October 1989

MOONGOLD RESOURCES INC.

HAWK MINERAL CLAIMS

Report on
1989 Exploration Program

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ILLUSTRATIONS

1. INTRODUCTION

The exploration program on Moongold's Hawk property was performed as a subcontract, under the management of Charlie Gold Inc.
NVC Engineering Ltd. provided technical services - geological mapping, geophysical and geochemical surveys. Under the overall supervision of V. Cukor, P.Eng., Damir Cukor, geologist, carried out the field program.

Field work was carried out during the month of October, under adverse weather conditions. The late start was caused mainly by the slow process of obtaining the necessary permits for the commencement of work within the park area. Prior to and after the completion of work, the field inspections were carried out by the Park inspectors.

The main objective of this part of the work was to find extensions of the vein structure, explored in the past by drilling and drifting, and to explore in detail the area where high geochemical soil results were obtained in prior surveys. This accomplished, the intention was to prospect the area south of Hawk Creek, toward the Red Dog Claims. This latest part could not be accomplished due to high and turbulent waters in Hawk Creek.

2. REVIEW

2.1 SUMMARY, CONCLUSIONS

The Hawk claim is mostly underlain by a Triassic volcano-sedimentary complex known to carry significant gold mineralization. On the property itself, the drill indicated reserves of 12,700 tons averaging 0.352 oz/t Au above the adit level have been reported (Noel, 1981).

This year's discovery of a showing assaying 0.23 oz/t Au over 1.9 m and with a grab sample assaying 2.384 oz/t Au is the highlight of the program. This could be interpreted as an extension of the Main Showing structure and thus would give a new perspective to the property's potential. In addition, the discovery of the large zone with anomalous gold geochemical values in the eastern portion of grid 1 should incite renewed interest in the property.

However, the inclusion of the property in the Edziza Park area calls for extreme caution. With the recent growing environmental awareness in the province, it has become increasingly difficult and expensive to meet all requirements and demands from the Parks and Environment branches of the government. It is also becoming more and more time consuming to obtain all the necessary permits for development. This might eventually lead to further reductions of an already short work season. The board of directors of both Moongold and Newhawk should give serious consideration to these problems when making future plans for further exploration and development.

2.2 RECOMMENDATIONS

There are three areas which deserve further intensive exploration on the Hawk 1 claim. First priority should be given to the area from where samples DC 17, 18, 19, 21 and 22 were collected. The main thrust should be toward exploring the idea that since these showings line up along the strike extension of the main structure, they indeed could be part of that zone. Detailed mapping and trenching should be carried out in this area.

The second area of interest is the extensive geochemical gold anomaly on the eastern portion of grid 1, containing some high values. Rock samples DC 9 and 10 were collected from here as well. This area requires further geological mapping, extensive sampling and trenching.

The third area of interest is the part of Hawk 1 claim south of Hawk Creek. This area should be prospected along the creek canyons and geochemically explored along a widely spaced grid.

If this next stage proves the southward extension of the main structure through the area of the newly discovered showings, an extensive drill program will be recommended as the subsequent stage of exploration.

2.3 COST ESTIMATE

The following is the estimated cost for the next stage of exploration:

Geological mapping - geologist	
60 days @ $300.00	$ 18,000.00
Assistant, 60 days @ $120.00	7,200.00
Grid cutting, soil sampling, trenching -	
three man crew, 60 days @ $120.00	21,600.00
Cook	5,000.00
Camp operation - 360 man days @ $65.00	23,400.00
Assays (estimated)	15,000.00
Mobilization, demobilization, camp	
supply, helicopter 25 hours @ $700.00	17,500.00
Expediting, communications	5,000.00
Field Program	$112,700.00
Data Compilation	7,500.00
Engineering Report	10,000.00
Contingencies	15,000.00
Total Estimated Budget	$145,200.00

3. PROPERTY

3.1 LOCATION

Moongold Resources' Hawk Property is located in the north-western portion of British Columbia, approximately 35 km west of Iskut, and 35 km south-east of Telegraph Creek. The claims are on NTS 104 G10 and 104 G9W. The property is centred on about 57° 42' north latitude and 130° 29' west longitude.

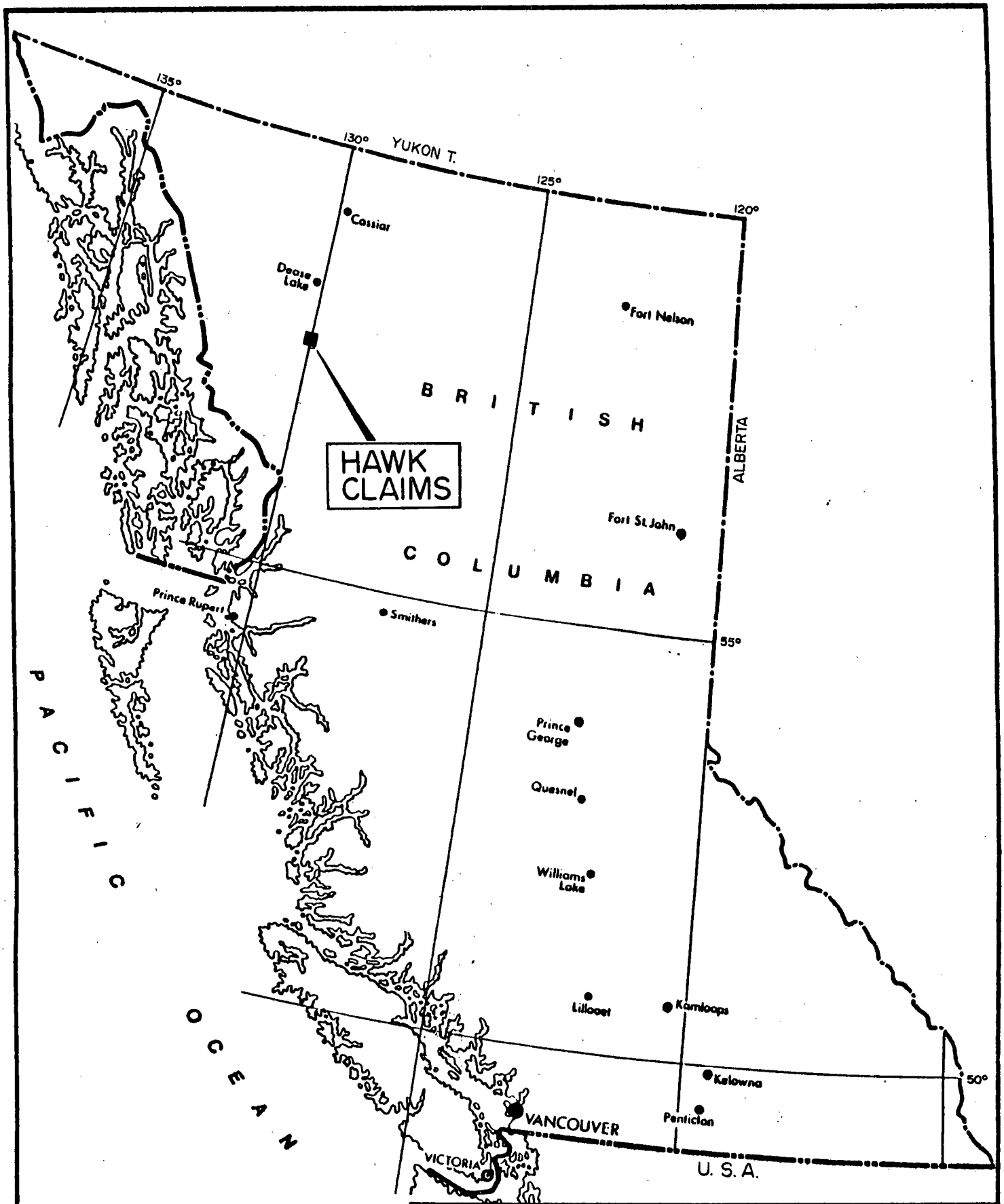
The property lies within Edziza Provincial Park and permits must be obtained from the Ministry of Parks in order to do any exploration work. This process takes from six weeks to three months. As well, the company is required to post a damage bond.

3.2 ACCESS

Access to the property is by helicopter from Iskut or Tatooga Lodge (summer helicopter bases) or directly from Dease Lake (permanent helicopter base). Although it is possible to land with a float plane on Nuttlude Lake, the road up to the campsite would have to be reconditioned before it could be used by an all-terrain vehicle; parts of the road are blocked by rockfalls and much of the road is grown over by scrub alder.

3.3 TOPOGRAPHY AND CLIMATE

The Hawk property is located on the Stikine Plateau, on the eastern slopes of Mount Edziza. Elevations on the property range from 2.700 ft. to 5,500 ft. for a total relief of 1,800 ft.



MOONGOLD RESOURCES INC

HAWK CLAIMS LOCATION MAP

LIARD M.D., B.C.

NTS 104 G/9W,10E

NVC ENGINEERING Ltd. - VANCOUVER, B.C.

DATE: October 1989

SCALE: 0 50 100 150 200 km

FIG. 1

Hawk 1 claim occupies the Hawk Creek Valley while the Hawk 2 claim covers the east slope of one of the numerous, steep-sided ridges of Mount Edziza, as well as a portion of the flats, towards Nuttlude lake. The physiography of the general area is a product of both recent glaciation and recent volcanism. Some of the numerous ridges surrounding Mount Edziza show the characteristic flat tops of lava flows while the valleys between have been carved steep-sided and U-shaped by the glaciers. The lower wooded slopes are between 20° and 30° in steepness and the upper, alpine slopes generally between 30° and 40° with a few slopes as extreme as 55°.

The slopes, especially the south facing slope on Hawk 1, have been deeply incised by steep-sided stream gullies. These streams, torrential from the snow melt in the spring, occupy oversized stream channels in other seasons. Hawk Creek is glacier fed and quite wild even in the other seasons. In the winter time, snowslides are frequent.

The treeline is about 4,100 ft. The woods consist almost exclusively of spruce with occasional jackpine or lodgepole pine and balsam. The underbrush consists of juvenile spruce, willows, mountain ash and various berry bushes. On the edge of slide areas, cottonwoods, alder and willows grow. The recent slide areas are covered by grasses, while other slides are covered by slide alder; some parts of the slides are infested by stinging nettles. Above the timberline grow willows, huckleberries, junipers and grasses.

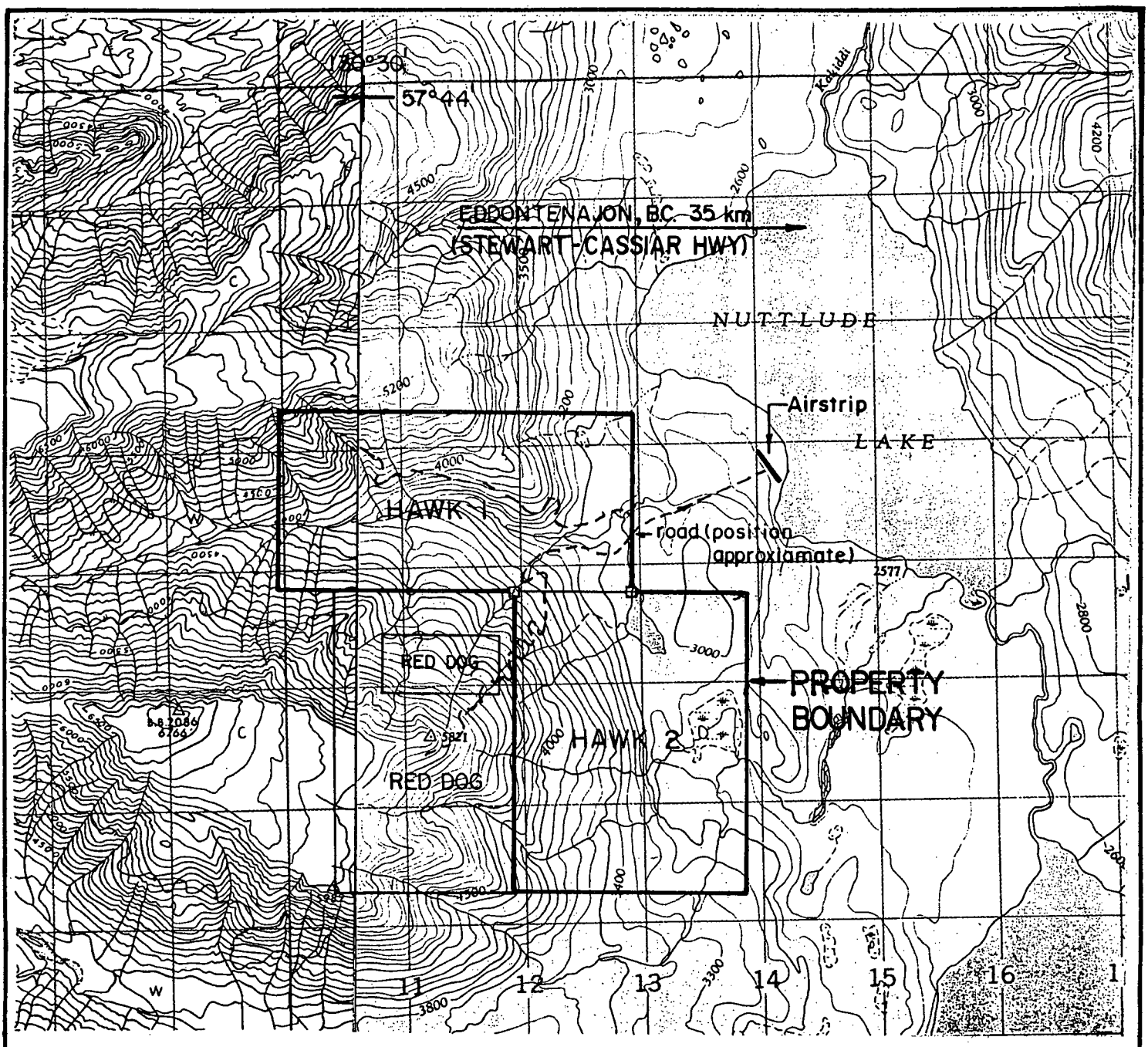
The climate of the area is of the northern interior type, characterized by short warm summers, long cold winters and most of the annual precipitation is in the form of snow. Snow typically occurs on the property from October to May.

Plentiful timber and water for exploration purposes are found on the property.

3.4 CLAIMS

The Hawk property comprises two contiguous mineral claims. Both claims are owned by Newhawk Gold Mines and are under an option agreement to Moongold Resources Inc. The claim names and corresponding record data are as follows:

Claim Name	No. of Units	Record No.	Anniversary Date
Hawk 1	18	532	February 21, 1991
Hawk 2	20	533	February 21, 1991



MOONGOLD RESOURCES INC

HAWK CLAIMS
CLAIMS and TOPOGRAPHY

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE: 0 500 1000 m	FIG. 2

4. GEOLOGY

4.1 REGIONAL GEOLOGY

The regional geology of the area has been studied and described by Souther (1971-72). Exploration by Cominco, Northcal and Newhawk made further contributions to geological knowledge of the property area.

A majority of the general area is underlain by a complex of volcano-sedimentary rocks of upper Triassic age. This complex consists of andesite and/or dacite flows, pyroclastics and such sediments as siltstone, greywacke, chert and sometimes limestone. The complex is invaded by numerous large or small Jurassic to Cretaceous intrusive bodies and related dykes.

A prominent feature in the area is a sequence of basalt flows and pyroclastics of late Tertiary to Pleistocene age, belonging to the Mount Edziza recent volcanism. These flows are flat lying, and they obscure older features; locally it has been observed that they are on the top of unconsolidated river gravel.

4.2 PROPERTY GEOLOGY

Mapping was carried out on Hawk 1 claim only, but it is known from previous exploration that most of Hawk 2 claim is covered by young Edziza flows and pyroclastics.

On Hawk 1 claim, the Edziza volcanics appear only on the high ground in the northwest corner of the claim. Diorite appears on only one location, on the claim on the west side. Here it is in intrusive contact with dacite from the following unit.

Different members of the Upper Triassic volcano-sedimentary complex cover the remainder of the Hawk 1 claim. This complex has been broken down into the following units for mapping purposes:

Chert: Only proper chert in this unit; the rock had to be extremely hard and brittle and have prominent box fracturing to be classified as chert. There is an abundance of dacite and andesite with various degrees of chertiners - classified under dacite and andesite. In several locations, cherty layering was noted, and on three locations the contact between chert and overlying strata were measured (see fig. 3).

Tuff: Rocks of mainly dacitic composition but with pyroclastic grain; this grain had to be visible and obvious.

Andesite: Dark grey, usually weathering with a brown hematitic-limonitic stain. Fine grained, massive, cherty in places.

Dacite: Medium grey, weathers brown with much limonitic stain. The most altered appearing of all the units. Fractured heavily and irregularly. Rock often contains a minor constituent of pyrite or iron oxides.

Basalt: Very dark grey, fine grained. Very few outcrops of this rock type.

The Composite Plan (fig. 3) shows the distribution of the described geological units.

Most of the Triassic units show a lensy character with an east-west or northeast-southwest strike. This trend is almost perpendicular to the majority of the geophysical trends on the property, which are in turn coincidental with the strike of the major showing structure and/or recognized faults and fracture systems.

The types of mineralization found on the claims has been described in great detail in previous reports and no new thoughts can be offered on this subject now. However, several samples from pyritized and silicified shear structures returned significant gold values. Better assays are shown in the following table:

Sample No.	Width (metres)	Description	oz/t Au
DC-6	0.5	Chip	0.015
DC-8	1.0	Chip	1.287
DC-9	-	Float	0.015
DC-13	-	Grab	0.018
DC-17	0.5	Chip	0.488
DC-18	1.0	Chip	0.040
DC-19	0.4	Chip	0.400
DC-22	-	Select	2.384

(For a detailed description of samples, see Appendix "A".)

Samples DC 17, 18 and 19 are on a 1.9 metre wide calc-silicate structure. The weighted average of these three samples is 0.23 oz/t over 1.9 metres. Sample DC 22 was taken from the same structure about five metres north of the three samples above. It consisted of a select-grab chunk of about 5 lb. of silicified and oxydized shear zone material.

The samples just described represent the most significant discovery of the 1989 program. Although the particular samples were taken from the structure with a strike N5E, which coincides with most of the cross-structures in the area, the showing is also on the strike extension of the main Hawk structure. Sample DC 21 is further south on the same trend, but it assayed only 0.005 oz/t gold. However, trenching of this locality could easily lead to the discovery of a more significant showing.

The other significant assay was obtained from sample DC 8, assaying 1.287 oz/t gold over the width of 1 metre. This sample of fault breccia with pyrite and arsenopyrite was taken at the northeastern corner of the extensive geochemical anomaly on grid 1. Float sample DC 9, assaying 0.015 oz/t gold was taken at the northern extension of the same zone, about 200 metres north of the limits of grid 1.

Only two samples were taken on grid 2; sample DC 13 assayed 0.018 oz/t Au. This sample, however, fell in an area where no geochemical response was recorded.

5. GEOPHYSICAL SURVEYS

5.1 GENERAL DESCRIPTION

The geophysical surveys consisted of ground magnetics, VLF-EM, and resistivity. These surveys were run simultaneously, all utilizing the Scintrex IGS-II system.

The part of the system dedicated to magnetics utilizes two console units, one set up as the base station, the other as the portable unit, and two similar proton precession sensors measuring total magnetic field. The base station and field unit are time synchronized so that the background field, diurnal variations and micro pulsations can be filtered from the data. The base station was programmed to measure the field and record the readings at five second intervals.

The VLF unit was set up to receive signals from two stations: NLK Seattle, Washington, 24.8 kHz and NPM, Lualualei, Hawaii, 23.4 kHz, measuring the horizontal field strength, and the in-phase and quadrature (or out-of-phase) components of the vertical field. The instrument uses a three coil system, one horizontal and two vertical coils, all at 90 angles to each other. The system is set to automatically adjust for topographical shadowing of signals.

For the resistivity survey, the IGS-II makes measurements of the VLF electric field, utilizing a dipole with an electrode spacing of five metres. The instrument then automatically calculates apparent resistivity from the in-phase and quadrature components of the horizontal electric field, using the horizontal magnetic field as a reference. See Appendix "B" for the apparent resistivity calculation.

As a preparation for the surveys, about 18 kilometres of grid lines were cut at 50 metre spacing, along which 25 metre stations were marked. For this purpose, 3 kilomtres of the 1988 Shangri-La grid was utilized with new, intermediate lines cut and new grid lines extended northward. The whole of grid 2 was cut this year east of grid 1. Grid 1 crosses two steep canyons, and portions of cross-lines are missing in such areas.

The entire lengths of grid 1 and grid 2 were used for geophysical surveys. Only portions of the grids were soil sampled, and portions were used as control points for geological mapping.

5.2 GROUND MAGNETIC SURVEY

The ground magnetic survey was performed on both grid 1 and grid 2 utilizing the Scintrex IGS system. The same set up for the base station was used for both grids, so all data have the same megnetic base.

Details on the theory of magnetic surveying and the instrument specifications are described in the previous chapter and in Appendix "B".

On each station, the total magnetic field was measured and corrected for diurnal variations and micropulsations. These values were then reduced by 58,000 gammas for easier handling and interpretation. These relative values obtained were then plotted on grid maps (figs. 4 and 5) and contoured.

Grid 1 shows a total magnetic relief of 1,187 gammas, with the lowest value being -300 and the highest 887 gammas.

In general, figure 4 shows a broad area of moderately low magnetic susceptibility. Only the anomaly M-1 and probably the related low anomaly M-3 shows the likely structural trend, parallel to the structure of the main showings.

Grid 2 (figure 5) shows a much higher magnetic relief than grid 1. With a low of -361 gammas and a high of 2,780 gammas, the total relief on this grid is 3,141 gammas. This grid, with its higher contrast, displays a trend parallel to the main showing on grid 1, and trends are much clearer than on grid 1. Although the grids are in close proximity to each other, grid 2 has the obviously higher magnetic susceptibility. This corresponds with the limits of the alteration envelope. Thus, the magnetite is expected to have been destroyed over much of the grid 1 area, while grid 2 rocks have retained thier magnetite and in fact, may have some skarning; M-9 and M-10 highs and the M-8 low may be due to this effect. M-5 and M-6 appear to be cross-structures.

5.3 VLF-EM SURVEY

Results of the VLF-EM survey are displayed as stacked profiles for both Seattle and Hawaii stations, for both grids 1 and 2 and also as contoured Fraser Filter plans, again for both grids 1 and 2; see figures 6-11.

On grid 1, on fig. 6, the VLF-EM stacked profiles, there are several conductors of interest, labelled from SP1 through to SP6. SP1 is the longest anomaly spanning 200 metres. It follows the same trend displayed by SF1 on the Seattle Fraser Filter plan and the trned on resistivity survey. SP2 is a short-structure - under 100 metres in length, though fair in response. SP3 is a weak conductor. SP4 and SP5 may be faulted extensions of a single conductor, as may be SP6 and SP7.

The Hawaii Stacked Profiles data contains no cross-overs, with all the data being in the negative values. This is probably due to the effect of the extreme topographical slopes. However, the Fraser Filter data does show some interesting structures. HF1 is in the same area as where Seattle Fraser Filter shows some moderate response. HF2 correlates directly with SF2 and HF3 with SF4.

Grid 2 - only two conductors of length are shown on fig. 10, the profile plan for Seattle for grid 2. Of these SP8 occurs within the Fraser Filter anomaly SF5 and the more substantial SP9 within SF6. SF10 overlies a Fraser Filter low. The Fraser Filter map, fig. 11, again shows the structure much better. The most conspicuous feature on the mpa is the low SF6, lying at about 170° across the whole map area.

On the Hawaii stacked profile plan, there are four short anomalies, all occurring in the southern portion of the grid. Only HP2 coincides with a Fraser Filter anomaly. Again, the Fraser Filter plan displays the structure better. The conductor HF6 corresponds directly with conductor SF6.

5.4 RESISTIVITY SURVEY

Results of the resistivity survey are displayed on contoured plans, figures 14 and 15.

Grid 1 - on fig. 14, grid 1 the resistivity high is 1,770 and the low 61 ohm metres, for a total relief of 1,709 ohm metres - only moderate relief. The contour interval is 100 ohm metres, values over 600 ohm metres are considered high anomalies and under 200 ohm metres, low anomalies. The general pattern of the low and high anomalies conforms to that displayed by the Fraser Filter plans. However, it is the low anomalies (high

conductivity) that may have economic importance. R1 is a fiarly strong low anomaly; it coincides with SF1 Fraser Filter anomaly. R2 is the strongest and longest anomaly on the map; it corresponds with both the Hawaii and Seattle Fraser Filter anomalies; SF2 and HF2. R3 runs as a cross-structure to R2 but has no support from either the Seattle or the Hawaii VLF-EM data.

For grid 2, fig. 15, there is much greater relief than grid 1, 6,477 ohm metres with a high of 6,560 and a low of 83 ohm metres. Contour interval is 500 ohm metres, with an extra contour at 250 ohm metres to deliniate better the low anomalies. Values over 1,500 ohm metres are considered high anomalies and values under 500 as the low ones. Several structures are apparent. R4 runs semi-parallel with the baseline; it is partially coincident with Fraser Filter anomalies SF6 and HF6 (both Seattle and Hawaii). R5 runs at almost right angles to R4 and is supported by both the Seattle and Hawaii VLF-EM data.

6. GEOCHEMICAL SURVEY

6.1 GENERAL DESCRIPTION OF SURVEY

Soil samples were located on the same two grids as were the geophysical surveys. The geochemical sampling on grid 1 was designed to augment the 1987 sampling by Shangri-La Minerals Limited. Grid 2 was constructed in the area where Cominco Ltd. reported some high gold values by geochemical reconnaisance. Grid 2 areas were sampled where geophysical anomalies were detected.

Samples were taken along the grid lines at 25 metre intervals, preferably from the "B" horizon. On some locations, the soil was very poorly developed and any fine material found on site was sampled. Locations with rock outcrops and/or with very deep organic material were left unsampled.

During the field work, a total of 120 soil samples were collected. they were taken from small pits dug by mattock. On most of the locations, the "B" horizon was at a depth of 5-20 cm. during sampling, pebbles, roots and organic material was discarded and soil was packed in standard kraft paper envelopes, on which site locations were marked. Samples were dried partially in the field and then delivered to General Testing Laboratories to be tested for gold.

The Laboratory has reported processing the samples in the following manner:

Samples were oven dried and screened by 50 mesh sieve. A 10 gram sample of the -50 mesh fraction was first processed by fire assay. The thus produced metallic bead was crushed, disolved with hot aqua regia and assayed for gold by Atomic Absorption. The lowest detectable limit was set by the laboratory at 0.02 ppm gold.

The results were plotted on the two geochemical plans, scale 1:2000, figure 16, showing the grid 1 area and figure 17, outlining the grid 2 results. For easier interpretation, results on the plans are plotted in ppb gold.

6.2 DISCUSSION OF RESULTS

Grid 1

On grid 1, only the northeast corner was sampled to complement the 1987 survey by Shangri-La, which detected high gold values in their part of the grid.

Figure 16 shows the recent assay results as well as the results in the anomalous area by Shangri-La. the extensive rock outcrops in the area of this year's survey allowed only sparse coverage by sampling. Nevertheless, out of 35 samples taken, 19 are over the anomalous threshold, of which 10 are in the significantly anomalous group. The highest reading is 560 ppb gold. the majority of these anomalous readings are grouped in the northern extension of Shangri-La's anomaly. The incompatibility of the two surveys as well as the irregularity of the sample distributions on both grids makes it impossible to contour the results and to interpret any possible trends of high anomalies. However, an area of about 200 metres wide by 500 metres long (marked by hatched lines) containing numerous readings of over 100 ppb gold should be considered an exceptional target for future exploration.

Grid 2

On Grid 2, the area covered by geophysical anomalies was sampled mainly. Anomalous values were contoured at 40 ppb (anomalous threshold) and 75 ppb (significantly anomalous).

As shown on fig. 17, most of the samples returned background values. Only several spotty, moderately high values appeared - the highest being 100 ppb Au. The only rock sample that returned some low, but significant gold, did not coincide with any of the areas with geochemical response.

Respectfully submitted

NVC Engineering Ltd.

D. Cukor, Geologist

V. Cukor, P.Eng.

NVC engineering ltd.

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CHARLIE GOLD INC.
804-750 West Pender
Vancouver, B.C.

October 18, 1989
Invoice # 579

Work program on the Hawk Property - Dease Lake B.C. area for the Moongold Resources Inc. Engineering services were performed from January 1989 and field work was completed in September and October 1989.

Magnetic survey, 17.5 km @ $ 600	10,500
VLF-EM survey, 17.5 km @ $ 700 (2 stations)	12,250
Resistivity Survey	21,000
Geological Mapping and Rock Sampling	5,000
Gaochemical soil sampling 120@ $ 15	1,800
Assays	1,740
Data compilation and Report	8,000
Drafting and printing maps and Reports	3,200
Engineering and Consulting	8,000
Total Charges	$ 71,490

CERTIFICATE

I, DAMIR CUKOR, of 6108 McKee Street Burnaby, British Columbia, DO HEREBY CERTIFY that:

1. I graduated from the University of British Columbia in 1984 as a Bachelor of Science in Geology;

2. Since 1983, I have been employed as a geologist with NVC ENGINEERING LTD;

3. I have worked in the field of exploration geology and geophysics for 12 seasons and have held positions of responsibility since 1982;

4. I performed and/or executed work as documented in this Report;

5. I have no interest, direct or indirect, in the properties of Moongold Resources Inc.

D. Cukor
NVC ENGINEERING LTD.

November 1989

CERTIFICATE

I, VLADIMIR CUKOR, of 304 - 1720 Barclay Street in the City of Vancouver, Province of British Columbia, DO HEREBY CERTIFY that:

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

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

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

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

5. I have supervsed the work program on the Hawk property.

November 1989

V. Cukor
NVC ENGINEERING LTD.

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A P P E N D I X "A"

DESCRIPTION OF ROCK SAMPLES

APPENDIX "A"

DC 1 — 40 cm chip sample of vein material. Gouge, quartz with pyrite arsenopyrite, speccularite and earthy hematite.

DC 2 — Grab sample of silicified, sheared material; hematitic but lacking in sulfide.

DC 3 — 40 cm rough chip sample from sub-horizontal gougy,zone. Hematite (earthy), limonite with minor silicification. Rock fractured and quite rubbly.

DC 4 — 1.3 m chip sample over breccia zone; somewhat gougy with quite heavy limonite and hematite stain.

DC 5 — 2 m chip sample of silicified pyritized brecciated dacite. Pyrite content: about 3%.

DC 6 — 50 cm chip sample from structure parallel to DC 5 structure. Silicified, pyritized, limonite material with some arsenopyrite. Manganese stained.

DC 7 — 30 cm ship sample of brecciated, pyritized, chloritized, somewhat silicified material with arsenopyrite..

DC 8 — 1 m chip sample of fault breccia. Bleached and oxydized, gougy and/or vuggy in some places. Rock heavily altered - silicification, chloritization, pyritization and hematite and limonite. Some arsenopyrite.

DC 9 — Silicified float with hematite.

DC 10 — 1.5 m chip sample of altered dacite. Material silicified.

DC 11 40 cm chip sample of altered, silicified, gougy material. Hematitic and limonite alteration.

DC 12 40 cm chip sample of rusty, silicified dacite.

DC 13 Grab sample of limey volcanic magnetic (may be skained).

DC 14 Grab sample of silicified hematitic magnetic material.

DC 15 15 cm chip sample of brecciated cherty dacite. Earthy hematite but no sulphides visible.

DC 16 2 m select sample of better looking lenses from breccia zone. Lenses approximately 30 cm in diameter.

DC 17 50 cm chip sample from fault structure (west portion). Heavily altered material with silicification, solid and disseminated pyrite, arsenopyrite and minor chalcopyrite.

DC 18 1 m chip sample. Continuation of the structure above (central portion) fault slice; less mineralized than the breccia zones. Disseminated pyrite; minor arsenopyrite.

DC 19 40 cm chip sample of eastern breccia zone. Same type of material as in DC 17.

DC 20 2 m chip sample of fault material; gougy, silicified in part, kaolinitic in part. Pyrite disseminated to solid, and possibly some arsenopyrite.

DC 21 40 cm ship sample of silicified, kaolinitic, hematitic material.

A P P E N D I X "B"

GEOPHYSICAL THEORY AND INSTRUMENT SPECIFICATION

THE IGS-2 SYSTEM

1.0 INTRODUCTION

1.1 General Information

The IGS-2 Integrated Geophysical System is a portable microprocessor-based instrument which allows more than one type of survey measurement to be performed by a single operator during a survey.

The IGS-2 is a modular system which can easily be configured to suit different and changing survey requirements. Reconfiguring the system is easy and offers both operational flexibility and minimal redundancy with a minimum number of spare consoles and/or modules.

When configured with any of the available sensor options, the IGS-2 System Control Console becomes a method-specific instrument according to the sensor option(s) utilized. In addition, the IGS-2 Console is an electronic notebook into which geophysical, geological or other data may be manually entered and digitally stored.

Data is stored in the IGS-2 in an expandable, solid state memory and can be output in the field by connecting the instrument to a printer, tape recorder, modem or microcomputer.

The 32 character digital display uses full words in most cases, ensuring clear communication. Both present and previous data are displayed simultaneously, allowing comparisons to be made at a glance during a survey.

The IGS-2 records header information, data values, station number, line number, grid number and the time of each observation in its internal memory. Data are first sorted by grid number, then in order of increasing line number and, within each line, by increasing station number. In this way, the data are organized logically regardless of the sequence in which they were taken. Ancillary data can also be manually entered and recorded at a given station, along with the survey parameters.

The IGS-2 may appear complex because of the new microprocessor-based technology employed in its design. However, it does not perform any operation that is, in principle, unfamiliar to an experienced operator. Only the procedures have changed. For instance, data can now be recorded in the memory of the IGS-2 by a

series of simple keystrokes, rather than recording measurements by hand in a notebook. Likewise, an error spotted in the records, which would be corrected or erased by hand, is now corrected by means of the Edit function which allows the error to be removed from memory, corrected, and then refiled, or erased altogether.

1.2 Product Updates

At Scintrex we are continually working in improve our line of products. You may be notified as important changes occur to either the software or hardware of our products. We would appreciate hearing from you if you are interested in our latest developments. We would also value hearing from you about any successes, or problems you may have encountered so that we may advise you.

THE MP-3/4 MAGNETOMETER

1.0 INTRODUCTION

1.1 General Outline

This section of the manual describes in detail the proton magnetometer method.

A theoretical explanation of the magnetic method is given first. Then the table MAG SETUP MENUS is presented for reference. After this, the following topics are dealt with in detail:

1) method enabling procedures,
2) measuring procedures,
3) warning messages,
4) equipment setup procedures,
5) troubleshooting information,
6) specifications and
7) parts list.

1.2 The Magnetic Method

The magnetic method consists of measuring the magnetic field of the earth as influenced by rock formations having different magnetic properties and configurations. The measured field is the vector sum of induced and remanent magnetic effects. Thus, there are three factors, excluding geometrical factors, which determine the magnetic field. These are the strength of the earth's magnetic field, the magnetic susceptibilities of the rocks present and their remanent magnetism.

The earth's magnetic field is similar in form to that of a bar magnet's. The flux lines of the geomagnetic field are vertical at the north and south magnetic poles where the strength is approximately 60,000 nT. In the equatorial region, the field is horizontal and its strength is approximately 30,000 nT.

The primary geomagnetic field is, for the purposes of normal mineral exploration surveys, constant in space and time. Magnetic field measurements may, however, vary considerably due to short term external magnetic influences. The magnitude of these variations is unpredictable. In the case of sudden magnetic storms, it may reach several hundred gammas over a few minutes. It may be

necessary, therefore, to take continuous readings of the geomagnetic field with a base station magnetometer while the magnetic survey is being done. An alternative field procedure is to make periodic repeat measurements at convenient traverse points, although this is a very unreliable method during active magnetic storms when it is important to have proper reference data.

The intensity of magnetization induced in rocks by the geomagnetic field F is given by:

$$I = kF$$

where I is the induced magnetization
k is the volume magnetic susceptibility
F is the strength of the geomagnetic field

For most materials, k is very much less than 1. If k is negative, the body is said to be diamagnetic. Examples are quartz, marble, graphite and rock salt. If k is a small positive value, the body is said to be paramagnetic, examples of which are gneiss ($k = 0.002$), pegmatite, dolomite and syenite. If k is a large positive value, the body is strongly magnetic and it is said to be ferromagnetic, for example, magnetite ($k = 0.3$), ilmenite and pyrrhotite.

The susceptibilities of rocks are determined primarily by their magnetite content since this mineral is so strongly magnetic and so widely distributed in the various rock types. (Of considerable importance, as well, is the pyrrhotite content.)

The remanent magnetization of rocks depends both on their composition and their previous history. Whereas the induced magnetization is nearly always parallel to the direction of the geomagnetic field, the natural remanent magnetization may bear no relation to the present direction and intensity of the earth's field. The remanent magnetization is related to the direction of the earth's field at the time the rocks were last magnetized. Movement of the body through folding, etc., and the chemical history since the previous magnetization are additional factors which affect the magnitude and direction of the remanent magnetic vector.

Thus, the resultant magnetization M of a rock is given by:

$$M = M_n + kF$$

where M_n is the natural remanent magnetization, and F is a vector which can be completely specified by its horizontal (H) and vertical (Z) components and by the declination (D) from true north. Similarly, M_n is specified when its magnitude and direction are known. Thus, considerable simplification results if $M_n = 0$, whereupon M merely reduces to kF. In the early days of magnetic

prospecting, it was usually assumed that there was no remanent magnetization. However, it has now been established that both igneous and sedimentary rocks possess remanent magnetization, and that the phenomenon is a widespread one.

1.2 Theory of Operation

The Very Low Frequency (VLF) Electromagnetic Method measures variations in the components of the electromagnetic fields, set up by communication stations operating in the 15 to 30 kHz frequency range. These stations, located around the world, generate signals for the purposes of navigation and communication with submarines.

In far field, above uniform earth, the groundwave of the vertically polarized VLF radiowave has three field components:

1) a radial, horizontal electrical field,
2) a vertical electrical field, and
3) a tangential, horizontal magnetic field.

When these three fields meet conductive bodies in the ground, eddy currents are induced causing secondary fields to radiate outwards from these conductors. In the Magnetic Field mode, the IGS-2/ VLF-4 measures the horizontal field and two components of the

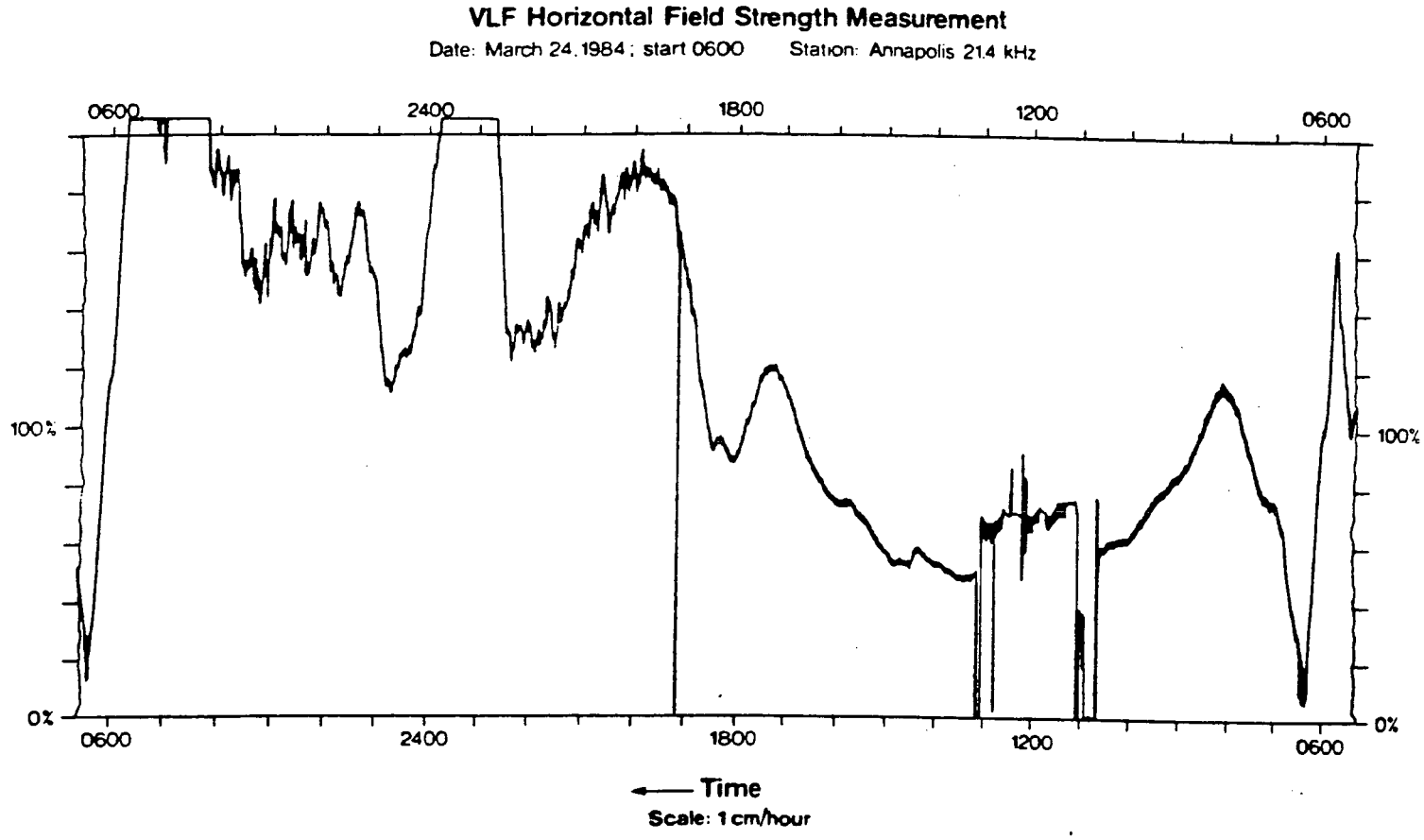


Figure VLF:1
Chart Recording of Primary Field Changing with Time

vertical field, normalized by the horizontal field measurement. In the Electrical Field mode, it measures the horizontal magnetic and electrical fields.

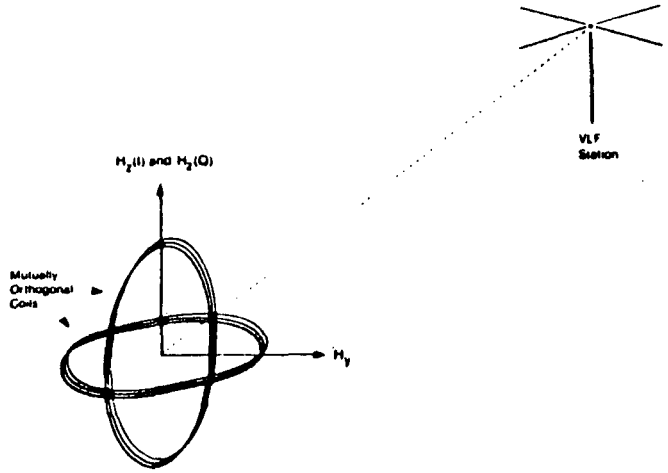
1.3 What the IGS-2/VLF-4 Measures

As its primary measurement, the IGS-2/VLF-4 employs two mutually orthogonal receive coils to determine three parameters of the VLF-magnetic field. These are: 1) the horizontal amplitude vector in a direction perpendicular to a line joining the operator to the station; 2) the amplitude of the component of the vertical field vector which is in phase with the horizontal vector; and 3) the amplitude of the component of the vertical field vector which is 90° out of phase with the horizontal vector. These three parameters, for the given VLF transmitter, are recorded simultaneously. Since the vertical components are expressed as a percentage of the horizontal vector, they are automatically normalized for any changes in the amplitude of the transmitted primary field.

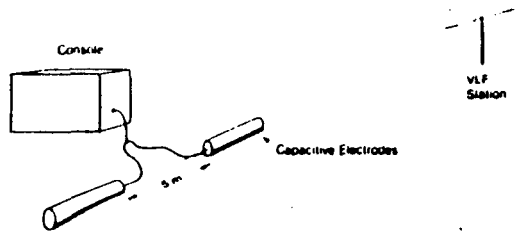
The primary field from a VLF station can in fact, vary considerably. Figure VLF:1 is a recording of the horizontal field strength from the Annapolis VLF station made in Toronto, Canada. For the most part, the field fluctuates moderately during the course of the day due to changes in atmospheric conditions. There are, however, more dramatic changes indicated on the recording. Towards evening there is a large upwards swing in the field strength, and at several points during the day, both partial and total drops in the field amplitude can be observed. In the light of these irregularities, the horizontal field data should always be considered with reservation as it is difficult to know whether changes are caused by conductors or by variations in the station's signal.

If the primary field strength is constant, changes in the amplitude of the horizontal magnetic field mainly reflect variations in the conductivity of the earth. Normally there will be no vertical magnetic field. However, near a conductor, a vertical field will be observed. The relative amplitudes of the in-phase and quadrature components may be used to interpret the conductivity-size characteristics of the conductor.

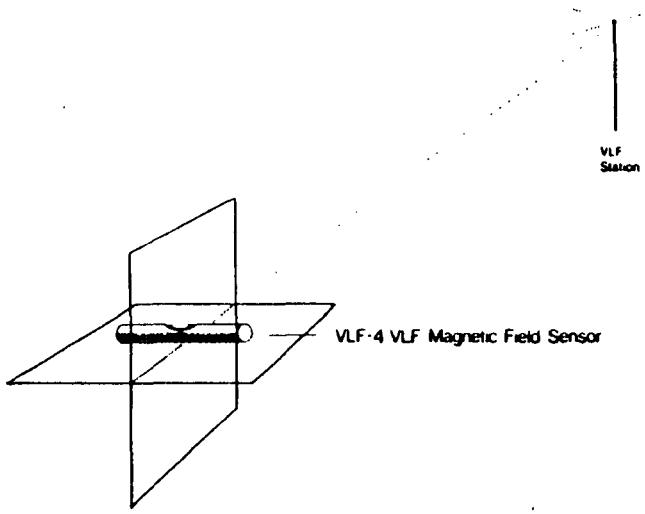
To permit measurement of the VLF-electric field, a dipole consisting of two cylindrical electrodes and 5 meters of wire is used. When this dipole is correctly laid out, the IGS-2/VLF-4 measures the in-phase and quadrature components of the horizontal electric field in the direction of the line joining the operator and the transmitter station. The phase reference is the horizontal magnetic field.



The VLF-magnetic field measurement comprises: 1) horizontal amplitude H_y, 2) the amplitude of $H_z(I)$ (the vertical field component which is in-phase with H_y) and 3) the amplitude of $H_z(Q)$ (the vertical field component which is 90° out-of-phase with H_y.



The VLF-4 is used to measure the in-phase $E_x(I)$, and quadrature $E_x(Q)$, components of the horizontal electric field, E_x, in the line joining the operator and the transmitter station. The phase is referenced to that of the horizontal magnetic field H_y. These components are not recorded but are used in the calculations of resistivity and phase made by the VLF-4.



An electronic level sensor on the axis of the horizontal vector receiver coil provides automatic side-to-side tilt compensation. The error in the vertical in-phase component is less than 1% for tilts up to 15° provided that the operator is facing the VLF station directly. Tilts in any other direction of up to 10° produce no significant error (1%) in the other components and, therefore, require no compensation.

Figure VLF:2
What the VLF-4 Measures

VLF THEORY

The signal transmitted by the VLF station is recorded by the vertical coils as:

$$Hp = A \sin wt; \quad Hs = B \cos (wt-\phi) \qquad (1.0)$$

where: Hp = primary signal
A = amplitude of primary signal
Hs = secondary (phase lagged) signal
w = frequency
t = time
B = amplitude of secondary signal
ϕ = phase lag

These two received signals combine giving an ellipse, which has two axis corresponding to the maximum length and minimum width of the ellipse.

i.e. $$\frac{Hp^2}{A^2} + \frac{Hs^2}{B^2} - \frac{2\,HpHs \sin \phi}{AB} = \cos^2 \phi \qquad (2.0)$$

By measuring the angle from horizontal of the long axis of the ellipse, a conductor is located when this tilt angle is zero.

The Scintrex IGS VLF measures the primary vertical (in phase) Hp and the secondary (quadrature) Hs to obtain a conductor's location (from Hp) and the conductor's quality using both Hp and Hs.

i.e. $$o = \tfrac{1}{2} \tan^{-1} (2\,Hp/100\,(1 - e^2))$$

where o = tilt angle (degrees)
Hp = vertical in phase, expressed as a o/o
$\phi = \tan^{-1} \left(\frac{Hp}{Hs}\right)$

Since the quadrature readings require a magnetic field phase reference, using unpublished means, the phase lag value is untested and should be considered qualatative only, but it is likely reasonably precise (the readings are repeatable), but may or may not be accurate (the correct value).

FRASER FILTERING

This technique for filtering VLF-EM data was proposed by Dr.D.C. Fraser in 1969. The reason for applying this filter is that there is a dynamic range problem when presenting the data as profiles. In the same area that a 5 degree peak to peak anomaly may be signifigant, anomalies of 100 degrees may also occur. This filtering operation transforms the zero cross-overs into peaks and noise is reduced by application of a low-pass filter. The data may be presented as profiles or the positive values may be contoured.

This filter was originally applied to dip angle data as collected by VLF receivers such as the Radem by Crone Geophysics. It is equally applicable to vertical in-phase and quadrature data.

The filter phase-shifts the data by 90 degrees so that zero cross overs and inflections are transformed into peaks. It removes dc and attenuates long spatial wavelengths to increase resolution of local anomalies.

These requirements are met by the difference operator (R(n+1)-R(n)), where R(n) and R(n+1) are any two consecutive readings.

The filter does not exaggerate the random noise. This is achieved by applying a low-pass operator to the differences as follows:

0.25(R(n+1)-R(n))+0.50(R(n+2)-R(n+1))+0.25(R(n+3)-r(n+2)).

The filtered output is then 0.25(R(n+2)+R(n+3)-R(n)-R(n+1)).

As this filtering process was originally designed to be simple so it could be applied by field personnel with limited facilities the constant is eliminated.

The plotted function then becomes F(n+1,n+2)=(R(n+2)+R(n+3))-(R(n)+R(n+1)).

This is plotted mid-way between the stations where readings R(n+1) and R(n+2) were taken.

The IGS-2/VLF-4 uses the magnetic and electric field measurements to automatically calculate the apparent resistivity of the earth as well as the phase angle between the magnetic and electric field components. If the earth is uniform (not layered) within the depth of the VLF measurement, the phase angle between the horizontal magnetic and electric VLF fields will be 45 degrees. A non-uniform earth will give rise to other phase angles.

The following formulae are used for resistivity and phase calculations:

Apparent Resistivity Calculation:

$$\rho = \frac{1}{2\pi f \mu_o} \left| \frac{E_x}{H_y} \right|^2$$

where:

ρ = apparent resistivity in ohm-meters
E_x = horizontal electric amplitude, calculated
$E_x = (E_x(I)^2 + E_x(Q)^2)^{\frac{1}{2}}$
H_y = horizontal magnetic amplitude, measured
f = VLF station frequency in Hertz
μ_o = permeability of the ground in Henries/meter, a constant

The resistivity calculation has a range of 1 to 100,000 ohm-meters with a resolution of 1 ohm-meter.

Phase Angle Calculation
The phase angle ϕ is expressed as:

$$\phi = \text{arc tan} \frac{E_x(Q)}{E_x(I)}$$

where:

$E_x(Q)$ = horizontal quadrature VLF electric field.
$E_x(I)$ = horizontal in-phase VLF electric field, phase rferenced to the horizontal magnetic field, Hy.

The phase angle calculation has a range of -180° to +180° with a resolution of 1°. By definition the angle is positive when the electrical field leads the magnetic field.

9.0 SPECIFICATIONS

9.1 Standard Console Specifications

Digital Display	32 character, 2 line LCD display
Keyboard Input	14 keys for entering all commands, coordinates, header and ancillary information.
Languages	English plus French is standard.
Standard Memory	16K RAM. More than sufficient for a day's data in most applications.
Clock	Real time clock with day, month, year, hour, minute and second. One second resolution, ±1 second stability over 12 hours. Needs keyboard initialization only after battery replacement.
Digital Data Output	RS-232C serial interface for digital printer, modem, microcomputer or cassette tape recorder. Data outputs in 7 bit ASCII, no parity format. Baud rate is keyboard selectable at 110, 300, 600 and 1200 baud. Carriage return delay is keyboard selectable in increments of one from 0 through 999. Handshaking is done through X-ON/X-OFF protocol. Allows IGS-2 to act as a master for other instrumentation.
Analog Output	For a strip chart recorder. 0 to 999 mV full scale with keyboard selectable sensitivities of 10, 100 or 1000 units full scale.

Console Dimensions	240 x 90 x 240 mm includes mounted battery pack.
Weights	Console: 2.2 kg Console with Non-rechargeable Battery Pack; 3.2 kg. Console with Rechargeable Battery Pack: 3.6 kg.
Operating Temperature Range	-40°C to +50°C provided optional Display Heater is used below -20°C.
Power Requirements	Can be powered by external 12 V DC or one of the Battery Pack Options listed below.

9.2 Battery Pack Options

Battery Pack lifetime depends on which Battery Pack is selected, sensor(s) used, reading time and ambient temperature. Life expectancy would be 1 to 10, eight hour survey days.

Non-Rechargeable Battery Pack	Includes battery holder and 10 disposable 'C' cell batteries for installation on console. Used in low sensitivity total field magnetometry or VLF in temperatures above 0°C. Weight is 0.9 kg.
Rechargeable Battery Pack and Charger	Includes battery holder, 6 rechargeable, non-magnetic, sealed lead-acid batteries and charger for installation on console. Best for high sensitivity total field measurements, all gradient measurements and operation below 0°C. Pack weighs 1.3 kg. Charger specifications are: 140 x 95 x 65 mm, 115/230 V AC, 50/60 Hz, 20 VA, overload protected.

8.0 SPECIFICATIONS

8.1 Magnetometry Specifications

Total Field Operating Range	20,000 to 100,000 nT (1 nT = 1 gamma).
Gradient Tolerance For Total Field:	±5000 nT/m.
Total Field Absolute Accuracy	±1 nT at 50,000 nT ±2 nT over total field operating and temperature range.
Resolution	0.1 nT.
Tuning	Fully solid-state. Manual or automatic mode is keyboard selectable.
Reading Time	2 seconds. For portable readings this is the time taken from the push of a button to the display of the measured value.
Continuous Cycle Times	Keyboard selectable in 1 second increments upwards from 2 seconds to 999 seconds.

9.0 SPECIFICATIONS

Frequency Tuning	Automatic digital tuning. Can be tuned to any frequency in the range 15.0 to 29.0 kHz with a bandwidth of 150 Hz. Up to three frequencies can be chosen by keyboard entry for sequential measurements.
Field Strength Range	Fields as low as 100 mA/m can be received. In practice, background noise may require fields up to 5-10 times this level. Maximum received field is 2 mA/metre. These values are specified for 20 kHz. For any other frequency, calculate the above limits by multiplying by the station frequency in kHz and dividing by 20.
Signal Filtering	Narrow bandpass, low pass and sharp cut-off high pass filters.
Measuring Time	0.5 seconds sample interval. As many as 2^{16} samples can be stacked to improve measurement accuracy.
VLF-Magnetic Field Components Measured	1) Horizontal amplitude, 2) vertical in-phase component, and 3) vertical quadrature components. Vertical components are displayed as a percentage of horizontal component and are related in phase to the horizontal component. Their range is ±120%; reading resolution 1%.
VLF-Magnetic Field Sensor	Two air-cored coils in a backpack mounted housing with an electronic level for automatic tilt compensation. The error in the vertical in-phase component is less than 1% for tilts up to ±15°.

A P P E N D I X "C"

ASSAY CERTIFICATES

CERTIFICATE OF ASSAY

Date: October 27, 1989

File: 0103-1074

SGS SUPERVISION SERVICES INC.
General Testing Laboratories Division
1001 East Pender Street,
Vancouver, B.C., Canada. V6A 1W2
Telephone: (604) 254-1647
Telex: 04-507514

TO: N.V.C. ENGINEERING LTD.
Ste. 304 - 1720 Barclay St.
Vancouver, B.C.
V6G 2Y1

We hereby certify that the following are the results of assays on: Ore

MARKED	GOLD oz/st	~~SILVER~~ xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx
DC - 1	0.005							
2	0.002							
3	0.005							
4	0.008							
5	0.003							
6	0.015							
7	0.005							
8	1.287							
9	0.015							
10	0.002							
11	0.005							
12	0.008							
15	0.003							
16	0.005							
17	0.488							
18	0.040							
19	0.400							
20	0.008							
DC -21	0.005							

NOTE: REJECTS RETAINED ONE MONTH. PULPS RETAINED THREE MONTHS. ON REQUEST PULPS AND REJECTS WILL BE STORE FOR A MAXIMUM OF ONE YEAR.

L. Wong
PROVINCIAL ASSAYER

CERTIFICATE OF ASSAY

Date: November 1, 1989

File: 0103-1145

SGS SUPERVISION SERVICES INC.
General Testing Laboratories Division
1001 East Pender Street,
Vancouver, B.C., Canada. V6A 1W2
Telephone: (604) 254-1647
Telex: 04-507514

TO: N.V.C. ENGINEERING LTD.
Ste. 304 - 1720 Barclay Street
Vancouver, B.C.
V6G 2Y1

We hereby certify that the following are the results of assays on: Ore

MARKED	GOLD oz/st	SILVER XXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX	XXXXXXXXX
DC 13	0.018							
DC 14	0.008							
DC 22	2.384							

NOTE: REJECTS RETAINED ONE MONTH. PULPS RETAINED THREE MONTHS. ON REQUEST PULPS AND REJECTS WILL BE STORE FOR A MAXIMUM OF ONE YEAR.

L. Wong
PROVINCIAL ASSAYER

CERTIFICATE OF ASSAY

SGS SUPERVISION SERVICES INC.
General Testing Laboratories Division
1001 East Pender Street,
Vancouver, B.C., Canada. V6A 1W2
Telephone: (604) 254-1647
Telex: 04-507514

Date: October 27, 1989
File: 0103-1072

TO: N.V.C. ENGINEERING LTD.
Ste. 304 - 1720 Barclay St.
Vancouver, B.C.
V6G 2Y1

We hereby certify that the following are the results of assays on: soil samples - GRID #1

MARKED		GOLD Au (ppm)	SILVER xxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	xx
L 250 N	125-E	0.02							
	150	0.02							
	175	0.02							
	200	0.04							
	225	0.05							
	250	0.35							
	300	0.17							
	350	0.08							
	375	0.26							
L 300 N	125-E	0.02							
	150	0.02							
	175	0.21							
	200	0.02							
	225	0.02							
	250	0.08							
	375	0.14							
	400	0.18							
L 350 N	175-E	0.03							
	200	0.02							
	225	0.04							
	250	0.16							
	375	0.07							
	400	0.38							
L 400 N	350-E	0.04							
	375	0.02							
	400	0.02							
L 450 N	175-E	0.14							
	200	0.02							
	225	0.02							
	250	0.05							
	275	0.03							
	300	0.02							
	350	0.56							
	375	0.02							
	400	0.39							

NOTE: REJECTS RETAINED ONE MONTH. PULPS RETAINED THREE MONTHS. ON REQUEST PULPS AND REJECTS WILL BE STORE FOR A MAXIMUM OF ONE YEAR.

L. Wong
PROVINCIAL ASSAYER

CERTIFICATE OF ASSAY

Date: November 1,1 989

File: 0103-1073

SGS SUPERVISION SERVICES INC.
General Testing Laboratories Division
1001 East Pender Street,
Vancouver, B.C., Canada. V6A 1W2
Telephone: (604) 254-1647
Telex: 04-507514

TO: N.V.C. ENGINEERING LTD.
Ste. 304 - 1720 Barclay Street
Vancouver, B.C.
V6G 2Y1

We hereby certify that the following are the results of assays on: soil samples

MARKED		GOLD Au (ppm)	SILVER xxxxxxxxxxxxxxxxxxxxxxxxxx		SAMPLE MARKED:			GOLD Au (ppm)
L0	0	0.06			L50S	25-E		0.02
	25-W	0.02				50		0.02
	100	0.02				75		0.10
	125	0.03				100		0.02
	150	0.03				125		0.02
	175	0.02				150-E		0.02
	200	0.02						
	225-W	0.01			L100N	0		0.02
						25-W		0.02
	25-E	0.02				50		0.02
	50	0.02				75		0.02
	75	0.05				150		0.05
	100	0.02				175		0.02
						200		0.03
L50N	25-W	0.02				225-W		0.02
	50	0.03						
	125	0.03				25-E		0.02
	150	0.02				50		0.06
	175	0.03				100		0.02
	200	0.02				125-E		0.02
	225	0.02						
	250-W	0.02			L100S	0		0.03
						25-W		0.02
	0-E	0.03				25-E		0.02
	25	0.02				50		0.02
	50	0.02				75		0.02
	75-E	0.02				100		0.02
						125		0.02
L50S	0	0.02				150-E		0.02
	25-W	0.05						
	100	0.02						
	125	0.04						
	150	0.03						
	175	0.02						
	200-W	0.04						

/ Continuned on page 2 .....

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L. Wong
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Telephone: (604) 254-1647
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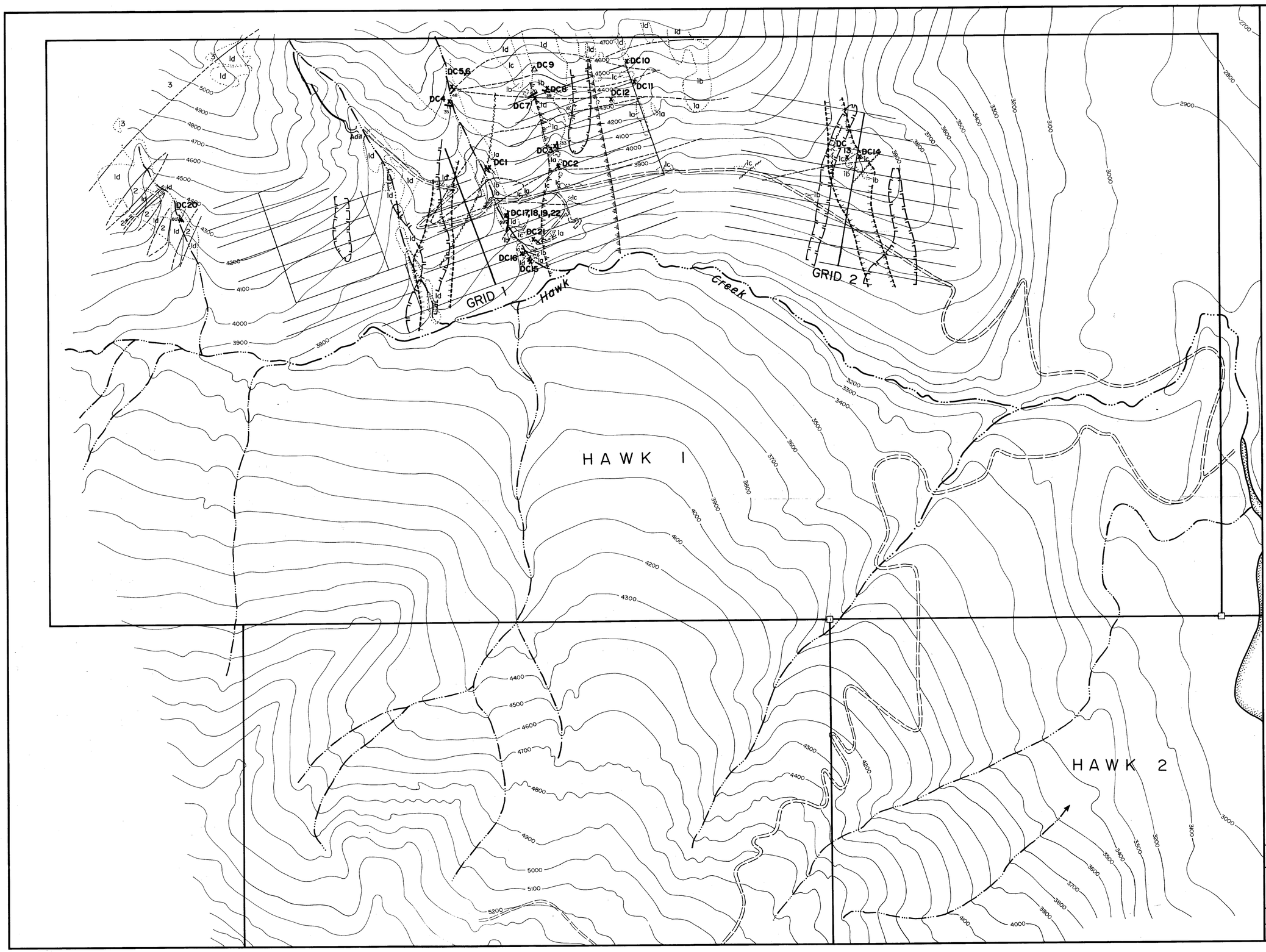
TO: N.V.C. ENGINEERING LTD.
Ste. 304 - 1720 Barclay Street
Vancouver, B.C.
V6G 2Y1

We hereby certify that the following are the results of assays on: soil samples

MARKED		GOLD Au (ppm)	SILVER ~~XXXXXXX~~XXXXXXXXXXXXX		SAMPLE MARKED:			GOLD Au (ppm)
L150N	25-W	0.02						
	50	0.02			L250N	25-W		0.03
	75	0.02				50		0.07
	100	0.02				75		0.02
	125-W	0.02				100		0.06
						125		0.02
	0-E	0.03				150		0.09
	25-E	0.02				175-W		0.02
	75	0.03						
	50	0.04						
	100	0.02						
	125	0.03						
L150S	0	0.05						
	25-W	0.06						
	25-E	0.08						
	50	0.02						
	75	0.03						
	100	0.02						
	125	0.02						
	150-E	0.02						
L200N	0	0.07						
	25-W	0.03						
	50	0.02						
	75	0.02						
	100	0.02						
	125	0.06						
	150-W	0.02						

NOTE: REJECTS RETAINED ONE MONTH. PULPS RETAINED THREE MONTHS. ON REQUEST PULPS AND REJECTS WILL BE STORE FOR A MAXIMUM OF ONE YEAR.

L. Wong
PROVINCIAL ASSAYER



LEGEND

TERTIARY

- 3 — Basalt, Pyroclastic (Edziza)

JURASSIC / CRETACEOUS

- 2 — Diorite

UPPER TRIASSIC

- Ia — Chert
- Ib — Tuff
- Ic — Andesite
- Id — Dacite
- Ie — Basalt
- Fault Breccia
- Qtz - carbonate Vein

Geological Contact

- Mapped
- Assumed
- Fault
- Fracture, Vertical Fracture
- Contact, Vertical Contact
- DC 8 — Sample Location
- Float
- Geochemical Gold Anomaly
- Resistivity Low Anomaly
- Fraser Filter High Anomaly

GEOLOGICAL BRANCH
ASSESSMENT REPORT

19,717

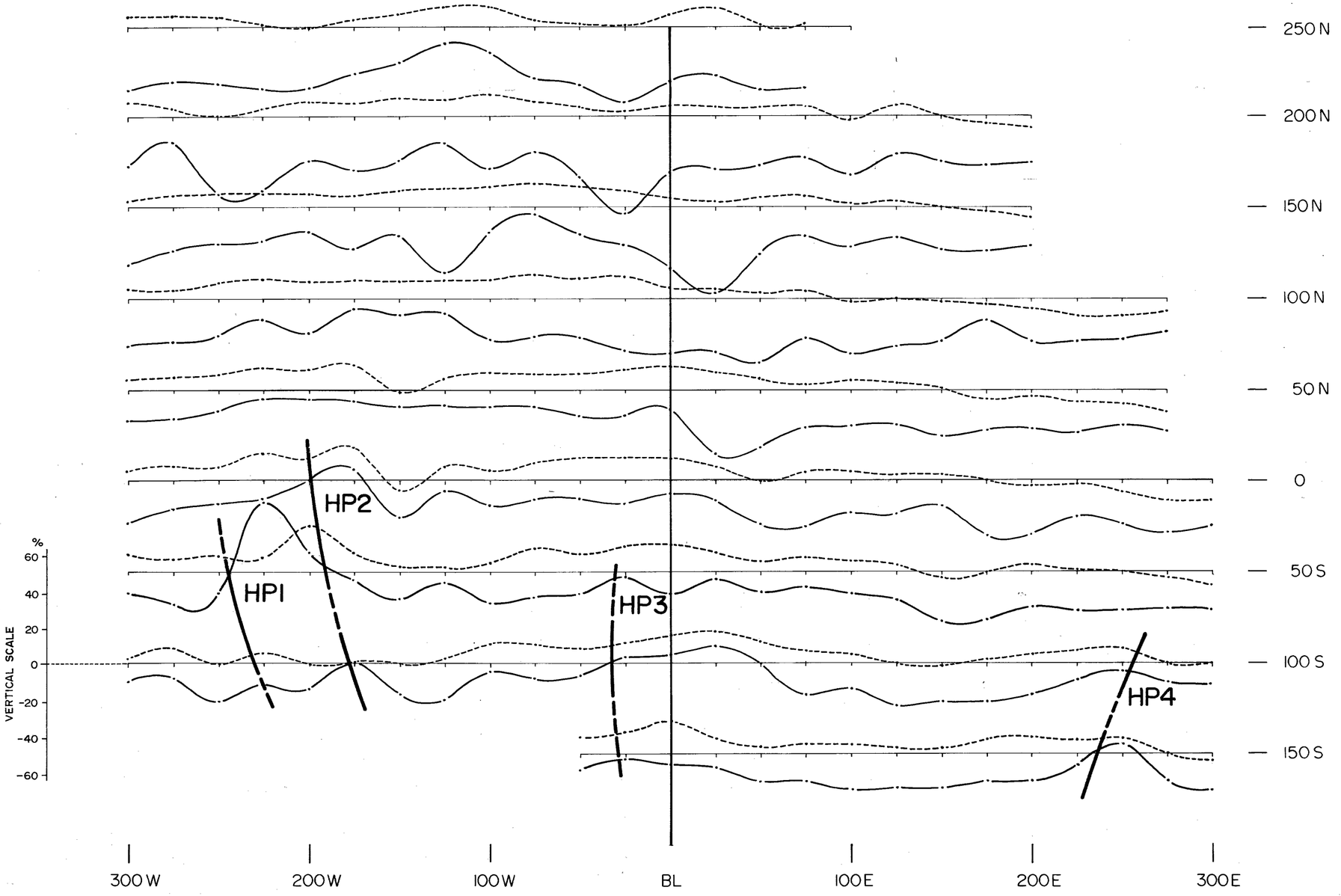
MOONGOLD RESOURCES INC.

HAWK CLAIMS
COMPOSITE PLAN

LIARD M.D., B.C. — NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: 0 50 100 m | FIG. 3



N

LEGEND

VLF-EM PROFILES
STATION: LUALUALEI, HAWAII,
23.4 kWz

IN PHASE %

QUADRATURE %

CONDUCTORS

0 50 100 m

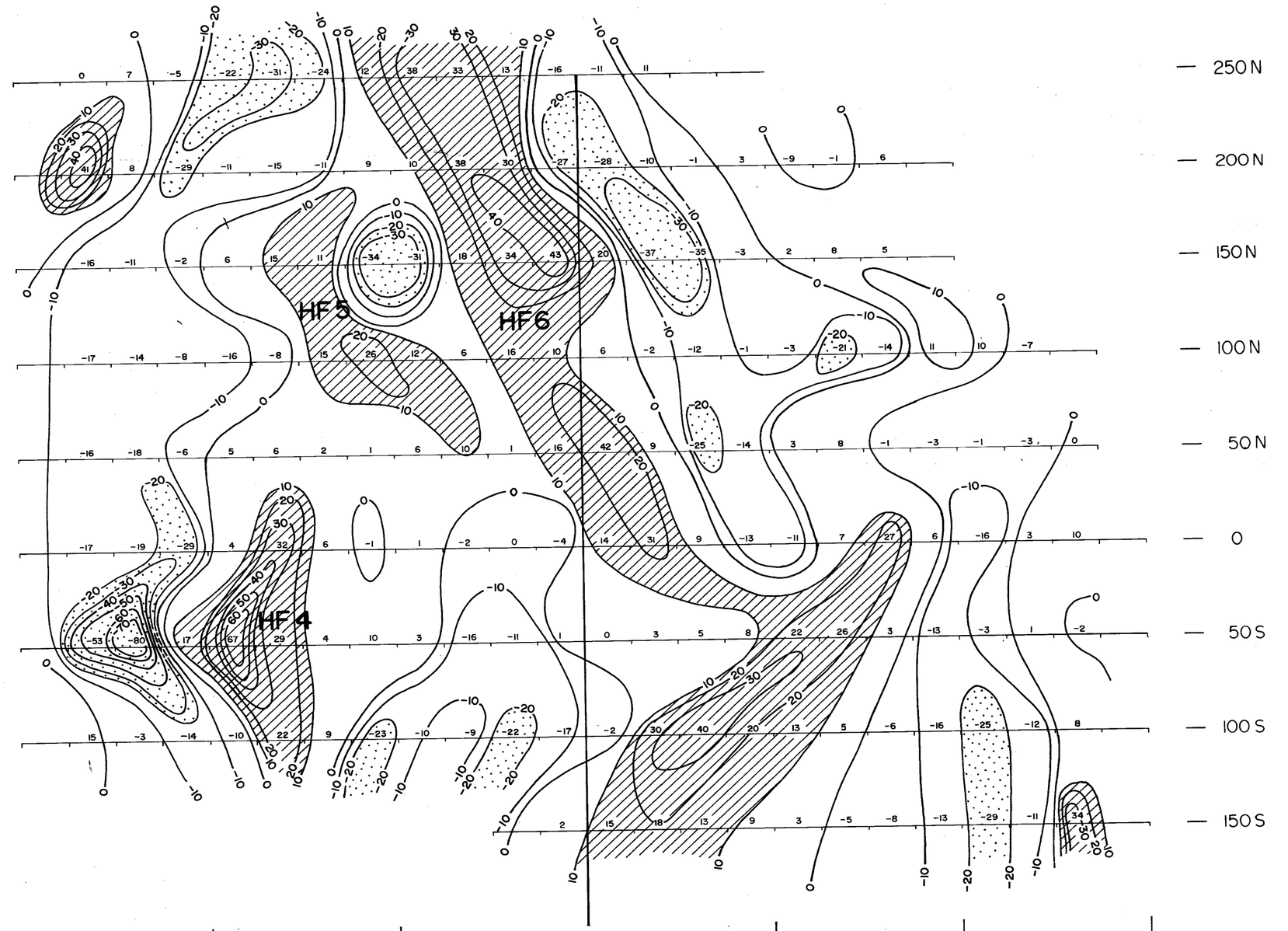
MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID 2 - VLF-EM PROFILES - HAWAII

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 12



N

LEGEND: (IN PHASE DATA)

RELATIVE HIGH ANOMALY (Values over 20)

RELATIVE LOW ANOMALY (Values lower than -20)

GEOLOGICAL BRANCH ASSESSMENT REPORT

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0 50 100 m

MOONGOLD RESOURCES INC

HAWK CLAIMS

GRID 2 - FRASER FILTER - HAWAII

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE:	FIG. 13

500 N
450 N
400 N
350 N
300 N
250 N
200 N
150 N
100 N
50 N
0

600W 500W 400W 300W 200W 100W BL 100E 200E 300E 400E 500E

N

LEGEND:

RELATIVE HIGH ANOMALY (Values>600 ohm meters)

RELATIVE LOW ANOMALY (Values<200 ohm meters)

0 50 100 m

MOONGOLD RESOURCES INC

HAWK CLAIMS

GRID I - RESISTIVITY SURVEY

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 14

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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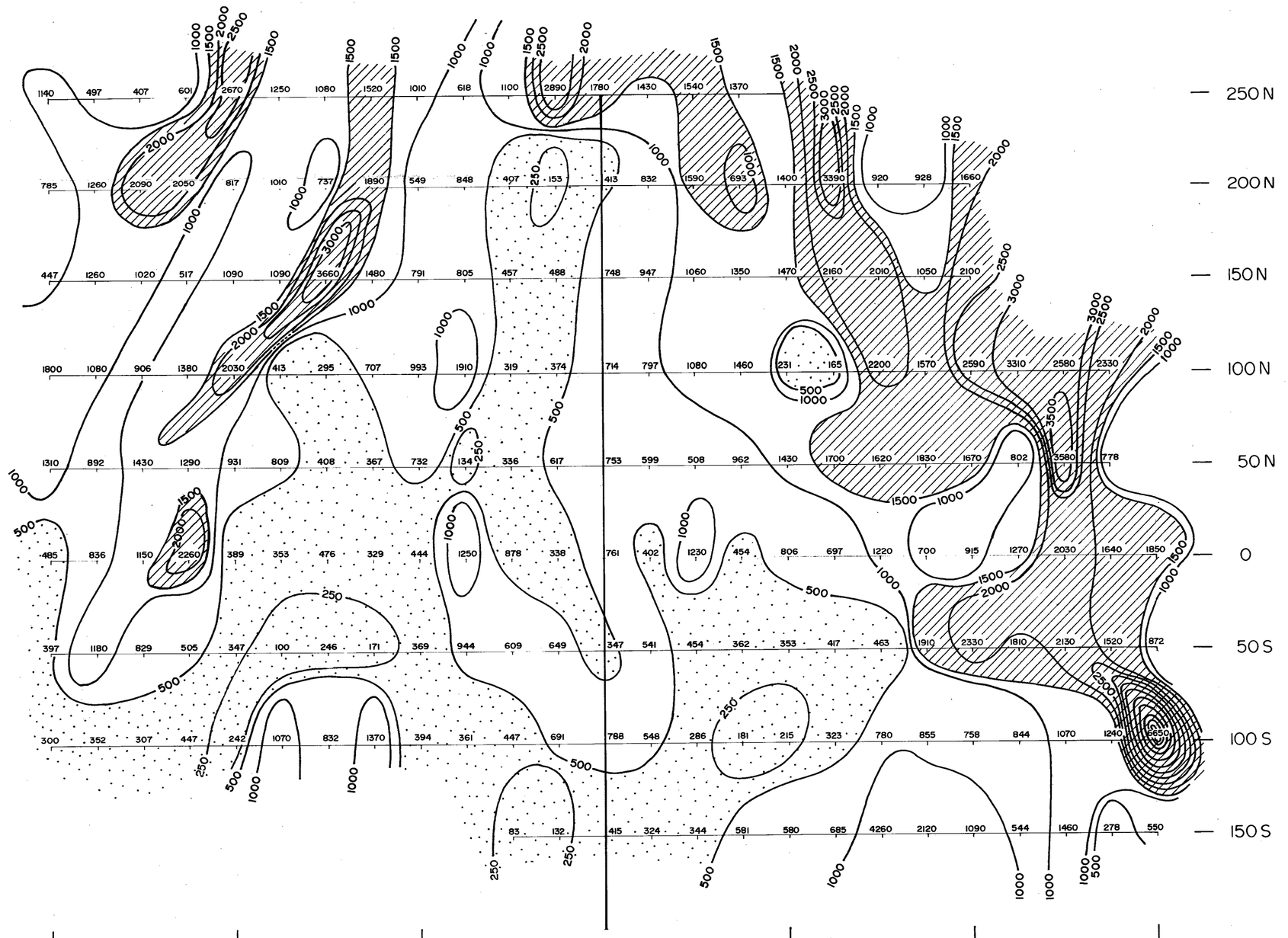


N

LEGEND:

RELATIVE HIGH ANOMALY
(Values>1500 ohm meters)

RELATIVE LOW ANOMALY
(Values<500 ohm meters)

0 50 100 m

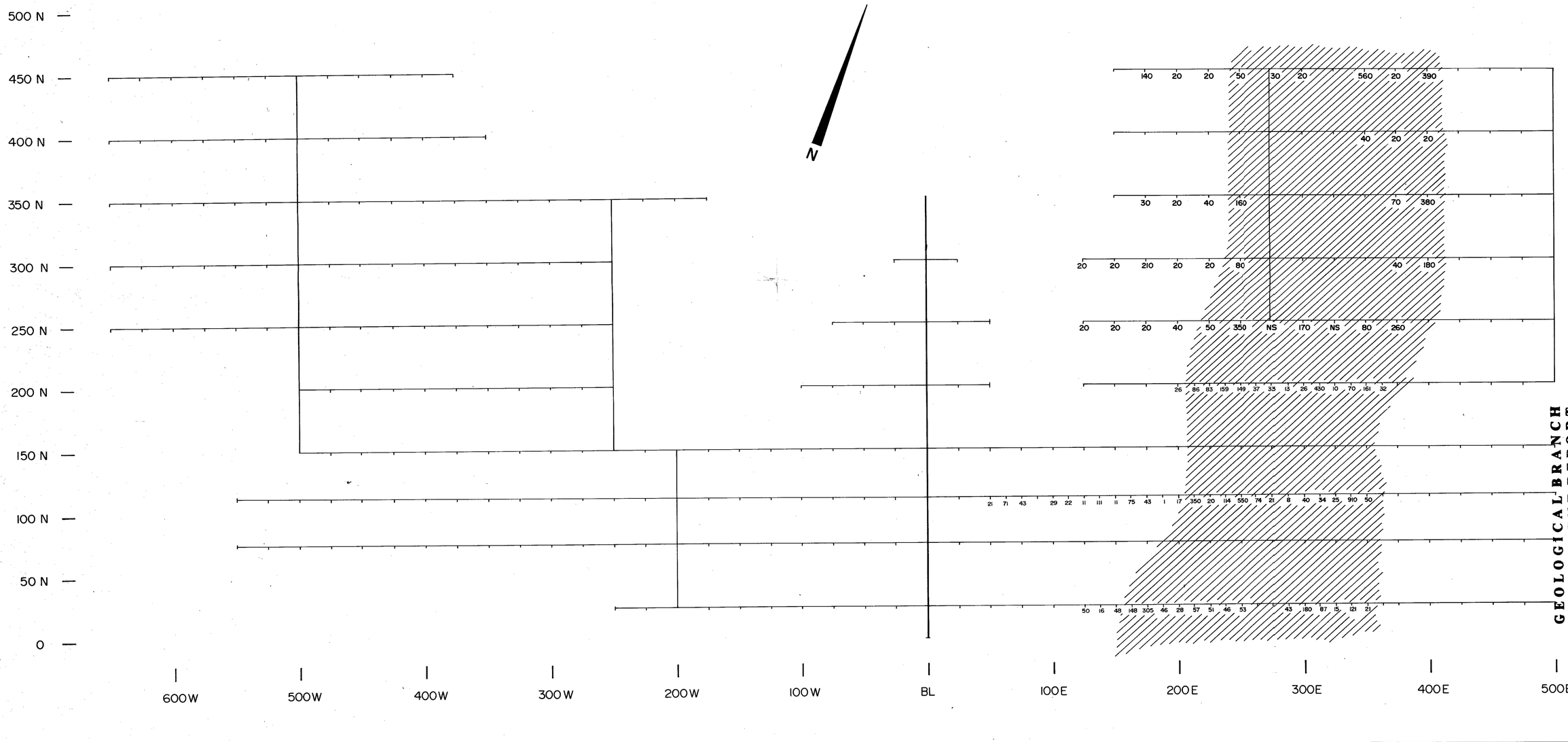
MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID 2 - RESISTIVITY SURVEY

LIARD M.D., B.C. NTS 104 G/9W,10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 15



LEGEND

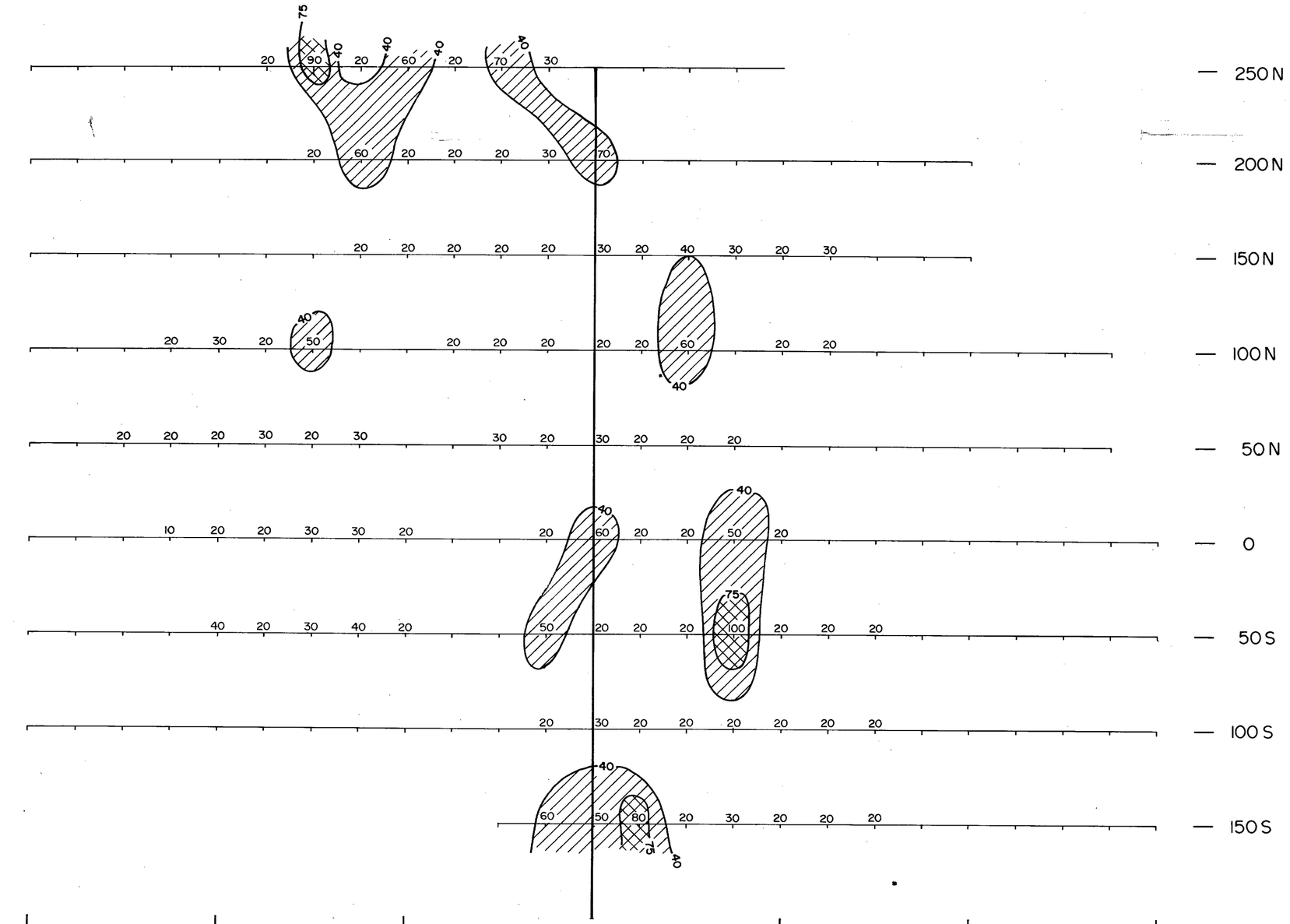
120 Samples taken in 1989

85 Samples taken in 1987

Area with anomalous gold readings (Values in ppb gold)

0 50 100 m

MOONGOLD RESOURCES INC		
HAWK CLAIMS GRID I - GEOCHEMICAL SURVEY GOLD		
LIARD M.D., B.C.		NTS 104 G/9W, 10E
NVC ENGINEERING LTD.		VANCOUVER, B.C.
DATE: October, 1989	SCALE:	FIG. 16



LEGEND

Values in ppb Au

40 Anomalous threshold

>75 Significantly anomalous values

N

0 50 100 m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID 2 - GEOCHEMICAL SURVEY
GOLD

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 17

500 N
450 N
400 N
350 N
300 N
250 N
200 N
150 N
100 N
50 N
0

600W 500W 400W 300W 200W 100W BL 100E 200E 300E 400E 500E

N

M-1
M-2
M-3
M-4

LEGEND:

MAGNETIC HIGH ANOMALY (>300 gammas)

MAGNETIC LOW ANOMALY (<0 gammas)

Note: All readings in gammas

0 50 100 m

MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID I - MAGNETOMETER SURVEY

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 4

500 N
450 N
400 N
350 N
300 N
250 N
200 N
150 N
100 N
50 N
0

N

Station off air

600W 500W 400W 300W 200W 100W BL 100E 200E 300E 400E 500E

LEGEND: (IN PHASE DATA)

RELATIVE HIGH ANOMALY (Values over 20)

RELATIVE LOW ANOMALY (Values lower than -20)

0 50 100 m

MOONGOLD RESOURCES INC

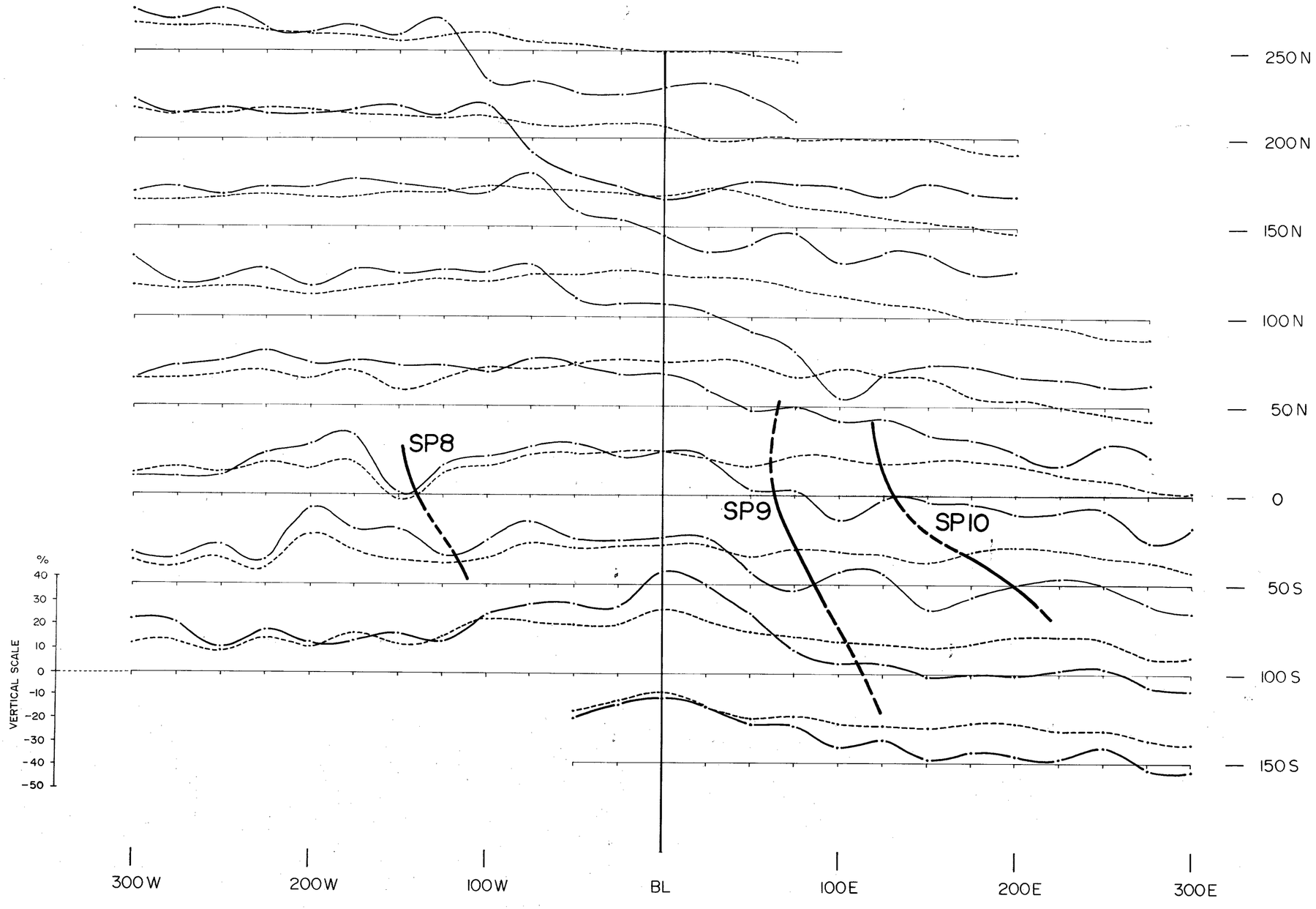
HAWK CLAIMS

GRID I - FRASER FILTER - HAWAII

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 9



LEGEND

VLF-EM PROFILES
STATION : SEATTLE, WASHINGTON
24.8 kHz

IN PHASE %

QUADRATURE %

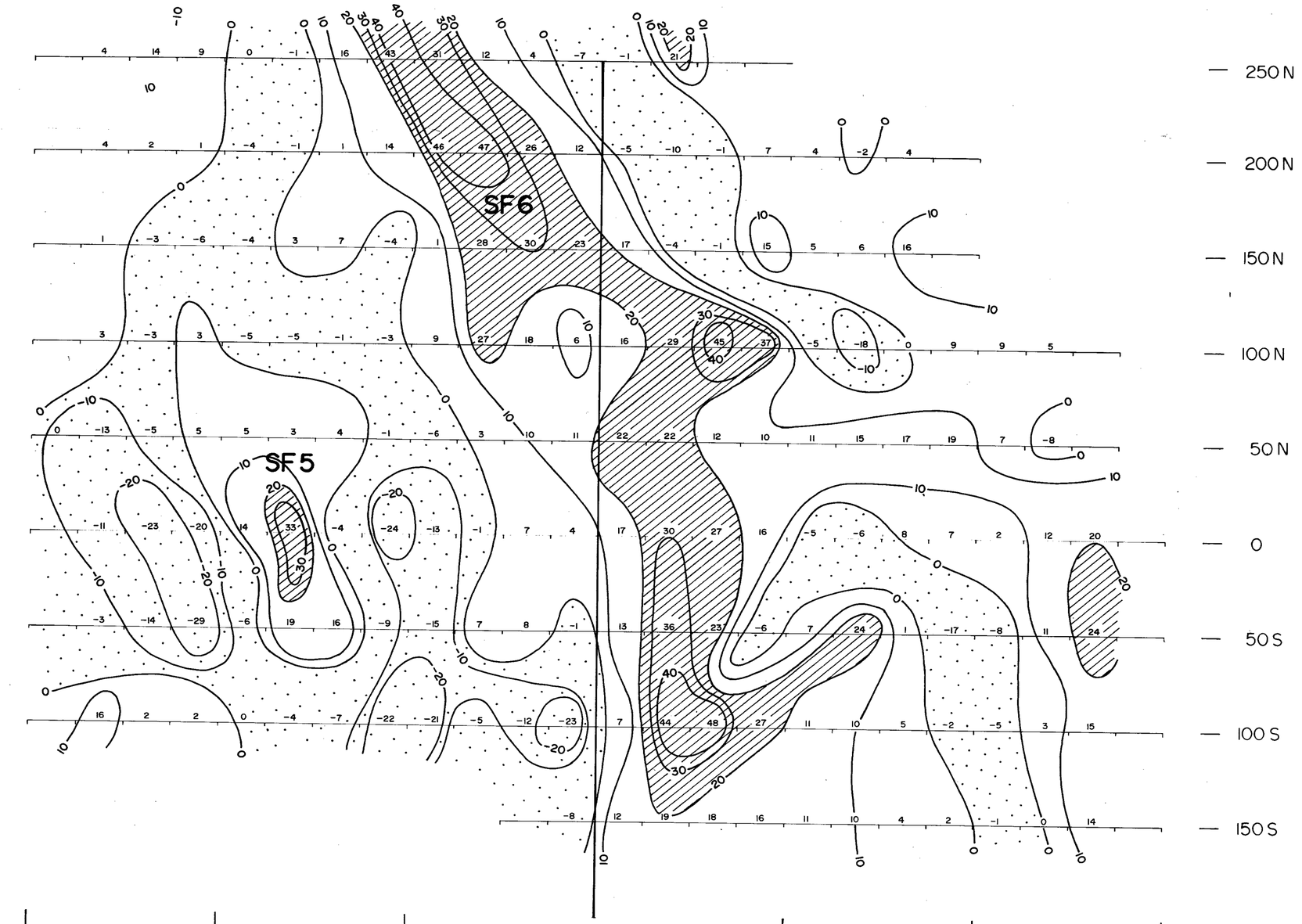
0 50 100 m

MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID 2 - VLF-EM PROFILES - SEATTLE
LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE:	FIG. 10



N

LEGEND: (IN PHASE DATA)

RELATIVE HIGH ANOMALY (Values over 20)

RELATIVE LOW ANOMALY (Values lower than -20)

0 50 100 m

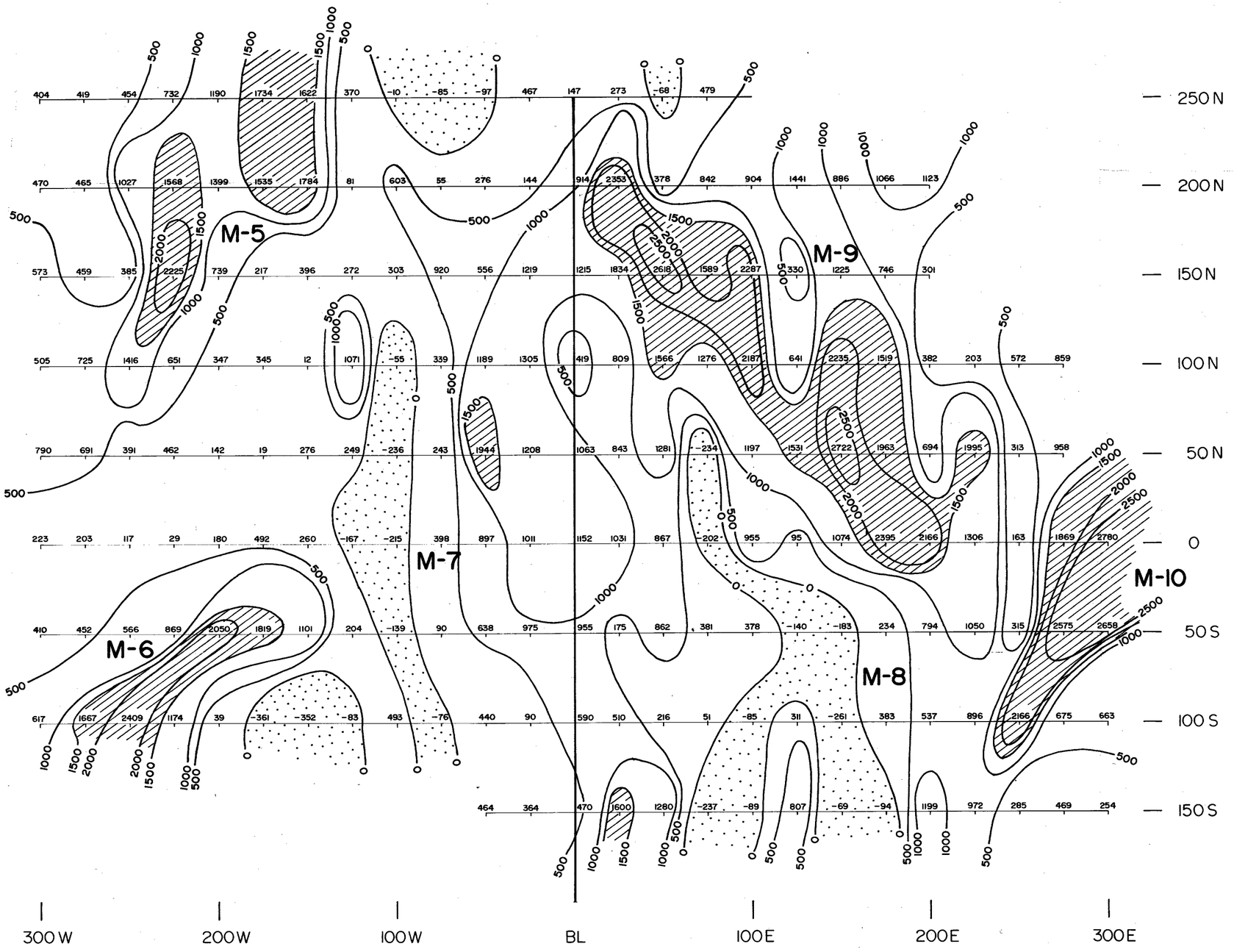
MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID 2 - FRASER FILTER - SEATTLE

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE:	FIG. 11



N

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ASSESSMENT REPORT

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LEGEND:

MAGNETIC HIGH ANOMALY (>1500 gammas)

MAGNETIC LOW ANOMALY (< 0 gammas)

Note: All readings in gammas

0 50 100 m

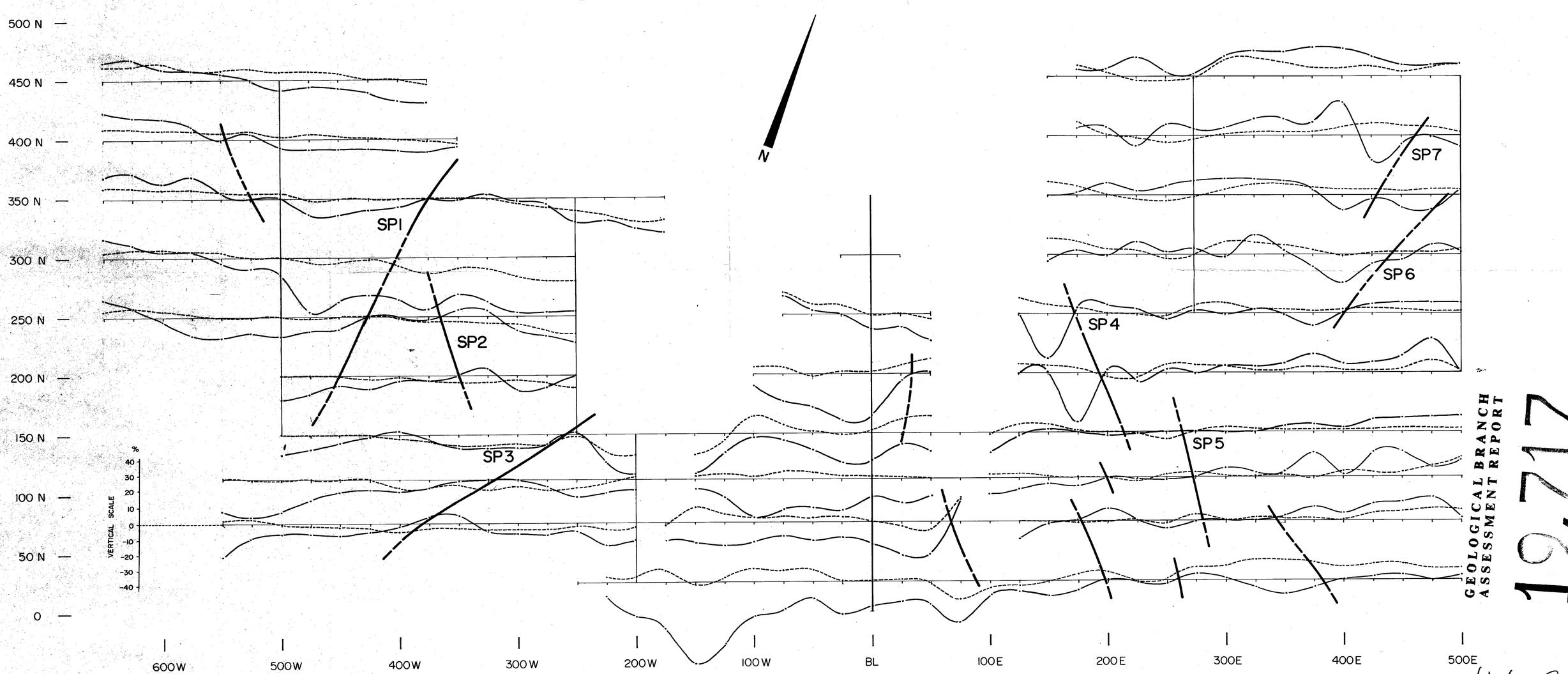
MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID 2 - MAGNETOMETER SURVEY

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE:	FIG. 5



LEGEND

VLF-EM PROFILES
STATION : SEATTLE, WASHINGTON

IN PHASE %

QUADRATURE %

CONDUCTORS

0 50 100 m

MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID I - VLF-EM PROFILES - SEATTLE

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE:	FIG. 6

500 N
450 N
400 N
350 N
300 N
250 N
200 N
150 N
100 N
50 N
0

600W 500W 400W 300W 200W 100W BL 100E 200E 300E 400E 500E

N

LEGEND: (IN PHASE DATA)

RELATIVE HIGH ANOMALY (Values over 20)

RELATIVE LOW ANOMALY (Values lower than -20)

0 50 100 m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID I - FRASER FILTER - SEATTLE

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989	SCALE:	FIG. 7

500 N
450 N
400 N
350 N
300 N
250 N
200 N
150 N
100 N
50 N
0

N

Station off air

VERTICAL SCALE
40
30
20
10
0
-10
-20
-30
-40

600W 500W 400W 300W 200W 100W BL 100E 200E 300E 400E 500E

LEGEND

VLF-EM PROFILES
STATION : LUALUALEI, HAWAII, 23.4 kHz

IN PHASE %

QUADRATURE %

CONDUCTORS

0 50 100 m

MOONGOLD RESOURCES INC

HAWK CLAIMS
GRID I - VLF-EM PROFILES - HAWAII

LIARD M.D., B.C. NTS 104 G/9W, 10E

NVC ENGINEERING LTD. VANCOUVER, B.C.

DATE: October, 1989 | SCALE: | FIG. 8