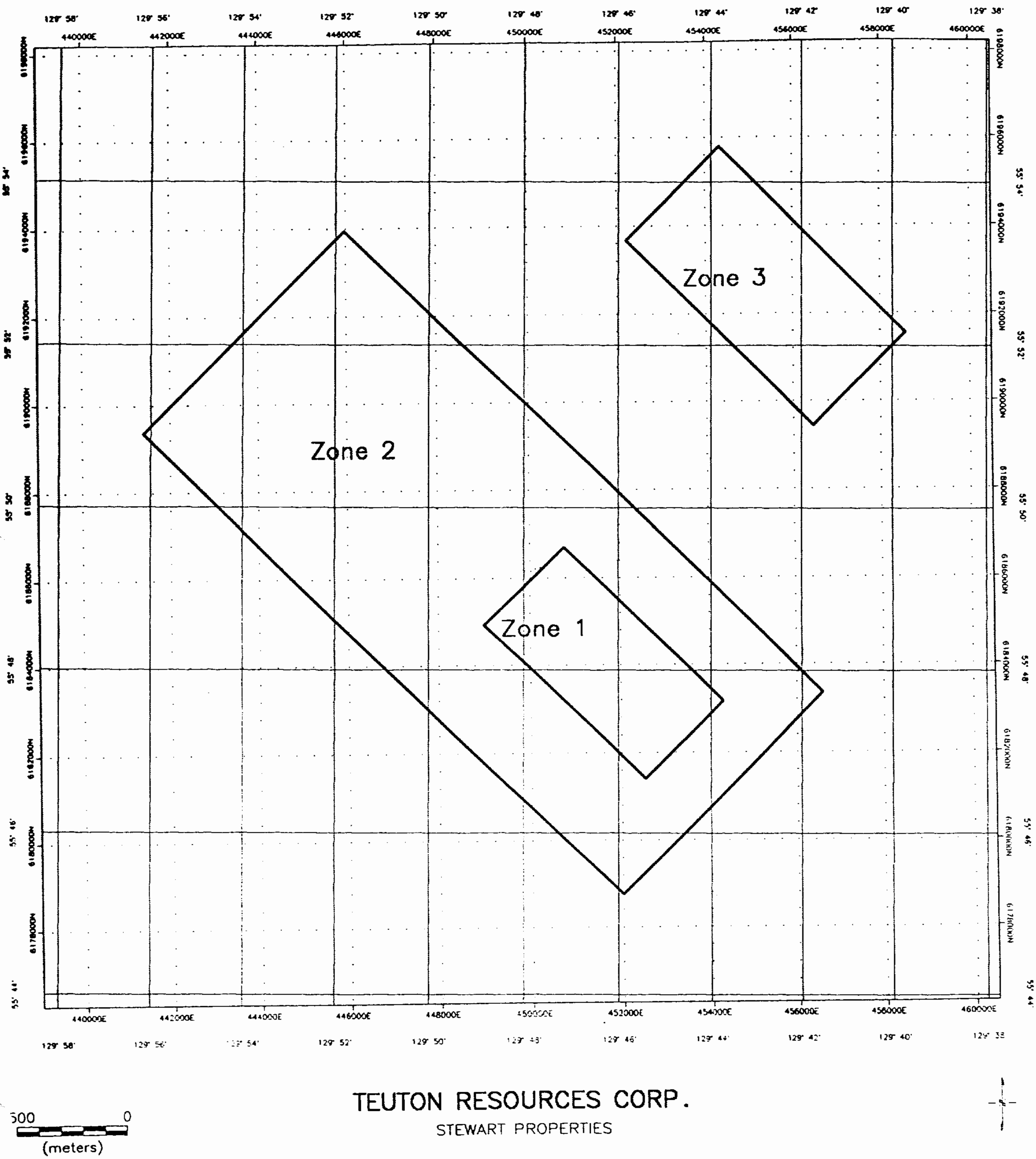
4.4. Analog Records and Flight Path Videos

All original analog chart records and video tapes available for each survey flight are delivered to Teuton Resources Corp.. Analog records are arranged in envelops and contain two sets of field profiles (EM/Magnetic and Radiometric/VLF data for each approved survey flight. Video tapes with flight path contain part or all of one complete flight.

SCINTREX LIMITED
June 27, 1996

APPENDIX I

SURVEY LOCATIONS



TEUTON RESOURCES CORP.

STEWART PROPERTIES

APPENDIX II

EM ANOMALY LISTING

CLONE PROJECT

STEWART PROPERTIES,ANOMALY LISTINGS

ZONE 1

Line	X	Y	Fiducial	Conductance (Mhos)	Frequency (Hz)	Ref.
535	451381.0400	6184680.1689	1236.8000	0.9	4800	A
545	451929.7600	6184676.5800	1427.8000	0.9	4800	A
605	452916.2234	6184142.7566	2111.8999	8.6	875	A
615	452258.4503	6183173.1817	2208.3999	5.0	875	A
625	452199.4110	6182860.2099	2262.7000	6.1	875	B

ZONE 2

Line	X	Y	Fiducial	Conductance (Mhos)	Frequency (Hz)	Ref.
10	445298.6000	6193240.0000	3275.2000	5.0	875	A
20	443327.2336	6191043.5432	3026.3999	0.8	4800	A
30	443475.3400	6190932.3000	2750.3999	1.5	4800	A
60	444020.8100	6190599.2100	1839.3000	3.7	875	A
	444489.6300	6190993.6466	1863.1000	3.9	875	B
	444617.9200	6191197.0389	1881.2000	3.9	875	C
80	444617.1804	6190665.1617	1322.3000	1.9	875	A
	444782.4664	6190830.1818	1334.2000	3.0	875	B
90	444723.4556	6190573.5722	1043.2000	2.9	4800	A
100	444487.6934	6190075.3027	785.2000	4.1	4800	A
120	445356.5703	6190339.8856	243.7000	3.4	4800	A
	445384.2094	6190360.2689	245.9000	2.7	4800	B
130	445698.7800	6190246.3800	4113.2002	9.8	4800	A
	445591.3200	6190141.3400	4122.3999	1.3	4800	B
	445353.1200	6189923.8600	4139.7998	4.5	4800	C
170	448183.6900	6191488.8400	2871.8999	1.1	4800	B
180	448244.3900	6191472.7200	2835.8999	1.1	4800	A
	448332.8400	6191540.7000	2840.3000	0.9	4800	B
190	444270.2600	6187144.6400	2545.2000	4.4	875	A
	443909.6560	6186875.8000	2589.3000	7.2	875	B
230	446554.9700	6188373.0300	1341.7000	1.6	4800	A
420	450047.3400	6186450.9300	2386.8999	2.5	4800	A
580	454044.3300	6185881.3600	2787.8999	6.4	875	A

ZONE 3

10	452823.3000	6194284.5000	233.0000	2.4	4800	A
110	454768.6229	6193361.3938	1562.7000	2.4	4800	A
130	454952.2950	6192991.7800	1931.0000	7.4	875	A

APPENDIX III

FLIGHT LOGS

CINT ARIE HY FLIG G

CLIENT: TELTOKI	BLOCK #:	JOB: 6128	PAGE OF
FLT #: 32	DATE: MAY 17	OPERATOR: JAMIK
PILOT: BOB M.	O.A.T.: 16°C /	A/C REG: ASTAR B1
BASE: STEWART	QNH: /	FUEL: 50 %
TAKE OFF: 17:30	LAND: 18:30	FLT TIME: 1:00
HEIGHT: 200	VLF LINE: SEATTLE	VLF ORTHO: MAINE
EM FREQ: F1 ___ F2 ___ F3 ___ F4 ___ F5 35		VIDEO TAPE #

GND TEST FILES	FLIGHT DATA FILES	SPECTROMETER R.O.I.'S
TEXT:	TEXT: 1720T23	TOTAL COUNT
DUP:	DUP:	POTASSIUM
RAW GPS:	RAW GPS:	URANIUM
		THORIUM

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GMD Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

LINE #	START	TIME		BOUNDARIES		FILE	ACCEPTED INTERVAL		COMMENTS
	FID	START	END	START	END	NAME	FID	BOUNDRY	
998.3	1					00B32			
720 E	158					00B41			
710 W						00B47			JPS TONES
700 E	669					00B51			F2 STRONG 800→
690 W	1114					00B59			
680 E	1364					01B04			F2 STRONG RESP.
670 W	1788					01B11			
994.7E	2080					01B21			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

CINT ARIB IY FLIG G

CLIENT: Teuton	BLOCK #: 2	JOB: 6128	PAGE OF

FLT #: 33
DATE: MAY 17/96
OPERATOR: DAMIR J.
PILOT: Bob M
O.A.T.: /
A/C REG: ASTAR ?1
BASE: Stewart
QNH: /
FUEL: 50%
TAKE OFF: 18:50
LAND: 20:05
FLT TIME: 1:15
HEIGHT: 200
VLF LINE: Seattle
VLF ORTHO: Maine
EM FREQ: F1 F2 F3 F4 F5 33K
VIDEO TAPE # 1

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GMD Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

GND TEST FILES
TEXT:
DUP:
RAW GPS:

FLIGHT DATA FILES
TEXT: 1701725
DUP:
RAW GPS:

SPECTROMETER R.O.I.'S
TOTAL COUNT
POTASSIUM
URANIUM
THORIUM

LINE #	START	TIME		BOUNDARIES		FILE	ACCEPTED INTERVAL		COMMENTS
	FID	START	END	START	END	NAME	FID	BOUNDRY	
3383E	1					01B49			
660E	129					01B57			360 → [illegible]
650W	513					02B04			
640E	770					02B10			
630W	1165					02B17			
620E	1422					02B22			
610W	1775					02B28			
600E	2013					02B33			
590W	2254					02B38			
580E	2515					02B42			
570W	2799					02B47			
555.3E	3067					02B54			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

SCINT... CARIB... HY... FLIG... OG

CLIENT: TEUTON	BLOCK #:	JOB: 6128	PAGE OF

FLT #: 34
PILOT: BOB M
BASE: STEWART
TAKE OFF: 20:20
HEIGHT: 200
EM FREQ: F1 ____ F2 ____ F3 ____ F4 ____ F5 ____

DATE: MAY 17 186
O.A.T.: 18°C /
QNH: /
LAND: 21:15
VLF LINE: SEATTLE

OPERATOR: DAMIR D
A/C REG: ASTAC 31
FUEL: 60%.
FLT TIME:
VLF ORTHO: MAINE
VIDEO TAPE #: 1

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GND Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

GND TEST FILES
TEXT:
DUP:
RAW GPS:

FLIGHT DATA FILES
TEXT: 1703T01
DUP:
RAW GPS:

SPECTROMETER R.O.I.'S
TOTAL COUNT
POTASSIUM
URANIUM
THORIUM

LINE #	START FID	TIME START	TIME END	BOUNDARIES START	BOUNDARIES END	FILE NAME	ACCEPTED INTERVAL FID	ACCEPTED INTERVAL BOUNDRY	COMMENTS
998.3E	1					03B19			NULL, QC
560 E	138					03B27			
550 W	511					03B33			
540 E	723					03B37			
530 W	1154					03B45			
520 E	1384					03B49			
510 W	1745					03B56			
[illegible]	1948					04B02			NULL, QC
999.3W									

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

SCINT ... CARIB ... HY ... FLIGHT LOG

CLIENT: TELUCK	BLOCK #: 2	JOB: C118	PAGE OF
FLT #: 35	DATE: MAY 18 / 96	OPERATOR: DARIO	
PILOT: Bob M	O.A.T.: 14°C /	A/C REG: [illegible]	
BASE: STEWART	QNH: /	FUEL: 60%.	
TAKE OFF: 7:45	LAND: 9:05	FLT TIME: 1:20	
HEIGHT: 200	VLF LINE: SEATTLE	VLF ORTHO: MAINE	
EM FREQ: F1 F2	F3 F4 F5 35K	VIDEO TAPE #: 2	

GND TEST FILES	FLIGHT DATA FILES	SPECTROMETER R.O.I.'S
TEXT: 17OCT06	TEXT: 1814T30	TOTAL COUNT
DUP:	DUP:	POTASSIUM
RAW GPS:	RAW GPS:	URANIUM
		THORIUM

TEST LINE CODES:

- EM GND PHASE: XXX1
- EM GND Q COIL: XXX2
- EM NULL/Q AIR: XXX3
- GND SPEC BG,UR TH: XXX4
- SPEC BG H2o/AIR XXX5
- SPEC TEST LINE XXX6
- RADAR ALT CAL XXX7
- TO BE ANNOUNCED XXX8
- TO BE ANNOUNCED XXX9

XXX=FLIGHT NUMBER

LINE #	START	TIME		BOUNDARIES		FILE	ACCEPTED INTERVAL		COMMENTS
	FID	START	END	START	END	NAME	FID	BOUNDRY	
35.1	1					14B20			PHASE NULL GND
999.3(?)	1					14B44			NULL Q.C AIR
500E	208					14B53			GPS JUMPS
490W	504					14B58			
480E	710					15B02			
470W	1069					15B08			
460E	1273					15B11			
450W	1544					15B16			
440E	1731					15B20			
430W	1968					15B24			
420E	2175					15B28			2360 – 2390 F5 INPH
410W	2553					15B34			
400E	2804					15B39			
390W	3212					15B46			
9993E	3477					15B52			NULL QC

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

CINT ARIB IY FLIG G

CLIENT:	BLOCK #:	JOB: 6125	PAGE OF

FLT # 36
PILOT:
BASE:
TAKE OFF: 9:20
HEIGHT:
EM FREQ: F1 F2 F3 F4 F5

DATE: MAY 18/96
O.A.T.: /
QNH: /
LAND: 10:45
VLF LINE:

OPERATOR:
A/C REG:
FUEL:
FLT TIME:
VLF ORTHO:
VIDEO TAPE #

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GND Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

GND TEST FILES
TEXT:
DUP:
RAW GPS:

FLIGHT DATA FILES
TEXT: 1815T57
DUP:
RAW GPS:

SPECTROMETER R.O.I.'S
TOTAL COUNT
POTASSIUM
URANIUM
THORIUM

LINE #	START	TIME		BOUNDARIES		FILE	ACCEPTED INTERVAL		COMMENTS
	FID	START	END	START	END	NAME	FID	BOUNDRY	
998.3 E	1					16B19			NULL ..
380. E	147					16B26			
370 W	572					16B34			
360 E	820					16B38			
350 W	1185					16B44			
340 E	1453					16B49			1600
330 W	1833					16B56			
320 E	2091					17B01			2230 – 2275
310 W	2515					17B08			
300 E	2747					17B13			2835 – 2885
290 W	3110					17B19			
280 E	3348					17B24			
270 W	3701					17B30			
999.3 E	3924					17B35			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

CINT ARIB HY FLIG G

CLIENT:	BLOCK #: 2	JOB: 6128	PAGE OF

FLT #: 37	DATE: MAY 15/96	OPERATOR:
PILOT:	O.A.T.: /	A/C REG:
BASE:	QNH: /	FUEL:
TAKE OFF: 11:55	LAND: 13:25	FLT TIME: 1:30
HEIGHT:	VLF LINE:	VLF ORTHO:
EM FREQ: F1 F2 F3 F4 F5		VIDEO TAPE #: 2

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GMD Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

GND TEST FILES	FLIGHT DATA FILES	SPECTROMETER R.O.I.'S
TEXT:	TEXT: 15/17 T 33	TOTAL COUNT
DUP:	DUP:	POTASSIUM
RAW GPS:	RAW GPS:	URANIUM
		THORIUM

LINE #	START	TIME		BOUNDARIES		FILE	ACCEPTED INTERVAL		COMMENTS
	FID	START	END	START	END	NAME	FID	BOUNDRY	
9993E	1					12B01			
260E	114					19B05			200 — 256
250W	626					19B14			
240E	889					19B18			
230W	1225					19B24			
220E	1476					19B29			
210W	1736					19B34			
200E	2023					19B38			
190W	2289					19B43			
180E	1634					19B49			
170W	2862					19B53			
160E	3136					19B58			
150W	3442					20B03			
140E	3759					20B09			
130W	4013					20B14			
999.3E	4285					20B18			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

SCINTREX-CARIBOU GEOPHYSICAL FLIGHT LOG

CLIENT: TEUTON	BLOCK #: 2	JOB: 6128	PAGE OF
FLT #: 38	DATE: MAY 18/96		OPERATOR: DARRIK
PILOT: BOB M	O.A.T.: 20°C /		A/C REG: ASTAR D1
BASE: STEWART	QNH: /		FUEL: 53%
TAKE OFF: 14:20	LAND: 15:55		FLT TIME:
HEIGHT: 200	VLF LINE: SEATTLE		VLF ORTHO: HAWAII
EM FREQ: F1 F2	F3	F4 F5	VIDEO TAPE # 3

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GMD Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

GND TEST FILES	FLIGHT DATA FILES		SPECTROMETER R.O.I.'S		
TEXT:	TEXT: 1820T23	1820T23	TOTAL COUNT		
DUP:	DUP:		POTASSIUM		
RAW GPS:	RAW GPS:		URANIUM		
			THORIUM		

LINE #	START FID	TIME START	TIME END	BOUNDARIES START	BOUNDARIES END	FILE NAME	ACCEPTED INTERVAL FID	ACCEPTED INTERVAL BOUNDRY	COMMENTS
998.3	1					20B24			
120.E	115					21B23			
110 W	353					21B28			GPS JUMPS
100 E	667					21B33			GPS JUMP
90 W	950					21B38			GPS JUMP
80 E	1176					21B42			GPS JUMPS
70 W	1452					21B47			GPS JUMPS
60 E	1700					21B51			
50 W	2003					21B57			
40 E	2273					22B01			
30 W	2585					22B07			
20 E	2860					22B12			
10 W	3215			?		22B18			
90105	3541			L50	L760	22B24			
90204	1				L570	22B36			
944.35	381					22B49			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

CINTI ARIB IY. FLIG G

CLIENT:	BLOCK #: 1	JOB: C128	PAGE 1 OF 2

FLT #: 39	DATE: MAY 10	OPERATOR:
PILOT:	O.A.T.: /	A/C REG:
BASE:	QNH: /	FUEL:
TAKE OFF: 16:20	LAND: 17:50	FLT TIME: 1:30
HEIGHT: 200	VLF LINE:	VLF ORTHO:
EM FREQ: F1 F2 F3 F4 F5		VIDEO TAPE #: 3

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GMD Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

GND TEST FILES	FLIGHT DATA FILES	SPECTROMETER R.O.I.'S
TEXT:	TEXT: 1022T48	TOTAL COUNT
DUP:	DUP:	POTASSIUM
RAW GPS:	RAW GPS:	URANIUM
		THORIUM

LINE #	START FID	TIME START	TIME END	BOUNDARIES START	BOUNDARIES END	FILE NAME	ACCEPTED INTERVAL FID	ACCEPTED INTERVAL BOUNDRY	COMMENTS
998.3	1					23B24			
1010 E	125					23B31			
1020 W	241					23B34			
1030 E	329					23B36			
1040 W	429					23B38			
1050 E	503					23B40			
1060 W	654					23B44			
1070 E	767								
1080 W	869								GPS STUCK
1090 E	1015					23B52			
1100 W	1186					23B55			GPS STUCK
1110 E	1313					23B58			
1120 W	1457					00B00			GPS JUMPS
1130 E	1554					00B02			
1140 W	1658					00B05			
1150 E	1798					00B08			
1160 W	1909					00B10			
1170 E	2015					00B12			
1180 W	2122					00B14			
1190 E	2225					00B17			
1200 W	2313					00B18			
1210 E	2408					00B21			
1220 W	2501					00B22			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

SCINT... CARIB... [illegible]Y FLIG[illegible]G

CLIENT:	BLOCK #:	JOB: 6128	PAGE 2 OF 2

FLT # 33
PILOT:
BASE:
TAKE OFF:
HEIGHT:
DATE: MAR 18
O.A.T.: /
QNH: /
LAND:
VLF LINE:
OPERATOR:
A/C REG:
FUEL:
FLT TIME:
VLF ORTHO:
VIDEO TAPE # 3

EM FREQ: F1 F2 F3 F4 F5

GND TEST FILES
TEXT:
DUP:
RAW GPS:

FLIGHT DATA FILES
TEXT:
DUP:
RAW GPS:

SPECTROMETER R.O.I.'S
TOTAL COUNT
POTASSIUM
URANIUM
THORIUM

TEST LINE CODES:

EM GND PHASE:	XXX1
EM GMD Q COIL:	XXX2
EM NULL/Q AIR:	XXX3
GND SPEC BG,UR TH:	XXX4
SPEC BG H2o/AIR	XXX5
SPEC TEST LINE	XXX6
RADAR ALT CAL	XXX7
TO BE ANNOUNCED	XXX8
TO BE ANNOUNCED	XXX9

XXX=FLIGHT NUMBER

LINE #	START FID	TIME START	TIME END	BOUNDARIES START	BOUNDARIES END	FILE NAME	ACCEPTED INTERVAL FID	ACCEPTED INTERVAL BOUNDRY	COMMENTS
1230 E	2586					00B24			
1240 W	2688					00B26			
1250 E	2769					00B28			
9040 N	2887					00B31			
9030 N	3074					00B37			
999.3 N	3229					00B43			

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME