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Battle Mountain (Canada) Inc.

KIRKLAND LAKE PROJECT

REPORT ON GEOLOGICAL MAPPING

AMALGAMATED KIRKLAND PROPERTY

July - December, 1989

TECK TOWNSHIP, LARDER LAKE MINING DIVISION

ONTARIO, CANADA

Kirkland Lake, Ontario
September, 1990

W. Benham

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1.0 SUMMARY

Geological mapping was carried out on the Amalgamated Kirkland property located in Teck Township, northeastern Ontario by Battle Mountain (Canada) Inc. (BMCI). This program was part of BMCI's Kirkland Lake Project covering six properties in the area. All of the properties are presently held by BMCI under an option agreement with Queenston Mining Inc. dated June 15, 1989.

The property is underlain by three geological domains. The southern domain includes the northern half of the Murdock Creek syenite stock. The central domain consists of complexly folded and faulted Timiskaming volcanic tuffs interbedded with clastic sediments and intruded by narrow syenite dykes. The northern domain is a feldspar-porphyritic syenite which intrudes Timiskaming sediments. The southern and central domains are separated by the Larder Lake Fault Zone.

The Lakeshore (015° to 025°) and the Murdock Creek (035° to 045°) fault sets offset an earlier alteration-mineralization related ductile-brittle shear set at 055° to 080°.

Two significant highly anomalous gold-bearing alteration zones were discovered by the 1989 mapping and overburden stripping. One showing, the 100-7290E zone, averaged 2.48 g/t Au over 6 metres, while the 102-8350E zone assayed 2.22 g/t Au across 6 metres including 5.0 g/t Au over 1.5 metres. Both showings are associated with altered, sericitic, pyritic, ductile-brittle shear zones in Timiskaming tuffs and graywackes which are intruded by syenite dykes.

The newly discovered altered and gold-bearing structures can be favourably compared to those associated with the present and past producing mines on the Kirkland Lake Main Break and the Upper Canada mine in Gauthier Township to the east.

Additional overburden stripping, detailed mapping and channel sampling was recommended and carried out during the 1990 summer field season.

2.0 INTRODUCTION

During the period July to December, 1989, the Amalgamated Kirkland property was mapped at a scale of 1:2500 by H. Dillon-Leitch, V. Sheen and S. Dawson under the supervision of D. Boucher. Particular attention was given to recognizing altered zones of brittle and ductile shearing trending 065° to 070° which are associated with the major gold deposits in the Kirkland Lake District.

Ground total field and vertical gradient magnetic surveys completed over the entire property proved to be quite useful in the interpretation of lithological contacts, faulting, folding and shearing. Details of the magnetic surveys are described in a separate report by J. Roth of Stratagex Ltd., 1990.

In order to facilitate the geological mapping and to create new outcrop, a program of overburden stripping, outcrop washing, chip and channel sampling was carried out during the 1989 field season. Results of this work are described in an assessment report by Bottrill et al., 1990b. Further overburden and channel sampling was completed during the 1990 field season (Benham, 1990).

2.1 Property, Location and Access

The Amalgamated Kirkland property consists of 27 mining claims optioned by Queenston Mining Inc. (formerly HSK Minerals Ltd.) from Premier Exploration Inc. The property is currently held by Battle Mountain (Canada) Inc. as part of an option agreement with Queenston Mining Inc. dated June 15, 1989.

An application for lease, mining rights only, was submitted November 12, 1987.

The claims are located in the Larder Lake Mining Division in the southeast quarter of Teck Township, south and southwest of the town of Kirkland Lake (NTS 42A/1; UTM 538800E/568600 N; See Figure 1 and Drawing PL-001).

Access to the northeastern part of the property is provided by Main, Queen and Earl streets in the Town of Kirkland Lake and the Hunton shaft bush road, as well as to the northwest through Government Road West (Chaput Hughes) and the Industrial Plaza on Highway 66.

A right of way for hydro and natural gas lines crosses the northern part of the property. The south westerly flowing Murdock Creek divides the property diagonally approximately in half.

2.2 Topography

The topography consists of seventy percent low rounded knolls and ridges and thirty percent tag alder and black spruce swamps. Elevations range from 305 to 345 m asl. There is about thirty percent outcrop and relatively thin glacial overburden of 1 to 20 metres over the majority of the claims.

Most of the property is covered by second growth poplar bush with local small stands of birch, spruce, balsam and pine.

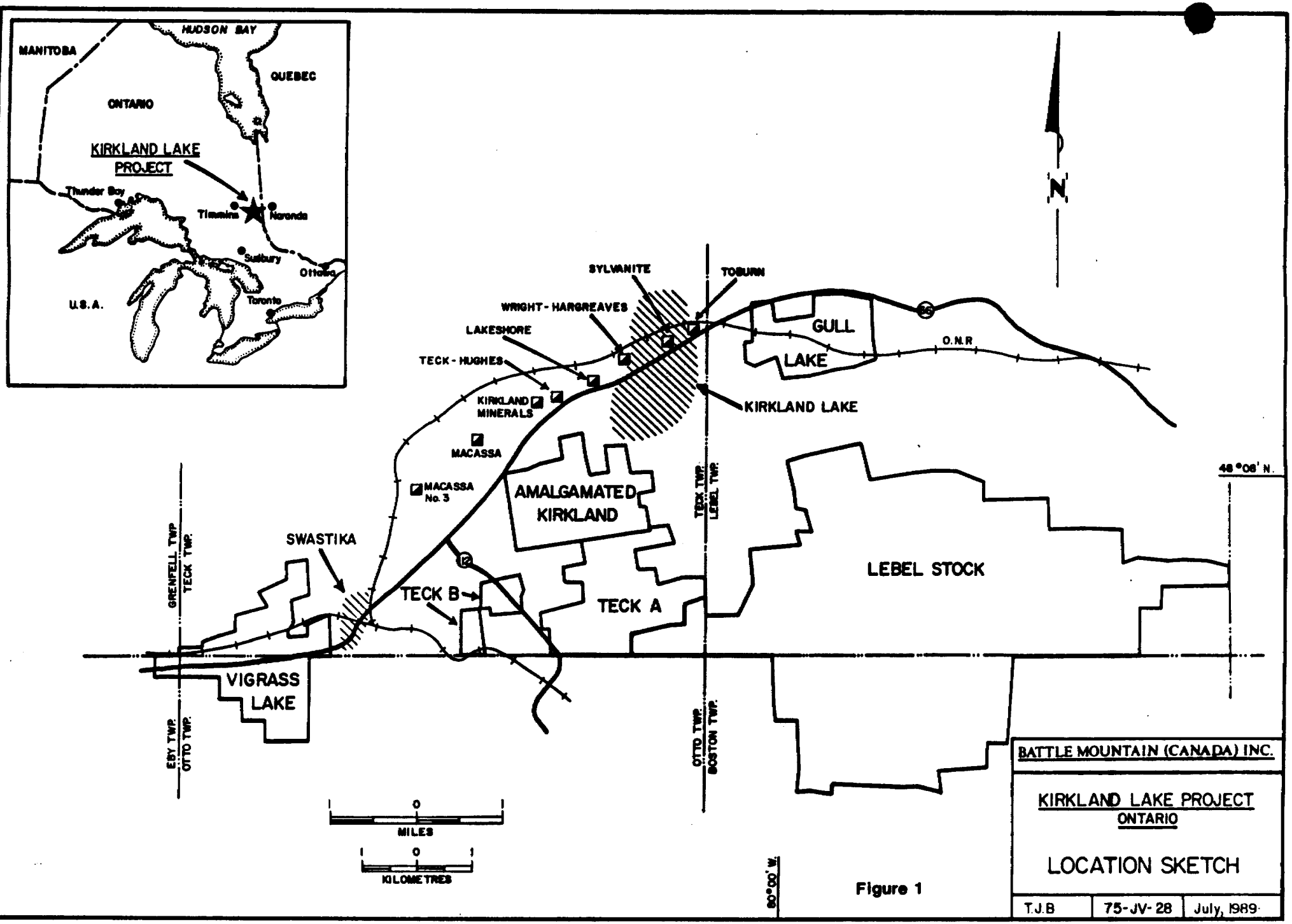

HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
N
SYLVANITE
TOBURN
WRIGHT - HARGREAVES
LAKESHORE
TECK - HUGHES
KIRKLAND MINERALS
KIRKLAND LAKE
GULL LAKE
O.N.R
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
VIGRASS LAKE
GRENFELL TWP.
TECK TWP.
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OTTO TWP.
BOSTON TWP.
48°08' N.
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MILES
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KILOMETRES
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
ONTARIO
LOCATION SKETCH
T.J.B
75-JV-28
July, 1989

Figure 1

3.0 PREVIOUS WORK

The Amalgamated Kirkland property has had a long history of exploration. Numerous programs consisting of geological mapping, hand and power trenching, geochemical sampling, geophysical surveys, and diamond drilling have been carried out over selected parts of the property. Extensive underground development work was carried out on the "Hunton" claim.

The historical exploration has not been systematic, instead it has been concentrated on specific claims or lithologies. Geological mapping of the current claim group by exploration companies has been limited. This may be attributed in part to the excellent map of Thomson (1950), completed when the area was deforested.

Descriptions of the previous work are grouped with respect to the lithological/structural domain investigated, i.e., companies working the "Florena" property-grouping concentrated on the Larder Lake Deformation Zone, the Amalgamated Kirkland grouping on the Amalgamated Kirkland Fault Zone, and the Hunton property on the "Hunton" Shaft area structures.

3.1 Highland Kirkland Mines Ltd. - "Florena" Property

The first report of work on these claims was by Tyrrell (1911) in which mapping, hand trenching, and sampling were recommended. This work was subsequently carried out (Summerhayes, 1911; Barney, 1920). Four diamond drill holes, totalling 976.3 m, were drilled by Highland Kirkland Mines Ltd. on the "Florena" claim group during February 1924 (principally historic claims L.16555, T.15752, and T.15753, and current claims L.477300, L.500059, and L.495228 respectively). This drilling tested strongly carbonate-altered rocks related to the Larder Lake Deformation Zone (LLDZ). Trenching during the early 1920's, over historic claims T.15750, T.15751, and T.15752 identified a quartz + galena vein on claim T15752. Another quartz vein on this claim strikes 060° for over 61 m (Summerhayes, 1911). Rocks collected from the main lithologies were examined petrographically (Riddell, 1937). A magnetometer survey which was carried out in 1936 and 1937 identified intrusive contacts and carbonate-altered rocks in and along the margins of the Murdock Creek stock (Thomson, 1950). A program of seven drill holes (2396 m) is reported by Thomson (1950) to have been conducted. However, no drill hole-locations or logs are available. As later workers do not mention this drill program there is some doubt that it was actually carried out.

One hole was drilled (36.6 m; DDH 73-3) during October 1973 by the Orme Prospecting Syndicate to test a mineralized zone near the Highland Kirkland inclined shaft; no significant results were reported (Dans, 1973).

Kerr Addison Mines Ltd. worked on a group of 11 claims covering the same ground as the "Florena" property, less the shaft area, but including a claim (historic claim 6187, L.495238) to the east which is not within the current property. The work program consisted of rock trenching, a ground magnetic survey, geological mapping (1:2400), and limited diamond drilling (Hinse, 1974). Four short, vertical holes were drilled in carbonate-altered rocks on claim 6187 with no significant results. The geological mapping concentrated on the highly altered rocks of the Larder Lake Deformation Zone.

Newmont Exploration of Canada Limited acquired the 27 claim "Duffy" property consisting of the current Amalgamated Kirkland property and one claim to the east (historic claim 6187, L.495238) in 1978. The program included geological mapping at a scale of 1:2400, trenching, geochemical sampling, ground geophysics, whole rock geochemistry, and diamond drilling (Atkinson, 1979). The program concentrated on the Larder Lake Deformation Zone, which was modelled as an exhalite derived, carbonate-facies iron-formation after Ridler (1976). Diamond drilling during the period November to December 1978 consisted of seven drill-holes (D-78-1 to D-78-7 inclusive) totalling 1902.3 m. The best intersection returned 0.03 oz/t Au over 0.4 m.

3.2 Amalgamated Kirkland Gold Mines Ltd.

Three shafts were sunk during the 1920's in the northwest corner of the original Amalgamated Kirkland property (Thomson, 1950). Only one is located on the current property. All of the shafts have been filled in. Muck rock and a small trench are visible on claim L.491183 in the 10220N, 7290E area (West Boundary Trench).

Amalgamated Kirkland Gold Mines Ltd. performed two programs of diamond drilling, totalling 4699.4 m, designed to test the Amalgamated Kirkland Fault Zone (AKFZ) and the "Powerline" Fault Zone (PFZ). The first drilling program, conducted between August 1939 and January 1940, consisted of 27 holes, (A1-A27 inclusive) totalling 3723.1 m. The second program of 14 holes, (A28-A41) totalling 1305.4 m, was drilled from February to May, 1945. The best results were returned from the AKFZ, where two zones were defined by shallow drill holes. The zones appear to plunge steeply (60°) to the west. Intersections of 0.21 oz/t Au over 4.8 m and 0.31 oz/t Au over 3.6 m were recorded; the deepest intersection was at a vertical depth of 28 m. The best mineralization associated with the PFZ returned 0.13 oz/t Au over 1.8 m. This zone has been sporadically tested along strike to a vertical depth of 205 m.

Horizontal hole #1 collared at the south end of the 3000 level cross-cut of the Macassa mine, which was driven to the northwest corner of the Amalgamated Kirkland Property, intersected 23 feet of "highly silicified material with considerable fine pyrite". Sludges were lost and the core from this interval was not sampled. This intersection lies beneath the Amalgamated Kirkland Zone but from its description is clearly different from the near surface vein mineralization. Hole #2 intersected 8 feet of highly silicified quartz porphyry with some sulphides, but was not assayed.

During February, 1981, Lampe Resources Ltd. drilled hole AK-1 (61.3 m), to test the Amalgamated Kirkland Zone in close proximity to the 1939 hole A12 gold intersection of 0.31 oz/t Au over 3.6 m. Hole AK-1 intersected 0.17 oz/t Au over 3.1 m (Leahy, 1981).

Eden Roc Mineral Corporation carried out two drill programs which totalled 359.4 m of diamond drilling. The first program, during December 1983, consisted of one 285.3 m hole (Eden Roc-1) testing the "Powerline" Fault Zone between 1939 holes A5 (0.13 oz/t Au over 1.8 m) and A6 (0.12 oz/t Au over 1.6 m). This hole intersected 0.01 oz/t Au over 2.5 m (Tremblay, 1983). The second program, which was carried out during November 1984, consisted of two holes (AK-2, AK-3), totalling 74.1 m. These two holes tested the Amalgamated Kirkland Zone above the 1939 hole A12 and the 1981 hole AK-1 gold intersection. Holes AK-2 and AK-3 assayed 0.44 oz/t Au over 0.4 m and 0.13 oz/t Au over 0.2 m respectively.

3.3 Hunton Property - "Hunton" Shaft Area

Extensive underground development work was carried out on the "Hunton" shaft area (claim T.16621, current claims L.524843 and L.571358) during the mid to late 1920's. A vertical shaft was sunk to 500 ft with stations at the 40, 125, 375, and 500 foot levels. Minor lateral development was conducted at the 125 and 500 levels to the north and south on the steeply south dipping #1, #2, and #3 veins. A 1050 ft long crosscut, driven to the north from the 375 level, intersected mineralization (#4 vein) at a conglomerate/syenite porphyry contact. About 500 feet of drifting was done on this structure (Thomson, 1950), and an internal, northward inclined winze was sunk to the 675 level. Limited horizontal underground drilling between the main shaft and the winze did not identify any significant structures. One hole on the north dipping #4 vein returned 4.6 oz/t Au over 1.8 m. Small ore shoots were developed on this vein but were never mined.

A series of southward dipping drill holes on historical claim T.16621 were carried out by Frobisher Exploration Co. to test the #4 vein (Heale, 1972). No logs are available.

Mayfield Exploration and Development Ltd. completed 11 holes (M1-M11 inclusive), totalling 854.9 m, testing the Hunton Zone, the Hunton North Zone, and an area west of the shaft during the period of January to February 1972 (Heale, 1972). No significant mineralization was encountered; however, less than 1% of the core appears to have been assayed.

Accord Resources Ltd. optioned the Amalgamated Kirkland property in 1986. The claim group had the same configuration as the Newmont Ltd. "Duffy" property (28 claims). An area immediately to the east of the Hunton shaft was stripped, washed, and channel sampled. The original discovery pit was dewatered (5 m) and sampled. Two surface channels (2.3 m apart) returned two intersections (0.14 oz/t Au over 0.4 m and 0.27 oz/t Au over 0.4 m) in a quartz + pyrite vein at the contact between syenite and Timiskaming Group sedimentary rocks (Vamos, 1986). A proposed exploration program was not carried out.

4.0 REGIONAL GEOLOGY

The Kirkland Lake District lies near the western end of the major Larder Lake/Cadillac break in Ontario and Quebec which, with the Destor-Porcupine break, form the historically two most significant gold-controlling structures in the Abitibi belt. The Kirkland Lake district is centred upon a five township, or 50 kilometre long and three kilometre wide belt of younger, "Timiskaming" volcanics, syn-volcanic intrusions and coarse clastic sediments.

The major producer in the district is a feature known as the "Mile of Gold" or "Kirkland Lake Main Break", which together with its major splays has produced and has reserves totalling about 25 million ounces, from mines with such famous names as Wright-Hargreaves, Lake Shore, Teck-Hughes, Kirkland Lake Gold and Macassa. Only the last of these is still in production from a new 7,000 foot deep shaft at the far western, down-plunge extent of this structure. Typical grades in the district have been over 0.5 opt Au, mostly from narrow quartz veins, but also from some stockwork or breccia orebodies.

The second important deposit is the Upper Canada Mine, located about 16 km further east, which produced about 4.7 million tons at a grade of 0.32 opt Au. Various ore-bodies were mined from narrow high grade veins as well as stockworks and breccias up to 30 m wide.

The Larder Lake district, including the Kerr-Addison mine, lies a further 18 km to the east, but is considered to form a separate district because of its different geological setting within the older, "Keewatin" mafic and ultramafic flows, rather than within the Timiskaming basin.

The Timiskaming sediments and volcanics appear to have been deposited in a half-graben structure, onlapping with angular unconformity the Keewatin basalt flows to the north, and bounded to the south by the steeply-dipping, "Larder Lake Fault". This graben lies along the southern, overturned side of the major synclinal structure lying between the Destor-Porcupine and Larder Lake breaks, which forms a large part of the Abitibi belt in Ontario. On a large scale, therefore, the Timiskaming sequence is north facing and south dipping, although local bedding relationships indicate some south facing areas, reflecting a more complex structural history and/or local folding within the Timiskaming sequence.

In the original mapping in the area in the 1940's (Thomson, 1950) all of the observed rocks were interpreted in terms of original petrogenetic types. Many of these terms had their origins in concepts prevalent at that time, and have poor or inexplicable origins as perceived today as volcanics, intrusives or sediments of normal mineralogy, chemistry and fabrics or in terms of their spatial distribution within standard facies settings. Instead, it seems more probable that many of these rocks can be explained in terms of alteration and or structural deformation of more normal lithologies and depositional settings. Indeed, most can be interpreted with a three-dimensional framework of original lithology, alteration and deformation. Original lithologies were probably volcanic flows, flow-top breccias, synvolcanic sills, conglomerates and graywackes. Alteration includes both widespread regional affects, such as K-metasomatism creating the so-called "trachytes", as well as various alteration facies related to mineralizing systems such as propylitic (chlorite, carbonate, "tuffaceous sediments"), phyllic (sericite schists), and silicic (red "arkoses", "syenite porphyries"). Deformation styles include both ductile (schists) and brittle-ductile regimes (pyroclastics, "tuffs"), in addition to the more readily mapped brittle fault zones.

The Timiskaming volcanics are of unusual composition compared with those typical of most of the Abitibi belt as they contain high potassium and have a trachytic texture. They have traditionally been called "trachytes", and contain large, angular phenocrysts of white, green or red colour and hence the name "white-spotted", etc. These phenocrysts now consist dominantly of quartz and carbonate, with minor sericite. Their colour and angular shapes have traditionally been taken to infer an original feldspar or feldspathoid. However, recent studies have indicated that they may have been mafic minerals such as hornblende or pyroxenes.

Although called trachytes, these rocks are not chemically true peralkaline, feldspathoid-normative trachytes (i.e. quartz deficient dacites), but rather are shoshonites (i.e. more mafic composition) or highly altered calc-alkaline andesites. Certainly the present composition of the phenocrysts indicates a high degree of rock-penetrative alteration, and the very high potassium contents are unlike almost any other fresh, magmatic, volcanic rock. On the basis of their setting, composition, and obvious alteration, the original rock types were probably andesites or high-k andesites, erupted in a distinct volcanic rift setting.

Many of the volcanic units consist of various clastic or fragmental rocks which may be agglomerates or flow top-breccias, and in the area around the Upper Canada Mine individual flow and accompanying flow-top breccia units are present. Other volcanic units have traditionally been referred to as "tuffaceous conglomerates (trachytic tuffs)". Whereas some of these units may indeed be fine grained pyroclastics, particularly within otherwise well-bedded areas, most appear to be due to various combinations of alteration and brittle-ductile deformation which has produced the fine-granular textures and foliation taken previously as tuffaceous bedding.

Three major volcanic horizons can be identified within the area, each about one kilometre thick. A large part of each of these volcanic units have been mapped as "syenite porphyry" or "mafic syenite-(augite)-porphyry". These "hypabyssal-intrusive" units are generally indistinguishable in chemistry and texture from most of the areas mapped as trachytes, particularly those mapped as trachyte sills. Most of the difference can be attributed to the various mappers who covered each of the townships and parts of the townships. In Teck Township, and around the "Mile of Gold", the volcanics are mapped as "syenite-porphyries" enclosed within "tuff and agglomerate", whereas further east in Lebel and Gauthier Townships it is the "trachyte flows and sills" which are enclosed within similar "tuffaceous and agglomeratic" units.

These volcanic units are stratigraphically separated by horizons of coarse clastic sediments, including polymictic conglomerates. The conglomeratic beds have been interpreted as fault-scarp debris flows, whereas the interbedded graywackes probably formed in subaerial, fluvial environments (Hyde, 1978). These sediments contain some distinctive clast lithologies, including bright-red jaspers, which are one of the principal distinguishing characteristics of "Timiskaming" sediments from the often similar coarse volcanic breccias or lapilli-tuffs.. These rocks are very similar in appearance to much of the nearby Huronian, and indeed to the Pleistocene glacial sediments, and like them have at times been interpreted as tillites (MacLean, 1956) and glacio-fluvial sediments.

However, in addition to these true sediments, there are various areas which were historically mapped as sediments and which consist of sericite and chlorite schists. Recent examination of these units has clearly shown that they have cataclastic textures typical of ductile deformation, shear or mylonite zones, and that their quartz plus clay mineralogy is due to hydrothermal alteration. However, considerable disagreement still exists as to whether the alteration preceded and focused the later ductile deformation - and the accompanying quartz vein rich brittle-ductile deformation - or whether pre-existing structures have been altered during or following deformation. Whichever, there

is a clear association of the mineralization throughout the district with rocks which are both altered and structurally deformed within shear zones.

Most of the major deposits within the "Mile of Gold", at the Upper Canada Mine, and in other minor occurrences throughout the district tend to lie within the various volcanic horizons rather than the true clastic sediments. The volcanic rocks clearly provide a better chemical and physical environment for the development of alteration and deformation.

Like most of the major gold districts in the Shield, that at Kirkland Lake is characterized by an abundance and complexity of structural features. Whether this is a real feature, or whether it is a function of the greater knowledge base relative to the great mass of the greenstone belts, is not clear. This complexity and abundance of structure is also a function of the variability in the original rock types, with their different strengths and reactions to deformation, as well as in the stratigraphy with the rapid facies changes developed along strike and down-dip within the original graben-setting. The most important of these structures are the mineralized vein-sets, whether as discrete quartz veins or as breccia or stockwork bodies. All of the major deposits within the district have the same strike of east-northeast with a variation of less than 5 degrees, indicating that they are part of a single stress regime. However, mapping in the Upper Canada area showed that many of these structures may have had their origins very early in the development of the area, and that they may have been syn-volcanic growth faults.

These mineralized structures are cut by many faults, most of which have strikes between due north and due east, with very few in the northwestern quadrant. The fault pattern can be interpreted as bounding a series of lozenge or sigmoidal shaped blocks. The boundary faults can be recognised as those which clearly off-set the Timiskaming-Keewatin contacts. Other faults appear to form shingle-sets lying within these larger blocks, off-setting the mineralized zones into series of *en echelon* bodies. These mineralized bodies plunge to the west in the western part of the district, and to the east in the eastern part, consistent with the apparent broad antiformal distribution of the district as a concave-north arc.

A general model can be developed from the regional stratigraphic and structural characteristics as described above. In this model, the main deposits appear to have formed as minimum-strain openings developed between the larger, boundary-off-setting structures, and specifically where these openings cross the volcanic horizons. Different deposits appear as brittle-ductile type structures within the more-massive volcanic units such as the "syenite-porphyries" or "trachyte sills", or as veins (mylonites) or disseminated within the ductile shear zones, historically mapped as "sediments", "sericite schist" or "tuffaceous" units.

5.0 PROPERTY GEOLOGY

The geological mapping program utilized a surveyed baseline at 071° and 100 metre spaced cross lines at 341° approximately perpendicular to the targeted favourable structural trends. The results of the mapping are presented on Drawings GL-001 to GL-006 at a scale of 1:2500 and Drawing GL-010 at a scale of 1:5000. The maps covering a small portion of the southwest corner of the property is included in the Teck A geology report. The position of the grid system relative to the individual mining claims is shown on Drawing GL-010.

5.1 Lithology

The geology of the property can be divided into three domains. The southern domain consists of the northern half of the Murdock Creek syenite stock intruded into altered spinifex-textured komatiitic volcanics of the Larder Lake Group. The central domain includes complexly folded and faulted Timiskaming ash- and lapilli-tuffs interbedded with conglomerates, graywackes, arenites, siltstones and mudstones which are intruded by narrow syenite dykes. The southern and central domains are separated by a 50 to 300 metre wide zone of intense carbonatization and chlorite-carbonate-talc schists associated with the Larder Lake Fault Zone. The northern domain is dominated by a 100 to 300 metre wide feldspar-porphyritic syenite body which intrudes Timiskaming conglomerates and graywackes. The central and northern domains are separated by a 25 metre wide diabase dyke. Grid mapping of the property found the geology to be much the same as described by Thomson (1950) with the exception of mineralized alteration zones discovered during the overburden stripping program.

The presence of clastic quartz, jasper and/or mariposite clasts was used to distinguish the sedimentary rocks from the Timiskaming volcanic tuffs. Altered, sheared versions of the finer grained sediments and volcanics are difficult to differentiate. The unaltered tuffs and graywackes contain disseminated magnetite; however, the volcanic rocks have a distinctively higher magnetic susceptibility. This diagnostic feature was used to interpret contacts in areas of sparse outcrop and where rocks of questionable origin were found.

The sandstones have been subjectively sub-divided into graywackes and arenites with the graywackes having greater than 15 percent matrix.

Siltstone and mudstone units were found to be too thin to be shown at a scale of 1:2500.

In the stripped and washed outcrops, rapid changes in bedding directions were found. These rapid changes are probably a result of a high energy fluvial environment in a rugged paleotopography.

A distinctive, coarse-grained, volcanic fragmental unit is located 50 metres south of the baseline in the western part of the property and 200 metres north of the baseline to the east. Angular to well rounded fragments, pebbles and boulders of trachyte, syenite and porphyritic-syenite, 2 to 15 cm in diameter, are set in a medium-grained, tuffaceous-ash matrix. This unit is strongly magnetic, persistent along strike across the property, and a useful marker horizon.

The Murdock Creek syenite has been subdivided into leuco-, meso- and mela-syenite facies. The contacts between the facies are very irregular and subjective. Large areas of strongly carbonated syenite lie east of the Murdock Creek Fault and south of the Larder Lake Fault Zone. These altered syenite bodies trend 020° parallel to the Lake Shore Fault. Xenoliths, roof pendants or windows of amphibolite bearing and spinifex textured komatiites were found within the Murdock Creek syenite. The syenite is strongly magnetic to the west of the Murdock Creek Fault. To the east the syenite is weakly magnetic with patches of higher magnetic susceptibilities, usually in the vicinity of komatiite outcrops.

The porphyritic syenites are pink to red with 15 to 25 percent white feldspar phenocrysts. Previous drilling has intersected augite syenite facies within the porphyritic syenite of the northern domain.

Small, 5 to 50 metre wide, fine to medium grained equigranular leuco syenite dykes intrude the tuffs and sediments in the central domain.

A 25 metre wide medium grained diabase dyke parallels the southern contact of the porphyritic syenite in the northern domain. A north-northeasterly striking dyke branches off this diabase along line 8400E.

5.2 Structure

The structural relationships between the various Timiskaming volcanic and sedimentary units is very difficult to interpret due to apparent rapid changes in bedding directions, a limited number of accurate determinations of facing directions, difficulty in distinguishing between fine grained tuffs and graywackes and three sets of complex faulting. The magnetic data was used extensively to interpret and extrapolate folding and faulting patterns.

Tightly folded, finely laminated mudstones were found in the stripped area at 8160E, 10220N. The steeply-dipping mudstones with interbedded siltstones exhibit soft sediment deformation and folding plunging 50° to the southwest (232°). The mudstones interfinger with the lapilli tuffs to the northeast. A dome-shaped arenite outcrop centred at 8190E, 10220N may follow an anticlinal axis. The mudstone arenite contacts strike 050° to 055°, the same as the synclinal fold axis which is located in the adjacent mudstone to the northwest. The magnetic data and bedding directions indicate that the interbedded tuffs and sandstones in the central domain are folded in a similar fashion.

Numerous faults, shear zones and linear alteration zones were observed and/or inferred from the ground magnetic results. The majority of these structures can be classified into a number of sets around 015° to 025° (Lakeshore set) or 035° to 045° (Murdock Creek set), both of which offset an earlier alteration- mineralization related brittle and ductile shear set at 055° to 080° .

The Murdock Creek set is the most dominant structure with areas of closely spaced foliation fabrics developed in most outcrops of the central domain, especially on the claim to the south of the Hunton Shaft. Offsets related to the Murdock Creek set are in the order of 10 to 100 metres, with a sinistral sense of motion. The Murdock Creek fault set is interpreted as splays off the Larder Lake Fault Zone.

Fabrics associated with the Lakeshore set are best observed in the newly stripped and washed outcrop areas. Sinistral offsets are usually less than 5 metres.

The Lakeshore fault passes through an area of deeper overburden between lines 8600E to 8800E in the north and central domains and along Murdock Creek in the southern domain.

The altered mineralized shear set occurs as 1 to 10 metre wide zones of ductile and brittle shearing within volcanics, sediments and intrusives in the central and northern domains. An interpretation of the magnetic and mapping data indicates at least six sub-parallel linear alteration shear zones which for reference purposes have been named the "99", "100", "102", "106", and "107" structures, based on their grid northings where originally identified. These shear zones are offset 5 to 60 metres by the later Lakeshore and Murdock Creek fault sets.

The Larder Lake Fault Zone separates the Timiskaming rocks of the central domain and the Murdock Creek syenite stock and Larder Lake volcanics of the southern domain.

The Amalgamated Kirkland-Blanche River fault crosses the northwestern corner of the property from 7400E to 7800E and 8600E to 8800E. This fault is regional structure sub-parallel to the Larder Lake Fault Zone.

5.3 Alteration

A weak to strong pervasive carbonate alteration is present in most outcrop areas on the Amalgamated Kirkland property. A moderate to strong carbonate-chlorite alteration is associated with the later Murdock Creek and Lakeshore fault sets.

A sericite-carbonate-quartz alteration is associated with the alteration-mineralization shear set. The outer margins of the alteration zones are diffuse and the generation of 5 to 15 percent chlorite porphyroblasts can only be identified by thin section examination (Appendix I, H. Dillon-Leitch). A progressive inward increase in carbonate (ankerite) concentration and the appearance of sericite corresponds with the progressive destruction of chlorite and the development of a light, yellow-green colour.

Magnetite, as detrital grains in ash tuff and within trachytic clasts of lapilli size, is progressively replaced by hematite during carbonatization. A decrease in the magnetic intensity is therefore an important field criteria for tracing these altered zones. Pyrite replaces hematite rapidly in the transition zone from chlorite to sericite dominant facies. The appearance of pyrite is coincident with the appearance of sericite and the total destruction of magnetite. Pyrite content ranges from trace to more than 10 percent.

The innermost alteration zone consists of a blue-coloured, carbonate + pyrite + quartz breccia vein (less than one metre wide) or more often a silicified breccia zone (two to six metres wide) of carbonate + sericite + pyrite + quartz (5-30 percent pyrite). Pyrite is disseminated, may replace individual clasts, and coarsens towards the central part.

Carbonated syenite units trending sub-parallel to the Lakeshore fault east of Murdock Creek in the Murdock Creek syenite were found. No distinct shearing was observed in these units.

Brown, buff and green carbonated rocks are associated with the Larder Lake Fault Zone. These carbonate bodies frequently contain stockworks of quartz veinlets or they are strongly sheared to talc-chlorite-carbonate schists.

5.4 Mineralization

Channel, chip and/or grab samples were taken of stronger sericite-carbonate alteration, quartz-carbonate veining and/or pyrite mineralization.

Two new areas of previously unreported mineralization were identified on the Amalgamated Kirkland property as a result of the 1989 program of geological mapping and sampling.

The first lies close to the western boundary of the property in proximity of an old shaft (now filled in) located southeast of the Amalgamated Shaft on the adjacent property held by J. Morgan. An old trench at 7290E named the "101-7290 zone", was cleaned out and extended from 102+00N to 10250N. From 10217N to 10223N this trench contained a zone which averaged 2.48 g/t Au over 6.0 metres, including 4.03 g/t Au over 2.0 metres. This zone corresponds to an area of strong foliation with a strike of 041°, dipping 70° south, in a rock thought to have originally been a graywacke, but now highly altered to ankerite plus sericite and containing 1 to 4% finely disseminated pyrite. Late in the season, a second trench was cleared 100 m to the east on line 7400E. No anomalous samples or highly altered areas were identified; assuming that there are no intervening faults, and at a strike of 070°, the mineralized zone would project into an area where the overburden was too deep for the back-hoe to reach bedrock, at the south end of this trench.

The second discovery, known as the "102-8350 zone", lies on line 8350E at 10237N, and was uncovered in an area of shallow overburden in one of the long overburden removal cuts. A single grab sample taken during the geological mapping returned 3.22 g/t Au. Follow-up channel sampling gave an average of 2.89 g/t Au over 3.5 metres.

Following this result, the decision was made late in the season to try and explore this area further and the zone was subsequently cleared of overburden for a further 50 metres to the east. Very cold temperatures and the heavy snow pack prevented washing or mapping of the outcrop, so that further work was restricted to two difficult channels cut 10 m apart, each about 13 m long, and the collection of 48 grab samples. The individual channel samples were all 0.5 metres long. These two channels returned:

West Channel (83+62E)	2.22 g/t Au over 6.0 m
including	2.71 g/t Au over 1.5 m
and	5.00 g/t Au over 1.5 m
East Channel (83+72E)	1.59 g/t Au over 6.0 m
and	1.44 g/t Au over 0.5 m

The grab samples included 11.45 g/t Au at 8398E and 29.18 g/t Au at 8356E.

This mineralized zone lies within an area of alteration hosted by trachytic lapilli tuffs intruded by a five metre wide syenite body.

The altered mineralized zone consists of three sub-zones of increasing alteration intensity inwards towards the area of higher grade mineralization, as follows:

a. an outer zone of unknown width of chlorite plus carbonate, with primary magnetite;

b. an intermediate zone up to 10 metres wide of gradual replacement of the chlorite by muscovite (sericite) and of the magnetite by hematite, still accompanied by carbonate;

c. the inner zone up to 6 metres wide, corresponding to the area of gold mineralization, within which the chlorite is totally replaced by muscovite and the hematite is now replaced by pyrite, with the total destruction of the original volcanic fabrics.

The best mineralization is associated with blue-grey quartz as a zone of silicified breccia, locally containing up to 30% fine-grained pyrite, together with minor galena and molybdenite. Native gold can be seen in polished section.

This mineralization, alteration, and its setting can be compared with some of the orebodies in the Kirkland Lake district, as well as those in the Upper Canada Mine which are hosted in similar trachytes.

The overall trend of the mineralization is about 070°, but the zone is divided into a series of blocks by steep 015° - 035° sinistral, normal faults with minor displacement.

Elsewhere on the property, anomalous samples were collected during the 1989 field season, in a number of areas. At 8175E, 10220N, grab samples of weakly altered graywacke with minor pyrite returned anomalous assays up to 1.91 g/t Au.

At the Hunton Shaft grab samples assayed up to 7.89 g/t Au. In a zone exposed in the 8850E overburden clearing, about 100 m east of the shaft, a sample from a narrow shear zone which strikes towards the shaft, assayed 630 ppb Au over 2.5 metres.

The northwestern syenite body, known as the Amalgamated Syenite, is generally anomalous with most samples at over 100 ppb Au, and up to 620 ppb Au. This is an area which has seen past drilling, including as recently as 1983, which intersected narrow mineralized zones in the hanging-wall of the Amalgamated Fault Zone. This fault lies just to the north of the area of syenite outcrops on the property.

One metre channel samples of foliated, sericitic tuffs at 8350E, 10591.5N and carbonated graywackes at 8350E, 10490N assayed 390 and 275 ppb Au respectively.

A sample of 770 ppb Au was obtained from the Murdock Creek syenite on line 7600E at 9465N, lying south of the old shaft on the Larder Lake Fault Zone and west of Murdock Creek. Relatively little historical exploration appears to have been carried out in this corner of the property, and it was not covered by Newmont's 1978 geophysical grid.

A grab sample from a narrow sericitic shear zone containing pyritic, quartz-carbonate veining at 8030E, 9882N assayed 4.66 g/t Au.

Detailed results of the 1989 and 1990 overburden stripping, outcrop washing, and channel sampling of the alteration-mineralization shear zones are presented in separate reports by Bottrill, 1990 and Benham, 1990. Assay results for grab samples taken during the 1989 and 1990 summer field seasons are shown on Drawings GA-001 to 006 at a scale of 1:2500. Anomalous grab sample assays are located on Drawing GA-010 at a scale of 1:5000.

5.5 Geochemistry

A limited number of whole rock and trace element analysis were done on altered mineralized samples from the 102-8350 gold zone. The results are presented in Appendix II.

The 102-8350 alteration-mineralization shear zone was found to be anomalous in silver up to 11.6 ppm Ag, lead up to 2467 ppm Pb, molybdenum up to 1452 ppm and gold up to 34560 ppb Au. Only traces of arsenic and tellurium were detected.

Whole rock analysis show altered mineralized samples to be enriched in silica and potassium and to be depleted in lime, magnesium and soda.

6.0 DISCUSSION OF RESULTS

Mapping of the Amalgamated Kirkland property found the geology to be much the same as mapped previously by Thomson (1950). A central domain of complexly folded and faulted Timiskaming volcanic tuffs with interbedded clastic sediments is bounded to the north and to the south by syenite intrusive domains. The southern domain consisting of the Murdock Creek syenite is separated from the central domain by the Larder Lake Fault Zone.

The Lakeshore and Murdock Creek fault sets, at 015° to 025° and 035° to 065° respectively, were found to offset an earlier alteration-mineralization related ductile and brittle shear at 055° to 080°.

Highly anomalous gold mineralization over substantial widths, up to 6 metres, were found associated with the earlier shear set at 8350E, 10237N and 7290E, 10223N. These mineralized altered gold-bearing structures can be favourably compared to those at the present and past producing mines of the Kirkland Lake Main Break and the Upper Canada mine.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Geological mapping, overburden stripping and magnetic surveys on the Amalgamated Kirkland property resulted in the discovery of two significant gold zones and some favourably-oriented alteration zones from which grab samples returned anomalous gold assays.

Additional overburden stripping, detailed mapping and channel sampling was recommended to follow-up the encouraging results of the 1989 exploration program. The recommended work was carried out during the 1990 summer field season. The significant results of the 1990 exploration program are described in a separate report by Benham, 1990.

REFERENCES

Amalgamated Kirkland property, 1939-1945 diamond drill hole file, A1 - A41 and Mac1 - Mac25; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake.

Atkinson, J.R., 1979, Newmont Exploration of Canada Limited, Duffy property General Exploration Report, 1978; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake, 30p.

Barney, M.T., 1920, Description of Property by M. Barney of the Highland Kirkland Gold Mines Limited; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake.

Basu, A. R., Goodwin, A. M. and Tatsumoto, M., 1984, Sm-Nd study of Archean alkalic rocks from the Superior province of the Canadian Shield; Earth Plan. Sci. Let., 70, p. 40-46.

Benham, W., 1990, Report on Overburden Stripping, Detailed Mapping and Channel sampling, Kirkland Lake Project, Amalgamated Kirkland Property, May-July, 1990, Teck Township, Larder Lake Mining Division, Ontario (Battle Mountain (Canada) Inc.).

Bottrill, T. J. 1989, Queenston Group Properties, Kirkland Lake, Ontario Battle Mountain (Canada) Inc., Memo to O.E. Leigh, April 5, 1989

Bottrill, T. J. et al., 1990a, Report on a fixed-wing airborne magnetic and VLF-EM survey, Kirkland Lake Project, Larder Lake Mining Division, Ontario, September, 1989; Assessment File Report - Teck Twp, Battle Mountain (Canada) Inc.

Bottrill, T. J., et al., 1990b, Report on overburden stripping, outcrop washing, and channel sampling, Amalgamated Kirkland Property, July-December, 1989, Teck Township, Larder Lake Mining Division, Ontario, Canada; Assessment File Report - Teck Twp, Battle Mountain (Canada) Inc.

Cameron, D. M., 1990 Alkaline magmatism at Kirkland Lake, Ontario product of strike-slip orogenesis; in Current Research, Part C, Geol. Surv. Can., Paper 90-10, p. 261-269.

Charlewood, S. H., 1964, Geology of deep developments on the Main Ore Zone at Kirkland Lake, Ont. Dept. Mines, Geol. Circ. 11, 49 p.

Colvine, A. S., Fyon, J. A., Heather, Marmont, S., Smith, P. M. and Troop, D. G., 1988, Archean lode gold deposits in Ontario; Ontario Geological Survey, Miscellaneous Paper, 139, 136 p.

Cooke, D. L. and Moorhouse, W. W., 1969, Timiskaming volcanism in the Kirkland Lake area, Miscellaneous Paper, 139, 136 p.

Dans, R. E., 1981, Orme Prospecting Syndicate file, Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake.

Fisher, R. V. and Schminke, H. U., 1984, Pyroclastic rocks; Springer Verlag, Berlin, 472 p.

Hattori, K. and Levesque, G., 1989, Hydrothermal activity in the Kirkland Lake intrusive complex; in Geoscience Research Grant Program, Summary of Research 1988-1989, edited by V. Milne, Ontario Geological Survey, Miscellaneous Paper 143, p. 59-67.

Heale, T., 1972, Report on diamond drilling, January, 1972, Kirkland Lake, Ontario: Duffy Property file, Mayfield Exploration and Development Ltd.; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake. 7 p.

Hinse, G. J., 1974, Kerr Addison Mines Limited Summary Report on Duffy - Teck option - "0 - 15"; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake. 5 p.

Hyde, R. S., 1978, Sedimentology, volcanology, stratigraphy, and tectonic setting of the Archean Timiskaming Group, Abitibi greenstone belt, northeastern Ontario, Canada; unpubl. Ph.D. thesis, McMaster University, 422 p.

Hyde, R. S., 1980, Sedimentary facies in the Archean Timiskaming Group and their tectonic implication, Abitibi greenstone belt, northeastern Ontario Canada; Precambrian Research, 12, p. 161-195.

Jackson, S. L., 1988, The Abitibi greenstone belt near Larder Lake; structural and stratigraphic studies; in Summary of Field Work and other activities 1988, by the Ontario Geological Survey, edited by A.C. Colvine, M. E. Cherry, B. O. Dressier, P. C. Thurston, C. L. Baker, R. B. Barlow, and c. Riddle, Ont. Geol. Surv., Misc. Paper 141, 498 p.

Jensen, L. S., 1978, Regional stratigraphy and structure of the Timmins-Kirkland Lake area, District of Cochrane and Timiskaming and the Kirkland Lake - Larder Lake area, District of Timiskaming; p. 67-72 in Summary of Field Work, 1978, by the Ontario Geological Survey, edited by V.G. Milne, O.L. White, R.B. Barlow, and J.A. Robertson, Ontario Geological Survey, Miscellaneous Paper, 82, p. 235.

Jensen, L. S. and Langford, F. F., 1985, Geology and petrogenesis of the Archean Abitibi Belt in the Kirkland Lake area; Ont. Geol. Surv., Misc. Paper 123, 130 p.

Kerrich, R., and Watson, G.P., 1984, The Macassa mine Archean lode gold deposit, Kirkland Lake, geology, patterns of alteration, and hydrothermal regime; Econ. Geol., 79, pp. 1104-1130.

Kishida, A. and Kerrich, R., 1987, Hydrothermal alteration zoning and gold concentration at the Kerr-Addison Archean lode gold deposit, Kirkland Lake, Ontario; Econ. Geol., 82, pp. 649-690.

Leahy, M., 1981, Report on diamond drilling on "Amalgamated Kirkland" property, Lampe Resource Co. Ltd. option, Teck Township, Ontario; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake. 2 p.

MacLean, A., 1956, Geology of Lebel Township; Ont. Dept. Mines Bull., 150, p. 63.

MacLean, D. H., 1978, Newmont Exploration of Canada Limited, Duffy Property, IP-Resistivity survey; Assessment File Report - Teck Twp, Resident Geologist's File, Kirkland Lake. 10 p.

Ontario Geological Survey, 1979, Airborne EM and magnetic survey, Kirkland Lake area (KLIP), by Questor Surveys.

Riddle, W., 1937, Petrographic classification, Florena Gold Mines Ltd. Assessment File Report, Resident Geologists File, Kirkland Lake; Florena Gold Mines Ltd., Teck Township, 21 p.

Ridler, R. H., 1976, Stratigraphic keys to the gold metallogeny of the Abitibi belt; Can. Min. J., 97, p. 2-8.

Roth, J., 1990a, Re-evaluation of IP/resistivity survey, Amalgamated Kirkland Property; internal Battle Mountain (Canada) Inc. memo to T. Bottrill, March 28, 1990, 4 p.

Rowins, S. M., Lalonde, A. E. and Cameron, E. M., 1989, Geology of the Archean Murdock Creek Intrusion, Kirkland Lake, Ontario; in Current Research, Part C, Geological Survey of Canada, Paper 89-1C, p. 313-323.

Summerhayes, 1911, Report on the Porcupine-Swastika Company's claims, Assessment File Report, Resident Geologist's File, Kirkland Lake; Highland-Kirkland Mines Ltd., Teck Township, 2 p.

Thomson, J. E., 1950, Geology of Teck Township and the Kenogami Lake area, Kirkland Lake Gold Belt; Ontario Department of Mines, Annual Report for 1948, Vol. 57, Part 5, p. 1-53. Reprinted 1989.

Thomson, J. E., Charlewood, K. G., Hawley, J. E., Hopkins, H., MacIntosh, C. E., Ogrilo, S. P., Perry, O. S., and Ward, W., 1950, Geology of the Main Ore Zone at Kirkland Lake; Ontario Department of Mines, Annual Report for 1948, Vol. 57, Part 5, p. 1-53. Reprinted 1989.

Tremblay, G. A., 1983, A report on the Teck Township Property of Eden Roc Mineral Corporation, Larder Lake Mining Division, Ontario; Assessment File Report, Resident Geologist's File, Kirkland Lake; Highland-Kirkland Mines Ltd., Teck Township, p 25.

Tyrrell, J. B., 1911, Report on mining claims belonging to the Porcupine-Swastika Gold Mining company; Assessment File Report, Resident Geologists File, Kirkland Lake; Highland-Kirkland Mines Ltd., Teck Township, p 2.

Vamos, P., 1986, Report on the company's property in Teck Township, Larder Lake Mining Division; Assessment File Report, Resident Geologist's File, Kirkland Lake; Highland-Kirkland Mines Ltd., Teck Township, p 23.

APPENDIX I

THIN SECTION DESCRIPTIONS

The following thin section descriptions were prepared by Dr. Henry Dillon-Leitch, who was employed by BMCI during 1989 and 1990 and who was principally responsible for the field mapping of the Amalgamated Kirkland property.

AK 8350E Zone 8354.5E-10234.5N (CP2 - 1.4N)

Sample No. 604 - nil

Protolith rock type: Trachyte ash- to lapilli-tuff (18ab)

Alteration type: Carbonate + Sericite ± Chlorite

Hand Specimen Characteristics

- non magnetic
- clasts are recognizable
- moderately bleached, buff colour
- no fabric, weakly fractured
- feldspar grains and trachyte clasts 1 to 5 mm long

Mineralogy

Chlorite	as tabular grains, < 1 %
Muscovite	as large euhedra, trace
Sericite	fine grains in groundmass, 10 %
Quartz	trace
Feldspars	twinned, almost completely replaced by carbonate + sericite, 20 % unaltered
Carbonate	ankerite, ubiquitous, as groundmass and as euhedra, 60 %
Apatite	trace
Magnetite	minor alteration to hematite about margins, sub-rounded grains (detrital), 2-3 %
Chalcopyrite	trace, irregular grains in carbonate, may be intergrown with pyrite and sphalerite
Pyrite	trace

Conclusions

Transition Zone: Carbonate > 50 %, Sericite 10-20 %, Chlorite trace

Stain indicates high carbonate alteration (ankerite).

The very high ankerite content coupled with the low sericite and trace chlorite indicate the influence of the later, crosscutting carbonate-alteration assemblage associated with the Murdock Creek or Lakeshore Fault set.

AK 8350E Zone 8356.5E-10237.5N

Sample No. 611 - 40 ppb Au

Protolith rock type: Trachyte lapilli-tuff (18b)

Alteration type: Carbonate + Sericite ± Chlorite

Hand Specimen Characteristics

- non magnetic
- clasts are recognizable
- moderately bleached, buff colour
- weak spotted texture from Chlorite porphyroblasts
- feldspar grains and trachyte clasts to greater than 5 mm long

Mineralogy

Chlorite	as replacement of feldspar and as large ragged porphyroblasts, 1-2 %
Sericite	replaces feldspars, fine grains, 30 %
Quartz	as trace grains and in carbonate veinlets
Feldspars	60 % altered to sericite + carbonate, some feldspar grains appear to be zoned
Carbonate	ankerite, ubiquitous, as groundmass and as euhedra, 50 %
Hematite	minor remnant magnetite, sub-rounded grains (detrital), 3-5 %
Chalcopyrite	trace
Pyrite	trace

Conclusions

Carbonate > 50 %, Sericite 30 %, Chlorite trace.

Stain indicates high Carbonate alteration (ankerite).

Highly altered trachyte lapilli-tuff from the intermediate zone.

AK 8350E Zone 8357E-10238N

Sample No. 613 - 3840 ppb Au; 4.59 g\t Au

Protolith rock type: Possibly tuffaceous?

Alteration type: Carbonate + Sericite ± Chlorite

Hand Specimen Characteristics

- non magnetic
- clasts are vaguely recognizable
- highly bleached, buff colour
- feldspar grains as laths and subequant phenocrysts
- moderate foliation, sericite on cleavage, minor veining

Mineralogy

Chlorite	trace
Amphibole	primary amphibole?, replaced by carbonate, moderate birefringence, 15° extinction, trace
Sericite	fine grains in groundmass, 50 %
Feldspars	twinned, almost completely replaced by carbonate + sericite, 10 % unaltered
Carbonate	ankerite, ubiquitous, as groundmass and as replacement of feldspars, 40 %
Hematite	trace, similar to pyrite in size and form
pyrite	8 %, two grain sizes, coarse (0.2-1.0 mm) and fine (0.01-0.2 mm), very rare in carbonate + feldspar veinlets
Chalcopyrite	trace, irregular grains in carbonate, may be intergrown with pyrite and sphalerite
Sphalerite	trace, inclusions in larger pyrite grains
Galena	trace, inclusions in larger pyrite grains
Au	inclusion in coarse pyrite?

Conclusions

Intermediate Zone: Sericite 50 %, Carbonate 40 %, Chlorite trace.

Stain indicates strong carbonate alteration (ankerite).

Appears to be tuffaceous.

An example of a pyrite-rich, sericite-rich schist from the intermediate zone.

AK 8350E Zone 8357.5E-10240.5N

Sample No. 617 - 290 ppb Au

Protolith rock type: Possibly "syenite", does not appear clastic

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- clasts are not recognizable, has a granular texture
- strongly bleached, buff colour
- no fabric, weakly fractured, rare micro-veinlets of carbonate + feldspar
- contains white blebs (Albite?) rimmed by chlorite feldspar grains

Mineralogy

Chlorite	large tabular grains
Sericite	fine, mat like intergrowth in groundmass, 20 %
Feldspars	twinned and zoned, almost completely replaced by carbonate + sericite, 10 % unaltered
Carbonate	ankerite, ubiquitous, as groundmass and as euhedra, 60-70 %
Hematite	trace wispy grains
Pyrite	10 %, coarse and fine grain sizes, inclusions of chalcopyrite and sphalerite
Chalcopyrite	trace, irregular grains in carbonate, may be intergrown with pyrite
Sphalerite	trace in pyrite

Conclusions

Intermediate zone: Carbonate > 50 %, Sericite 20 %.

Stain indicates strong carbonate alteration (ankerite).

Texturally ambiguous, possibly a highly carbonate-altered syenite. Slab should be re-examined to determine feldspar versus carbonate blebs.

AK 8350E Zone 8358.5E-10242.5N

Sample No. 622 - 2400 ppb Au; 2.88 g\t Au

Two slides (A & B)

Protolith rock type: Unknown

Alteration type: Sericite + Carbonate + Quartz

Hand Specimen Characteristics

- non magnetic
- clasts are not recognizable
- moderately bleached, buff colour
- foliated and banded textures, sulphide-, feldspar + carbonate, and sericite + sulphide ± carbonate-rich parts
- variable veinlets, quartz and carbonate
- brecciated texture

Mineralogy

Chlorite	trace in veinlets
Sericite	replaces feldspars, fine grains, intergrown with carbonate and feldspar, 45 %
Quartz	as mosaic grains and in carbonate + feldspar + chlorite veinlets, 15 %
Feldspars	70 % altered to sericite + carbonate; grains have a mosaic texture where outline of original phenocryst can be seen; may be zoned
Carbonate	ankerite, ubiquitous, as groundmass, 30 %
Hematite	minor, after magnetite?
Chalcopyrite	trace, as free grains or included in pyrite
Pyrite	10 %, coarse (0.2-1.0 mm) and fine (0.01-0.2 mm) grain sizes, may be rimmed by hematite - surface oxidation, blue coloured areas are rich in very finely disseminated pyrite (to 50 % locally)
Sphalerite	trace inclusions in pyrite
Au	rare inclusions in large pyrite grains, irregular form to 30 microns
Tellurides	possibly associated with native Au? inclusions in pyrite

Conclusions

Inner Zone: Sericite 45 %, Carbonate > 30 %.

Stain indicates strong Carbonate alteration (ankerite).

Highly altered rock of undetermined origin from the inner zone.
Highly silicified and pyritic, most pyrite is associated with sericite.
Has a crude brecciated texture defined by angular sulphide-rich clasts.

AK 8350E Zone 8359.5E-10244.5N

Sample No. 627 - 30 ppb Au

Protolith rock type: Trachyte ash- to lapilli-tuff (18ab)

Alteration type: Carbonate + Chlorite ± Sericite

Hand Specimen Characteristics

- weakly magnetic
- clasts are recognizable, lapilli size to 3.0 cm, have a light pink colour
- moderately bleached, weak buff colour
- no fabric, weakly fractured

Mineralogy

Chlorite	as ragged, subequant porphyroblasts and as anhedral masses within the groundmass, < 20 %
Sericite	fine grains in groundmass, < 10 %
Quartz	trace
Feldspars	twinned, mostly replaced by carbonate + sericite, 20 % unaltered
Carbonate	ankerite, as groundmass, 30 %
Apatite	trace
Magnetite	highly altered to hematite about margins, sub-rounded grains (detrital), 1-2 %
Chalcopyrite	trace, irregular grains in carbonate, may be intergrown with pyrite and sphalerite
Pyrite	trace, one large grain to 2 mm
Sphalerite	intergrown with chalcopyrite in pyrite

Conclusions

Outer Zone: Carbonate > 30 %, Chlorite < 20 %, Sericite < 10 %

Stain indicates strong carbonate alteration (ankerite).

The very high ankerite and moderate chlorite content, coupled with the low sericite, indicate the influence of the later, crosscutting carbonate-alteration assemblage overprinting the outer, chlorite-rich alteration zone.

AK 8350E Zone 8360.5E-10248N

Sample No. 634 - nil

Protolith rock type: Trachyte ash- to lapilli-tuff (18ab)

Alteration type: Carbonate + Chlorite ± Sericite

Hand Specimen Characteristics

- weakly magnetic
- clasts are recognizable, lapilli size to 3.0 cm, have a light pink colour
- moderately bleached, weak buff colour
- no fabric, weakly fractured

Mineralogy

Chlorite	as ragged, subequant porphyroblasts and as anhedral masses within the groundmass, < 30 %
Biotite	trace, Fe-rich grains, alters to chlorite
Sericite	fine grains in groundmass, alteration of feldspar grains, < 10 %
Quartz	trace
Feldspars	twinned, moderate and variable alteration to sericite + carbonate
Carbonate	ankerite, as groundmass and with sericite replacing feldspar, < 30 %
Apatite	trace
Magnetite	highly altered to hematite about margins, sub-rounded grains (detrital), 3-4 %
Chalcopyrite	trace, irregular grains in carbonate, may be intergrown with biotite
Pyrite	trace

Conclusions

Outer or least altered zone ? Carbonate < 30 %, Chlorite < 30 %, Sericite < 10 %

Stain indicates strong carbonate alteration (ankerite).

The high chlorite content, moderate carbonate, and low sericite, suggest either the outer part of the chlorite alteration halo or that the sample may represent the "least altered" or regional alteration facies.

AK 8350E Zone 8377E-10240N

Sample No. 688 - 50 ppb Au

Protolith rock type: Trachyte lapilli-tuff (18b)

Alteration type: Carbonate + Sericite + Chlorite

Hand Specimen Characteristics

- non magnetic
- clasts are recognizable, less than 1.0 cm long
- moderately bleached, light green colour
- highly foliated, late carbonate + chlorite veinlets

Mineralogy

Quartz	trace
Chlorite	as tabular masses in groundmass, along late veinlet margins, < 10 %
Biotite	rare tabular grain?, after amphibole?
Sericite	fine grains in groundmass and alteration of feldspar grains, < 30 %
Feldspars	mosaic texture, large grains, moderately altered to sericite + carbonate (50 %)
Carbonate	ankerite, as granular patches in groundmass, with sericite replacing feldspar, and in late veinlets, < 30 %
Apatite	trace
Hematite	very fine irregular grains in groundmass, may replace pyrite rims, < 0.5 %
Pyrite	1-2 %, as disseminated coarse grains, may contain chalcopyrite and sphalerite inclusions
Chalcopyrite	rare inclusions in pyrite

Conclusions

Outer to transition zone: Carbonate < 30 %, Sericite < 30 %, Chlorite < 10 %

Stain indicates strong carbonate alteration (ankerite).

Transition or intermediate zone, no chlorite porphyroblasts. Low pyrite content and lack of magnetite are compatible with the transition zone.

AK 8350E Zone 8381E-10237.5N

Sample No. 694 - 10 ppb Au

Protolith rock type: Trachyte lapilli-tuff (18b)

Alteration type: Carbonate + Sericite + Chlorite

Hand Specimen Characteristics

- non magnetic
- clasts are recognizable, less than 1.0 cm long
- strongly bleached, buff colour
- moderate foliation, veined by crosscutting fractures

Mineralogy

Quartz	trace
Chlorite	as rare ragged, subequant porphyroblasts to 1.0 mm, < 15 %
Sericite	fine grains in groundmass and alteration of feldspar grains, < 20 %
Feldspars	mosaic texture, large grains, moderately altered to sericite + carbonate (50 %)
Carbonate	ankerite, as patches in groundmass, with sericite replacing feldspar, < 30 %
Hematite	very fine irregular grains in ground mass, may replace pyrite rims, < 0.5 %
Pyrite	< 0.3 %, as sparsely disseminated fine to coarse grains, some surface oxidation

Conclusions

Outer to transition zone: Carbonate < 30 %, Sericite < 20 %, Chlorite < 15 %

Stain indicates strong carbonate alteration (ankerite).

Transition or outer zone, chlorite porphyroblasts being replaced by carbonate. Low pyrite content and lack of magnetite are compatible with the transition zone.

AK 8350E Zone 8382.5E-10237N

Sample No. 695 - 4110 ppb Au; 3.63 g/t Au
3430 ppb Au; 3.39 g/t Au

Protolith rock type: Unknown

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- clasts are not recognizable
- strongly bleached, buff colour
- two foliations, S_2 crenulates strong sericite fabric (S_1)

Mineralogy

Quartz	trace
Chlorite	nil
Sericite	fine grains in groundmass and alteration of feldspar grains, < 30 %
Feldspars	mosaic texture, large grains, highly altered to sericite + carbonate (90 %)
Carbonate	ankerite, as groundmass and with sericite replacing feldspar, < 20 %
Hematite	trace, ragged grains in groundmass
Chalcopyrite	trace, inclusions in pyrite
Pyrite	30 %, as fine and coarse grains, fine subhedral grains dominate, large grains tend to be anhedral and porous, trains of pyrite and sericite define foliation
Au	possible rare free grains?

Conclusions

Intermediate Zone: Carbonate < 20 %, Sericite < 30 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, with a very high content of pyrite: the mineralized zone.

AK 8350E Zone 8392E-10238N

Sample No. 697 - 440 ppb Au

Protolith rock type: Trachyte ash- to lapilli-tuff (18ab)

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- clasts are weakly recognizable
- strongly bleached, buff colour
- moderate foliation

Mineralogy

Chlorite	as rare ragged, subequant porphyroblasts to 0.2 mm, < 1 %
Sericite	fine grains in groundmass and alteration of feldspar grains, < 50 %
Feldspars	mosaic texture, large grains, highly altered to sericite + carbonate (70 %)
Carbonate	ankerite, as groundmass and with sericite replacing feldspar, < 25 %
Hematite	trace, ragged grains in groundmass
Chalcopyrite	trace, inclusions in pyrite
Pyrite	5 %, as fine and coarse grains, larger grains are "porous", contain inclusions of chalcopyrite and galena
Galena	trace, inclusions in pyrite or in close proximity to large grains of pyrite

Conclusions

Intermediate Zone: Carbonate 25 %, Sericite < 50 %, Chlorite < 1 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, chlorite porphyroblasts being replaced by sericite, and very high contents of carbonate and sericite.

AK 8350E Zone 8393E-10240.5N

Sample No. 699 - 40 ppb Au

Protolith rock type: Unknown

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- clasts are not recognizable
- strongly bleached, buff colour
- moderate foliation, veined parallel to cleavage

Mineralogy

Chlorite	as rare ragged, subequant porphyroblasts to 1.0 mm and along veinlet margins, < 1 %
Sericite	fine grains in groundmass and alteration of feldspar grains, < 30 %
Quartz	in carbonate + chlorite veinlets, parallel to foliation
Feldspars	mosaic texture, large grains, highly altered to sericite + carbonate (50 %)
Carbonate	ankerite, as patches in groundmass, with sericite replacing feldspar, and with quartz and chlorite in veinlets, < 25 %
Hematite	after pyrite in oxidized parts and along late fractures
Chalcopyrite	trace, anhedral grains in carbonate + quartz + chlorite veinlets
Pyrite	3 %, as fine and coarse grains, very rare in veinlets, some sulphide-rich patches along cleavage

Conclusions

Intermediate Zone: Carbonate 25 %, Sericite < 30 %, Chlorite < 1 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, chlorite porphyroblasts being replaced by sericite, and very high contents of carbonate and sericite. Sulphide blebs are oriented parallel to a dominant fabric.

AK 8350E Zone 8399E-10241.5N

Sample No. 700 - 130 ppb Au

Protolith rock type: Unknown

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- clasts are not recognizable, sulphide blebs may represent altered clasts?
- strongly bleached, buff colour
- moderate foliation; carbonate overprints sericite cleavage; cleavage oblique to sulphide clast elongation

Mineralogy

Chlorite	as rare, ragged, subequant porphyroblasts to 0.1 mm, < 1 %
Sericite	fine grains in groundmass and alteration of feldspar grains, < 40 %
Feldspars	mosaic texture, large grains, highly altered to sericite + carbonate
Carbonate	ankerite, as patches in groundmass and with sericite replacing feldspar, 40 %
Hematite	wispy filaments, < 1 %
Chalcopyrite	trace, irregular grains in carbonate and as inclusions in pyrite
Pyrite	3-5 %, as fine and coarse grains and as fine grains along cleavage direction, dominantly fine-grained

Conclusions

Intermediate Zone: Carbonate 40 %, Sericite < 40 %, Chlorite < 1 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, chlorite porphyroblasts being replaced by sericite, and very high contents of carbonate and sericite. Sulphide blebs are oriented parallel to a secondary fabric.

AK 8350E Zone 8360E-10241N

Sample No. 8447 - 34.9 g/t Au

Two sections (A-B)

Protolith rock type: **Trachyte lapilli-tuff (18a)**

Alteration type: **Carbonate + Sericite + Quartz**

Hand Specimen Characteristics

- non magnetic
- lapilli-size clasts with trachytoid textures
- highly bleached, light blue to cream colour
- weakly veined, fragments appear to be oriented

Mineralogy

Quartz	rare free grains, within carbonate + feldspar ± chlorite veinlets, sample has 71.3 weight % SiO_2
Chlorite	large, iron-rich ragged grains (porphyroblasts), < 2 %
Muscovite	rare tabular laths, oriented parallel to foliation, < 2 %
Sericite	very fine-grained alteration of feldspar-rich matrix and some trachyte clasts, may replace chlorite porphyroblasts, may be oriented, < 25 %
Feldspars	most have a mosaic texture and may be altered to a mix of fine sericite ± carbonate or all sericite (60 % replacement)
Carbonate	ankerite, as coarse-grains in veins, most is finely intergrown with sericite in the matrix or is replacing feldspar grains, < 35 %
Hematite	trace, very fine subhedral grains in groundmass
Pyrite	10 %, bimodal grain sizes (< 0.1 and 0.1-1.2 mm), chlorite? is frequently situated in the pressure shadows of rotated grains, minor surface oxidation to hematite
Chalcopyrite	trace, as inclusions in pyrite and as free grains
Galena	trace, as free grains, associated with pyrite and feldspar veinlets, and included in pyrite

Conclusions:

Intermediate to inner zone: **Carbonate < 35 %, Sericite < 25 %, Chlorite < 2 % , high silica content**

Stain indicates strong carbonate alteration (ankerite).

The alteration assemblage and lack of visible quartz in section A is compatible with the intermediate zone. However, the high silica content, shown from geochemical analysis, the presence of quartz veinlets in section B, and the blue colouration is consistent with the inner zone alteration facies.

AK 8350E Zone 8399E-10242.5N

Sample No. 72867 - 70 ppb

Protolith rock type: Trachyte lapilli-tuff (18b)

Alteration type: Carbonate + Sericite + Chlorite

Hand Specimen Characteristics

- non magnetic
- clasts are recognizable, lapilli size to 1.5 cm, replaced by sulphide?
- moderately bleached, weak buff colour
- strong fabric, defined by sericite concentrations and the elongation of sulphide patches

Mineralogy

Chlorite	as ragged, subequant porphyroblasts to 2.0 mm, may be replaced by carbonate + sericite, associated with carbonate-poor areas, 3-5 %
Sericite	fine grains in groundmass, alteration of feldspar grains, 20-30 %
Feldspars	mosaic texture, large grains, variable alteration to sericite + carbonate
Carbonate	ankerite, as patches in groundmass and with sericite replacing feldspar, < 25 %
Hematite	wispy filaments and as rare tabular to subequant subhedra within areas of low pyrite concentrations
Chalcopyrite	trace, irregular grains in carbonate and as inclusions in pyrite
Pyrite	5 %, as fine and coarse grains and as very fine blebs along silicate/carbonate cleavage planes
Sphalerite	rare inclusions in pyrite?

Conclusions

Transition Zone: Carbonate < 25 %, Sericite 25-30 %, Chlorite < 5 %

Stain indicates strong carbonate alteration (ankerite).

Transition zone, with chlorite porphyroblasts being replaced by sericite and pyrite almost completely replacing hematite.

AK 8350E Zone 8399E-10240N

Sample No. 72868 - 2270 ppb Au, 2.09 g/t Au

Protolith rock type: Trachyte ash- to lapilli-tuff (18ab)

Alteration type: Carbonate + Sericite ± Quartz

Hand Specimen Characteristics

- non magnetic
- clasts are weakly recognizable, ash to lapilli size to 4 mm; "clasts" are very angular and appear to have been brecciated; rare feldspar grains to 4 mm
- blue colour
- weak fabric within sericite-rich parts, weak alignment of clasts

Mineralogy

Chlorite	rare overall, traces in the sericite-rich parts, < 1 %
Sericite	fine matted grains in groundmass and as alteration of feldspar grains, < 15 %
Quartz	< 1 %
Feldspars	mosaic texture, highly altered to carbonate + sericite
Carbonate	ankerite, may be coarse in groundmass and fine-grained with sericite where replacing feldspar, < 30 %
Hematite	wispy grains and replacement of pyrite, < 1 %
Chalcopyrite	very rare, irregular, free grains in carbonate
Pyrite	5 - 8 %, bimodal grain sizes, rare inclusions of galena and sphalerite
Galena	rare inclusion in large pyrite grains
Sphalerite	rare inclusion in pyrite with chalcopyrite

Conclusions

Intermediate Zone: Carbonate < 30 %, Sericite < 15 %

Stain indicates strong carbonate alteration (ankerite).

The moderate sericite and pyrite content and the lack of chlorite indicate the intermediate zone. Contains domains of sericite + pyrite which anastomose about clasts.

AK 8350E Zone 8390E-10239N

Sample No. 72870 - 60 ppb Au

Protolith rock type: Trachyte ash tuff (18a)

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- clasts are faintly recognizable, ash size to 4.0 mm
- strongly bleached, buff colour
- moderate fabric, patchy alteration

Mineralogy

Chlorite	trace, < 2 %
Sericite	fine grains in groundmass, alteration of feldspar grains, up to 40 % locally, overall < 20 %
Quartz	trace
Feldspars	mosaic texture, moderate alteration to sericite + carbonate
Carbonate	ankerite, as groundmass and with sericite replacing feldspar, < 30 %
Apatite	trace
Magnetite	highly altered to hematite about margins, irregular grains, < 1 %
Chalcopyrite	trace
Pyrite	trace to 5 percent locally, fine- to coarse-grained, may be totally oxidized

Conclusions

Intermediate zone: Carbonate < 30 %, Sericite < 20 % Chlorite, < 2 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, patchy alteration indicates sericite- and carbonate-rich parts. Sulphides are associated with carbonate-rich part.

AK 8350E Zone 8390E-10244.5N

Sample No. 72871 - 10 ppb Au

Protolith rock type: Trachyte ash-tuff (18a)

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- very weakly magnetic
- ash-size clasts of feldspar grains and trachyte
- weakly bleached, light green colour
- weakly foliated

Mineralogy

Chlorite	very deep green pleochroism, large ragged grains (porphyroblasts), < 5 %
Muscovite	rare porphyroblast
Sericite	alteration of feldspar-rich matrix and some trachyte clasts, late carbonate replaces some sericite, < 20 %
Feldspars	most have a mosaic texture and are altered to a mix of fine sericite ± carbonate (80 %)
Carbonate	ankerite, as coarse-grained patches in groundmass, intergrown with sericite when replacing feldspar grains, < 40 %
Hematite	30 to 80 % replacement of magnetite grains, grains range from 0.03 to 1.0 mm, large grains are irregular and fractured
Pyrite	trace, as free grains and as a replacement of hematite
Chalcopyrite	trace

Conclusions

Transition Zone: Carbonate < 40 %, Sericite < 20 %, Chlorite < 5 %

Stain indicates strong carbonate alteration (ankerite).

Transition zone, hematite has mostly replaced magnetite and is undergoing incipient replacement to pyrite. Very low pyrite content indicates the outer limit of the transition zone.

AK 8350E Zone 8394E-10244N

Sample No. 72872 - 10.9 g/t Au; 12.0 g/t Au

Protolith rock type: Trachyte lapilli-tuff (18b)

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- lapilli-size clasts of feldspar, trachyte, and mafic material; some are sulphide-or sericite-rich
- strongly bleached, buff colour
- weakly foliated

Mineralogy

Chlorite	nil
Sericite	alteration of matrix, some trachyte clasts, and feldspar phenocrysts, < 30 %
Feldspars	most have a mosaic texture and are altered to sericite + carbonate (80 %)
Carbonate	ankerite, as coarse-grained patches in groundmass, with sericite replacing feldspar, < 30 %
Hematite	trace, wispy filaments
Pyrite	3-5 %, 0.01 to 0.2 mm across, pyrite-rich patches appear to replace sericite-altered tuff clasts
Chalcopyrite	trace, inclusions within pyrite
Galena	trace as anhedral free grains, associated with chalcopyrite, possibly some tellurides?
Au	rare free grains, may be associated with pyrite

Conclusions

Intermediate Zone: Carbonate < 30 %, Sericite < 30 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, no oxides. High pyrite and sericite content indicates the highly mineralized part of the intermediate zone.

AK 8350E Zone 8397E-10243.5N

Sample No: 72873 - 830 ppb Au

Protolith rock type: Trachyte lapilli-tuff (18b)

Alteration type: Carbonate + Sericite

Hand Specimen Characteristics

- non magnetic
- lapilli-size clasts are defined by sulphide blebs?, giving a fragmental appearance
- strongly bleached, buff colour
- weakly foliated, sulphide blebs are elongated parallel to foliation

Mineralogy

Quartz	trace
Chlorite	nil
Sericite	alteration of feldspar phenocrysts and groundmass, < 30 %
Feldspars	large subequant grains, rarely unaltered (orthoclase?), most have a mosaic texture and are altered to sericite + carbonate (40 %)
Carbonate	ankerite, as coarse-grained patches in groundmass, with sericite replacing feldspar, < 30 %
Hematite	trace, wispy filaments in silicates, minor replacement of pyrite along late fractures (surface oxidation)
Pyrite	< 3 %, 0.01 to 1.0 mm across, pyrite-rich patches appear to replace tuff clasts, where the pyrite within the blebs has a porous texture
Chalcopyrite	trace, inclusions within pyrite
Galena	trace as anhedral free grains, associated with pyrite, or included in pyrite

Conclusions

Intermediate Zone: Carbonate < 30 %, Sericite < 30 %

Stain indicates strong carbonate alteration (ankerite).

Intermediate zone, complete replacement of hematite after magnetite by pyrite and no chlorite.

AK 8350E Zone 8390E-10240N

Sample No. 72874 - 90 ppb Au

Protolith rock type: Leucosyenite (464b)

Alteration type: Carbonate + Sericite ± Chlorite

Hand Specimen Characteristics

- non magnetic
- large feldspar grains to 4 mm long, porphyritic
- weakly bleached, pink colour
- veined to breccia-like textures

Mineralogy

Amphibole	trace, restricted to less altered parts, after primary pyroxene, occurs as interstitial grains to feldspar phenocrysts
Chlorite	as large, deep green pleochroic patches associated with late veinlets and as the alteration of matrix material, < 3 % in matrix
Sericite	alteration of feldspar phenocrysts and interstitial grains, < 10 %
Feldspars	rare twinning visible, large subequant grains, weak sericite alteration and strong carbonate alteration (40 %)
Carbonate	ankerite, as coarse-grained patches in groundmass, with sericite replacing feldspar, < 40 %, also associated with open space filling or breccia texture
Hematite	prevalent in non brecciated material, 3-5 %, replacement of primary interstitial magnetite, up to 0.5 mm across
Pyrite	0.5 %, 0.05 to 0.5 mm across, mostly restricted to veinlets
Chalcopyrite	trace, associated with pyrite or as free grains, may be associated with galena
Galena	trace as free grains associated with pyrite

Conclusions

Transition Zone: Carbonate < 40 %, Sericite < 10 %, Chlorite < 3 %

Stain indicates strong carbonate alteration (ankerite).

Equivalent to transition or intermediate zone. Complete hematization of magnetite and moderate pyrite content is compatible with the transition zone.

AK 8350E Zone 8399.5E-10246.5N

Sample No. 72875 - 2610 ppb Au; 2.85 g/t Au

Protolith rock type: Leucosyenite (464b)

Alteration type: Carbonate + Sericite + Chlorite

Hand Specimen Characteristics

- non magnetic
- large feldspar grains to 4 mm long, porphyritic
- weakly bleached, salmon colour
- weakly foliated, veined by crosscutting fractures

Mineralogy

Quartz	trace
Chlorite	as large, deep green pleochroic patches associated with late veinlets and large pyrite grains, and as the alteration of matrix material, < 15 % (after matrix)
Sericite	alteration of feldspar phenocrysts and interstitial grains, < 20 %
Feldspars	rare twinning visible, large tabular grains, moderately altered to a mosaic texture and sericite + carbonate (50 %)
Carbonate	ankerite, as coarse-grained patches in groundmass and with sericite replacing feldspar, < 20 %
Hematite	fine subhedra to 0.3 %, wispy grains and trails along late fractures
Pyrite	5-8 %, bimodal distribution of 90 % large grains and 10 % fine, located at grain boundaries of feldspars and as weak cleavage trails in matrix, some evidence of surface oxidation
Chalcopyrite	trace, inclusions in pyrite or as free grains, may be associated with sphalerite
Galena	trace as inclusion in pyrite

Conclusions

Transition to intermediate zone: Carbonate < 20 %, Sericite < 20 %, Chlorite < 15 %

Stain indicates moderate carbonate alteration (ankerite).

Transition or intermediate zone. Lack of magnetite and moderate pyrite content is compatible with the transition or intermediate zone.

West Boundary Zone 7292E-10235N

Sample No. 72721 - nil ppb Au

Protolith rock type: **Pebbly Quartz, Feldspathic Arenite (231cp)**

Alteration type: **Carbonate + sericite ± chlorite**

Hand Specimen Characteristics

- weakly magnetic
- pebble clasts recognizable
- weakly bleached
- stain indicates moderate/low carbonate alteration (ankerite)

Mineralogy

- matrix is altered to carbonate + sericite ± chlorite
- chlorite porphyroblasts are ragged

Fabric: aligned clasts, moderate cleavage development defined by sericite trails

Sulphides: trace pyrite ± rare chalcopyrite

Oxides: 1 to 2 % magnetite is altered to hematite (50%)

Conclusions

Sample is interpreted to be located on the outer margin of carbonate + sericite alteration envelope where the alteration of magnetite to hematite is occurring and the development of pyrite is incipient. An earlier assemblage of chloritic alteration is overprinted.

West Boundary Zone 7292E-10223N

Sample No. 72725 - 500 ppb Au

Protolith rock type: Feldspathic Arenite (231c) ?

Alteration type: Carbonate + sericite ± chlorite

Hand Specimen Characteristics

- non magnetic
- no clasts are recognizable
- highly bleached, buff colour
- weak spotted texture, chlorite porphyroblasts ?
- stain indicates strong carbonate alteration (ankerite)

Mineralogy

- quartz is rare
- feldspars are virtually unrecognizable
- matrix is highly altered to carbonate + sericite ± rare chlorite
- chlorite porphyroblasts are ragged
- carbonate > 50%, sericite 10-20 %, chlorite trace

Fabric: highly foliated, cleavage defined by sericite, two cleavage orientations ?

Sulphides: patchy, trace to 3 % pyrite; very finely disseminated

Oxides: trace hematite

Conclusions

The presence of trace quartz suggests an arenaceous protolith. The very strong carbonate alteration overprints the sericitic alteration and develops a bleached, massive rock. The sample is from the outer margin of the sulphide enriched zone.

West Boundary Zone 7293E-10222N

Sample No. 72726 - 2370 ppb Au

Protolith rock type: Pebbly conglomerate (21p)

Alteration type: Carbonate + sericite

Hand Specimen Characteristics

- non magnetic
- clasts of quartz, chert, and volcanic material are recognizable
- highly bleached, buff colour
- patchy spotted texture, chlorite porphyroblasts ?
- stain indicates very strong carbonate alteration (ankerite)

Mineralogy

- feldspars are virtually unrecognizable
- matrix is highly altered to carbonate ± sericite
- chlorite porphyroblasts are ragged and irregularly distributed as clumps
- carbonate > 50%, sericite < 10 %, chlorite trace

Fabric: strongly foliated, cleavage defined by sericite

Sulphides: 1 to 2 % pyrite, very finely disseminated

Oxides: trace hematite, wispy texture

Conclusions

The presence of quartz and chert pebbles suggests a sedimentary protolith rather than volcanic (trachytic). The very strong carbonate alteration overprints the sericitic alteration and develops a bleached, massive rock with conchoidal fractures. The sample is from the sulphide enriched zone.

West Boundary Zone 7293E-10221N

Sample No. 72727 - 3.6 g/t Au

Protolith rock type: Feldspathic Arenite (231c)

Alteration type: Carbonate + sericite ± chlorite

Hand Specimen Characteristics

- non magnetic
- rare grains of quartz
- trace remnant feldspar grains
- highly bleached, buff colour
- stain indicates strong carbonate alteration (ankerite)

Mineralogy

- matrix is highly altered to carbonate ± sericite
- chlorite porphyroblasts are ragged and irregularly distributed
- carbonate > 50%, sericite < 10 %, chlorite trace

Fabric: strongly foliated, cleavage defined by sericite

Sulphides: 1 to 2 % pyrite, very finely disseminated
trace chalcopyrite anhedra associated with pyrite

Oxides: trace hematite, wispy texture

Conclusions

The presence of quartz and feldspar grains suggest an arenaceous protolith. The very strong carbonate alteration overprints the sericitic alteration and develops a bleached, massive rock with conchoidal fractures. The sample is from the sulphide enriched zone.

West Boundary Zone 7293E-10220N

Sample No. 72728 - 3.26 g/t Au

Protolith rock type: unknown

Alteration type: Carbonate + sericite

Hand Specimen Characteristics

- non magnetic
- rare grains of quartz
- highly bleached, buff colour
- stain indicates strong carbonate alteration (ankerite)

Mineralogy

- feldspar grains are discernable, exhibit a fine mosaic texture
- matrix is highly altered to carbonate ± sericite
- chlorite porphyroblasts are ragged and irregularly distributed
- carbonate > 50%, sericite < 10 %, chlorite trace

Fabric: moderately foliated, cleavage defined by concentrations of pyrite and carbonate veinlets

Sulphides: 10 to 15 % pyrite, very finely disseminated grains, form patches about foliation
trace chalcopyrite anhedra
trace sphalerite as inclusions in pyrite
gold, free grains in close association with pyrite

Oxides: trace hematite, wispy texture

Conclusions

The presence of quartz and feldspar grains suggest an arenaceous protolith. The very strong carbonate alteration overprints the sericitic alteration and develops a bleached, massive rock with conchoidal fractures. The foliation is defined by sulphide concentrations. The sample is from the core of the sulphide enriched zone.

APPENDIX II

WHOLE ROCK and TRACE ELEMENT ANALYSIS

Kirkland Lake Project

Amalgamated Kirkland Geology

WHOLE ROCK GEOCHEMISTRY

102 -8350 ZONE

Sample #		8447	8448	8449	627	622	675	684
Easting		8362	8365	8370	8359.3	8358.5	8361	8373
Northing		10240	10238	10235	10245	10242.5	10236	10240
Alt. Type		5	4	4	3	5	4	4
SiO_2	%	71.31	68.14	59.21	54.10	65.50	50.10	75.40
Al_2O_3	%	7.81	9.64	13.42	14.00	13.10	13.00	7.79
Fe_2O_3	%	6.58	8.50	6.71	7.08	7.90	7.31	6.94
CaO	%	2.79	1.08	4.31	5.06	1.58	7.83	1.22
MgO	%	1.67	0.93	2.05	4.19	1.50	4.69	1.01
Na_2O	%	0.72	0.56	1.94	3.70	0.07	0.47	0.02
K_2O	%	4.01	4.97	5.62	2.82	5.31	4.90	3.08
TiO_2	%	0.34	0.69	0.69	0.60	0.63	0.52	0.40
MnO	%	0.30	0.07	0.45	0.16	0.16	0.47	0.31
P_2O_5	%	0.31	0.51	0.43	0.35	0.38	0.35	0.27
LOI	%	4.08	4.82	5.06	8.21	4.12	10.28	3.34
H_2O^+	%	NA	NA	NA	0.10	ND	0.05	ND
CO_2	%	NA	NA	NA	6.56	1.29	10.57	1.41
Total	%	99.92	99.91	100.01	100.27	100.25	99.93	99.78

NA = not analyzed; Alteration type: 1="regional"; 2=outer zone; 3=transition zone; 4=intermediate zone; 5=inner zone.

Samples analysed by Bondar-Clegg & Company Ltd., Ottawa, Ontario

Battle Mounatin (Canada) Inc.

September, 1990

Kirkland Lake Project

Amalgamated Kirkland Geology

WHOLE ROCK GEOCHEMISTRY

102 -8350 ZONE

Sample #		8447	8448	8449	627	622	675	684
Easting		8362	8365	8370	8359.3	8358.5	8361	8373
Northing		10240	10238	10235	10245	10242.5	10236	10240
Ba	ppm	106	1281	1908	606	139	151	144
La	ppm	NA	NA	NA	45	55	36	43
Ce	ppm	NA	NA	NA	77	115	42	92
Cr	ppm	1155	968	416	81	81	39	123
V	ppm	NA	NA	NA	36	15	24	4
Co	ppm	NA	NA	NA	19	36	17	37
Ni	ppm	NA	NA	NA	32	25	21	21
As	ppm	NA	NA	NA	<5	120	26	174
Nb	ppm	190	193	182	NA	NA	NA	NA
Sr	ppm	241	195	716	459	196	847	124
Y	ppm	<10	28	24	12	14	13	10
Zr	ppm	107	343	329	162	173	150	123
Au	ppb	34560	2740	1080	30	2400	1280	870
Ag	ppm	11.6	6.1	0.7	<0.5	2.4	<0.5	6.2
Cu	ppm	79	29	52	87	149	20	163
Pb	ppm	798	247	97	6	484	121	2467
Zn	ppm	50	54	81	112	35	61	47
Mo	ppm	319	214	9	3	146	9	1452
Te	ppm	8	5	1	<10	<10	<10	<10
Sb	ppm	NA	NA	NA	<5	<5	<5	6
Bi	ppm	NA	NA	NA	<5	<5	<5	<5
W	ppm	NA	NA	NA	<10	<10	<10	<10
SG	gcc	NA	NA	NA	2.76	2.69	2.87	2.81

Battle Mounatin (Canada) Inc.

September, 1990

Kirkland Lake Project

Amalgamated Kirkland Geology

WHOLE ROCK GEOCHEMISTRY

FIELD MAPPING, 1989

Sample #		none	none	none	none
Easting		7950	7950	7950	7950
Northing		10412	10295	10104	10061
Alt. Type		1	1	1	1
SiO_2	%	47.50	51.20	46.70	50.70
Al_2O_3	%	13.90	13.90	12.50	14.60
Fe_2O_3	%	6.79	7.53	8.54	7.67
CaO	%	7.85	6.77	8.17	5.67
MgO	%	4.15	4.24	5.21	4.28
Na_2O	%	2.29	4.96	0.58	1.75
K_2O	%	3.45	1.04	4.20	3.76
TiO_2	%	0.67	0.60	0.69	0.62
MnO	%	0.16	0.16	0.22	0.14
P_2O_5	%	0.36	0.50	0.42	0.32
LOI	%	12.33	8.00	13.18	9.73
H_2O^+	%	0.05	ND	0.10	0.05
CO_2	%	10.71	6.69	11.17	7.22
Total	%	**99.45**	**98.90**	**100.41**	**99.24**

NA = not analyzed; Alteration type: 1="regional"; 2=outer zone; 3=transition zone; 4=intermediate zone; 5=inner zone.

Samples analysed by Bondar-Clegg & Company Ltd., Ottawa, Ontario

Battle Mounatin (Canada) Inc.

September, 1990

Kirkland Lake Project

Amalgamated Kirkland Geology

WHOLE ROCK GEOCHEMISTRY

FIELD MAPPING, 1989

Sample #		none	none	none	none
Easting		7950	7950	7950	7950
Northing		10412	10295	10104	10061
Ba	ppm	330	805	151	185
La	ppm	38	37	35	30
Ce	ppm	51	55	40	43
Cr	ppm	46	95	73	47
V	ppm	28	70	30	31
Co	ppm	21	20	16	39
Ni	ppm	15	20	31	26
As	ppm	<5	<5	<5	17
Nb	ppm	NA	NA	NA	NA
Sr	ppm	416	689	764	362
Y	ppm	11	14	13	14
Zr	ppm	116	139	118	144
Au	ppb	3	2	1	2
Ag	ppm	<0.5	<0.5	<0.5	0.6
Cu	ppm	119	5	56	36
Pb	ppm	7	13	7	6
Zn	ppm	40	108	50	74
Mo	ppm	3	3	4	2
Te	ppm	<10	<10	<10	<10
Sb	ppm	<5	<5	<5	<5
Bi	ppm	<5	<5	<5	<5
W	ppm	<10	<10	<10	<10
SG	gcc	2.74	2.78	2.88	2.70

Battle Mounatin (Canada) Inc.

September, 1990

Kirkland Lake Project

Amalgamated Kirkland Geology

WHOLE ROCK GEOCHEMISTRY

FIELD MAPPING, 1990

Sample #		AK-1	AK-2	AK-3	AK-4	AK-5
Easting		8359	8356.5	8357.3	8360.2	8361
Northing		10244.8	10237.4	10240.5	10240.6	10242.2
SiO_2	%	53.72	53.35	53.35	72.69	47.15
Al_2O_3	%	14.00	13.65	14.41	6.88	11.84
Fe_2O_3	%	7.01	9.28	6.06	4.84	6.94
CaO	%	4.78	5.35	7.47	3.76	8.86
MgO	%	3.45	3.35	3.22	1.99	4.59
Na_2O	%	3.68	0.64	2.74	0.32	0.92
K_2O	%	2.63	4.84	4.08	2.57	4.06
TiO_2	%	0.55	0.63	0.71	0.32	0.57
MnO	%	0.14	0.41	0.50	0.33	0.49
P_2O_5	%	0.25	0.36	0.56	0.38	0.32
LOI	%	8.58	6.89	8.67	4.78	13.19
H_2O^+	%	1.70	1.70	1.20	0.90	1.30
CO_2	%	6.68	6.30	8.79	4.92	12.10
Total	%	**98.79**	**98.75**	**98.89**	**98.86**	**98.93**

Samples analyzed by Department of Geology, University of Western Ontario

Battle Mounatin (Canada) Inc.

September, 1990

Kirkland Lake Project

Amalgamated Kirkland Geology

WHOLE ROCK GEOCHEMISTRY

FIELD MAPPING, 1990

Sample #		AK-1	AK-2	AK-3	AK-4	AK-5
Easting		8359	8356.5	8357.3	8360.2	8361
Northing		10244.8	10237.4	10240.5	10240.6	10242.2
Ba	ppm	902	945	1037	1014	1173
La	ppm	39	54	100	39	36
Ce	ppm	72	100	180	67	71
Cr	ppm	183	196	72	191	250
V	ppm	178	240	168	122	206
Co	ppm	26	35	17	12	15
Ni	ppm	31	31	20	07	29
As	ppm	3	76	25	68	8
Nb	ppm	7	9	12	5	6
Sr	ppm	619	543	849	407	861
Y	ppm	17	17	26	3	13
Zr	ppm	108	143	260	85	71
Au	ppb	34	3320	90	11800	409
Ag	ppm	<5	<5	<5	22	<5
Cu	ppm	110	107	112	55	82
Pb	ppm	11	136	33	2034	82
Zn	ppm	151	149	117	290	137
Mo	ppm	<5	13	<5	610	15
Te	ppm	NA	NA	NA	NA	NA
Sb	ppm	1.6	3.5	1.6	6.5	2.0
Bi	ppm	NA	NA	NA	NA	NA
W	ppm	NA	NA	NA	NA	NA

Battle Mounatin (Canada) Inc.

September, 1990

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REPORT

on a

MAGNETOMETER SURVEY

AMALGAMATED KIRKLAND PROPERTY

KIRKLAND LAKE

ONTARIO

for

BATTLE MOUNTAIN (CANADA) INC

Toronto, Ont.

J. Roth

STRATAGEX LTD

October, 1990 **Toronto, Ont**

STRATAGEX LTD.
Geophysical Consulting

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REPORT
on a
MAGNETOMETER SURVEY
AMALGAMATED KIRKLAND PROPERTY
KIRKLAND LAKE, ONTARIO

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References

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STRATAGEX

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Map AK–2 Total Field & Vertical Gradient Profiles (East & West Sheets) 1:2500

STRATAGEX

REPORT
on a
MAGNETIC SURVEY
AMALGAMATED KIRKLAND PROPERTY

SUMMARY

A magnetometer survey was executed by Val d'Or Geophysique during March and April, 1990, over 27 claims comprising the Amalgamated Kirkland property located south of Kirkland Lake, Ontario. This survey forms part of an integrated exploration program for structurally controlled gold deposits being conducted by Battle Mountain (Canada) Inc. within portions of this prolific gold district, under an agreement with HSK Minerals Ltd.

The Amalgamated Kirkland property is known from past geological mapping and substantial prior exploration to be underlain by volcanics, sediments and subordinate syenitic intrusives of the Timiskaming Group in the north and a portion of the composite Murdock Creek Stock in the south. The supracrustal rocks, exposed in outcrop and recent trenches, exhibit considerable complexity as to strike and multiple episodes of deformation and shearing, but have an average ENE trend. Several major ENE-trending deformation zones, including the important Larder Lake DZ, are known to extend across the property. The northeast-striking Murdock Creek Fault transects the property, with an indicated 300m offset to the southwest. Younger transverse faults further disrupt both stratigraphy and early mineralized shear zones.

The Amalgamated Kirkland property lies immediately south of the principal gold mines of the Kirkland Lake camp, and several small deposits were developed and exploited on or adjacent to the present claims, among them the historic Hunton and Amalgamated occurrences. A significant number of interesting gold prospects associated with shear zones

have been discovered by recent exploration on and adjacent to the claims, among them the '99', '100' and '102' showings, all located in the northern sector of the property.

Following initial success with very detailed test magnetic surveys in mapping lows associated with the mineralized '100' and '102' shear zones, the entire property was surveyed in detailed fashion, using a NNW-oriented grid with a line spacing of mainly 50m. Including tie lines, a total of 68.9 km of magnetic survey was completed, measuring total field and vertical gradient at 12.5m stations, with fill-in readings at 6.25m where appropriate.

The results, integrated with the extensive geologic information, are interpreted to define ten lithomagnetic domains (I through X). The northern domains I - V primarily delineate ENE-trending subunits of the Timiskaming Group. The southern domains VI - X correlate with portions of the Murdock Creek Stock; their ENE fabric is attributed to incorporation of supracrustal rocks in this composite, largely non-magnetic intrusive.

Major, dominantly east-northeast strike faults, including the readily recognizable Larder Lake DZ, are inferred to bound most of the magnetic domains, while secondary shear zones internal to several domains correspond (inter alia) to the known '99', '100', '102' and '106' gold occurrences. The oblique NE-striking Murdock Creek Fault is readily defined by the magnetic data, as are subordinate NNW-to-NNE-striking transverse faults.

Comparison and correlation of the detailed ground survey data with district-wide aeromagnetic surveys has enabled recognition of the more persistent structural and lithologic features. The detailed ground data, however, is required for full definition of the multiple, shallow magnetic sources and the complex structural regime beyond the resolving capability of the airborne survey data.

Based on the geophysical results, taken in the context of pertinent geological information, it is recommended that:

1) Additional mapping, sampling and trenching be directed at interpreted strike faults/shear zones, particularly where geological and/or geochemical encouragement is discerned;

2) Very detailed local magnetic surveys be completed on specific prospects as part of a detailed evaluation, to help establish continuity, character and overburden depths, and guide subsequent drilling where warranted;

3) Additional detailed IP/resistivity surveys be considered where gold mineralization associated with significant disseminated sulphides cannot be readily traced by trenching due to overburden depths;

4) The present interpretation be reviewed and revised as new information is obtained and/or new gold occurrences identified.

1.0 INTRODUCTION

This report treats the results of a magnetometer survey completed over the Amalgamated Kirkland property currently being explored by Battle Mountain (Canada) Inc. as part of its agreement with HSK Minerals Ltd. (now Queenston Mining Inc.)

The property is located in the south-central sector of the Kirkland Lake gold camp, approximately two kilometers south of the town of Kirkland Lake in the east-central Teck Township, as seen in Figure 1.

This property is one of several under intensive exploration by Battle Mountain (cf Fig. 1) for new gold deposits similar to the major deposits already discovered in this prolific district. The present geophysical surveys comprise one component of an integrated exploration effort which has included regional geophysical surveys and geological studies as well as detailed mapping, trenching, sampling and limited drilling on specific properties.

2.0 GEOLOGY & PRIOR EXPLORATION

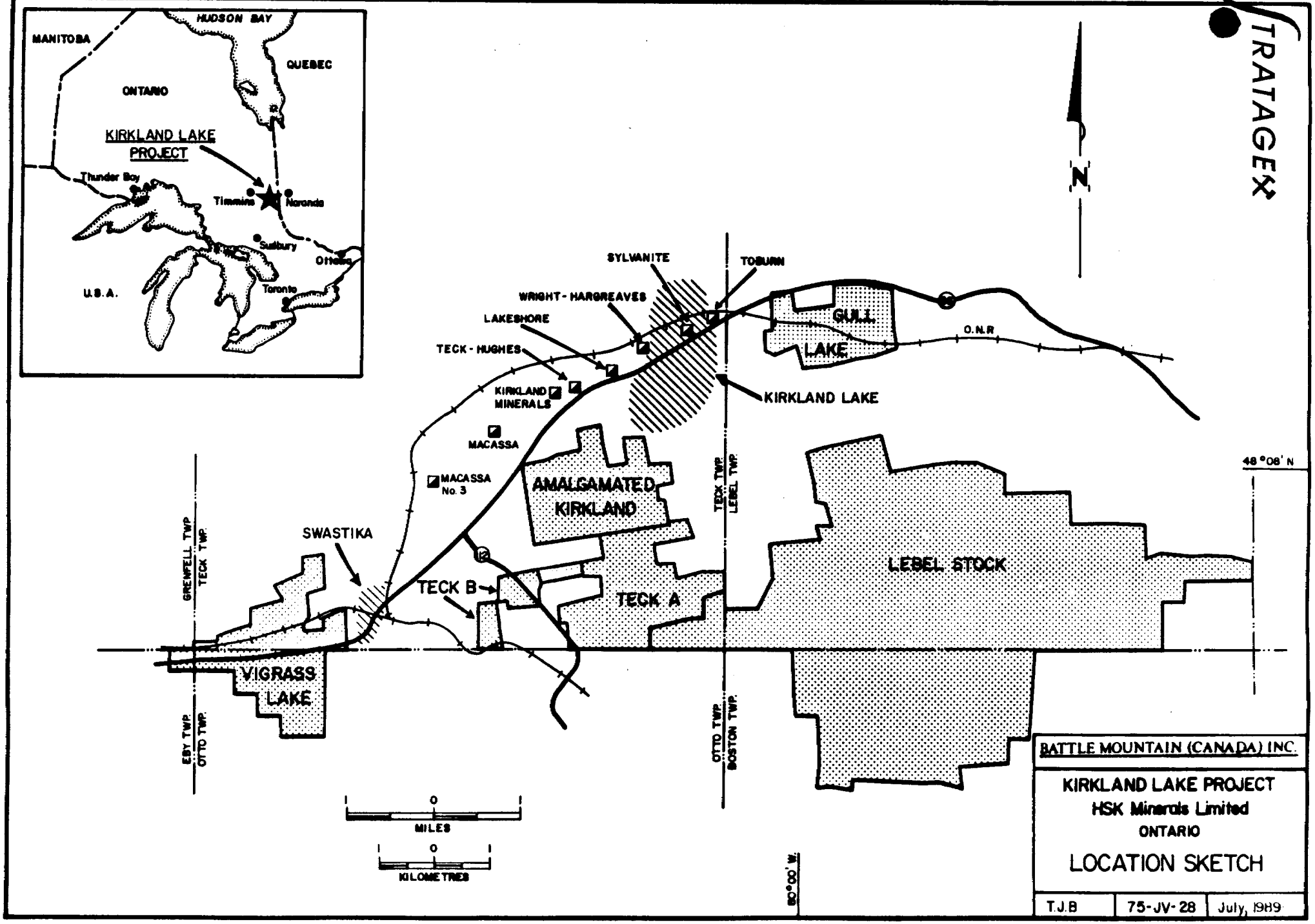
The Kirkland Lake sector of the Archean Abitibi greenstone belt is characterized by a distinct assemblage of Precambrian lithologies designated the Timiskaming Group. This unit is comprised of clastic sediments and subordinate volcanics (including trachytes), which have been intruded by syenites and syenodiorites, all with a dominant orientation of east-northeast. Major deformation zones trending sub-parallel to stratigraphy host most of the significant gold deposits exploited in the Kirkland Lake camp.

The Larder Lake Group occupies the southern portion of the district. This unit, formerly termed the Keewatin, consists of mafic and ultramafic volcanics with subordinate sediments and intrusives.

Younger composite intrusives of varying composition, such as the Murdock Creek and Lebel stocks, have further complicated the geologic setting.

The Amalgamated Kirkland property is known from considerable outcrop and prior exploration to be underlain by Timiskaming Group sediments and trachytic volcanics in the northern half, while the composite Murdock Creek Stock, nominally a syenite, occupies much of the southern half of the claims.

The important ENE-trending Larder Lake deformation zone traverses the property, separating the northern Timiskaming terrain from the southern Murdock Creek intrusive; other lesser ENE-trending shear zones have been mapped on the claims, including six which have associated gold mineralization. The younger Murdock Creek fault zone extends NE-SW across the centre of the property, and is indicated to offset lithologic units approximately 300m to


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KIRKLAND MINERALS
KIRKLAND LAKE
G.M.L.
LAKE
O.N.R
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
48°08' N
GREENFELL TWP
TECK TWP
TECK TWP
LEBEL TWP
EBY TWP
OTTO TWP
OTTO TWP
BOSTON TWP
VIGRASS LAKE
0
MILES
0
KILOMETRES
80°00' W.
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO
LOCATION SKETCH
T.J.B
75-JV-28
July, 1989

the southwest. Other, still younger transverse faults oriented NNE are known to offset both stratigraphy and mineralized ENE-striking shear zones.

Exploration for and exploitation of gold deposits commenced in the Kirkland Lake district in the early 1900s, with the original discoveries near Swastika, followed by the subsequent discovery and development of the main Kirkland Lake camp.

In the post-war period, when gold prices were low, exploration throughout the Kirkland Lake camp was quite limited. Renewed exploration commenced with the advent of increased gold prices, with many exploration companies known to have been active in the Kirkland Lake district since 1974.

Early prospecting and exploration on or adjacent to the present Amalgamated Kirkland claims led to the discovery of several shear-hosted gold occurrences, including the Amalgamated and Hunton deposits, which saw limited underground development and production.

Among the recent exploration activities on and near the Amalgamated Kirkland property, Labrador Mining and Exploration Inc. carried out ground geophysics and limited drilling in the early 1980s for base metals; Rio Algom drilled three holes immediately to the south as part of a gold exploration program in the mid-1980s; and HSK Minerals Ltd. in 1987-88 carried out extensive soil geochemical, mapping, sampling and limited drilling for gold, leading to the discovery of the DK gold prospect on the adjacent Teck A property to the south.

Recent detailed mapping, sampling and trenching by Battle Mountain has led to the discovery of several new encouraging gold occurrences in the central and northern sectors of the claims. These showings are designated in terms of north and east grid locations as the '99-8050', '100-7290', '101-7300', '102-8350', '106-7350 and '107-7850' zones, and have been explored to date by trenching and mapping. The gold mineralization is associated with alteration (including minor pyrite) in a variety of Timiskaming lithologies, and has been shown to correlate with local linear magnetic lows.

Additionally, as part of its integrated exploration strategy, Battle Mountain has carried out regional aeromagnetic and VLF surveys (by Terraquest) and a detailed IP survey over the gold occurrences in the northern portion of the present property (discussed in a separate report). Battle Mountain is also undertaking similar exploration on the Teck 'A' property immediately to the south of the Amalgamated Kirkland claims.

Full details as to the lithologic units, alteration and gold occurrences as well as the past exploration on and around the present claims may be found in various reports by Battle Mountain (Canada) and HSK Minerals.

3.0 SURVEY DESCRIPTION

Prior to commencing the present geophysical surveys, a metric cut line grid was established by Battle Mountain in 1989 for mapping purposes. This grid, cut by Fred Kiernicki of Kirkland Lake, has cross lines at 100m spacing oriented NNW (345^{o}) and tie lines at 800m intervals surveyed in by Northland Positioning Services of Kirkland Lake, for a total of 42.0 km. The grid extends from 8800N to 11200N (with the baseline designated 10000N) and from 7300E to 10000E.

The success of the initial ultra-detailed test surveys in outlining magnetic lows associated with mineralization prompted detailed magnetic surveying over the entire property. Consequently, a further 26.9 km of fill-in (50m spacing) lines were cut in March, 1990 by F. Kiernicki over most of the property.

Minor departures from the intended ideal grid occurred during line cutting. The grid portrayed on the attached geophysical plans is an accurate version of the actual grid, as established in the course of geological mapping of the property.

The magnetic survey was conducted by Val d'Or Geophysique from March 26 to April 13, 1990, employing an EDA OMNI PLUS proton magnetometer reading the total magnetic field and vertical gradient with a sensitivity of 1.0nT and 0.1nT, respectively. A digital EDA base station magnetometer was used to record diurnal variations for subsequent removal.

Because magnetic sources were anticipated to be complex and shallow, the survey was conducted in a very detailed fashion, with readings taken at 12.5m intervals, and fill-in readings at 6.25m intervals where significant anomalies were noted by the operator. A total of 69.8 km of magnetic survey was completed on all cross and tie lines.

The total field magnetic data were processed to remove the diurnal variations, and gridded and contoured at 25 nT intervals where appropriate. The resulting contoured version of the total field data displayed good coherency and good ties at tie line intersections.

The magnetic data for the Amalgamated Kirkland property was originally compiled on (eight) separate 1:2500 map sheets corresponding to previously established geologic map sheets. However, for the present report, the data has been composited by Urquhart-Dvorak Ltd to form two maps at 1:2500, divided into east and west sheets (Maps AK-1E & AK-1W); local trending, regridding and recontouring was incorporated during this phase to improve line-to-line coherency.

The vertical gradient data, by contrast, display a considerable lack of coherency and erratic ties at tie lines due to the multiple shallow, variable magnetic sources. Consequently, the vertical gradient data are presented in profile form, as seen in Maps AK-2(E&W), together with the

total field data in profile form. The gradient data, while erratic from line to line, are useful in the analysis of total field data.

The magnetic features indicated by the survey have been interpreted in terms of simplified sources, distinguished in terms of generalized susceptibility (low, moderate, high and very high) as seen in the attached maps. Regions with similar magnetic characteristics have been designated as magnetic domains I through X.

Faults and shear zones identifiable from the magnetic data have also been indicated on the attached maps, and distinguished as to major, intermediate or minor. These zones are of particular importance in view of the structurally controlled nature of most gold mineralization in the Kirkland Lake camp.

4.0 MAGNETIC SURVEY RESULTS

The magnetic interpretation is portrayed superimposed on the contoured total field magnetic data (Maps AK-1E & AK-1W).

The magnetic survey on the Amalgamated Kirkland property has revealed alternating bands of low and moderate-to-high susceptibilities, with a general alignment of east-northeast, interrupted in places by compact, ovoid positive features as well as poorly defined irregular subareas of low susceptibility.

The magnetic sources are dominantly narrow, linear, sub-vertical and within ten metres of the surface. However, some variability of orientation and geometry is evident. Several of the magnetic features appear to have moderately dipping contacts, as indicated in the interpretation. In particular, the prominent magnetic feature in the north-central sector of Map AK-1 exhibits a gentle dip to its southern contact (with considerable persistence to depth), as well as a gentle plunge to the south to its fault-bowed western end.

The regions of differing magnetic characteristics have been designated as magnetic domains I through X, as seen in Maps AK-1(E&W) and as described in greater detail below. Strike faults, also generally trending east-northeast, are inferred to bound most of these domains.

Domain I, located in the extreme northern portion of the Amalgamated Kirkland survey grid, is a moderately magnetic terrain with relatively little local magnetic relief. Its full character is better displayed in the aeromagnetic data, which indicates that this domain is a broad, linear area extending several kilometers to the west, suggestive of mixed trachytes or syenodioritic intrusives.

Domain II, located south and west of domain I, is only partially defined by the present survey coverage. It contains abundant, narrow, moderate-to-strong, linear magnetic sources which display an average trend of east-

northeast. Trachytic flows and syenodiorite sills are suggested as the geologic sources of the magnetic features in this domain.

The northern contact of domain II with domain I is not well defined in the present survey data, but it is speculatively surmised to be gradational rather than fault-bounded. The southern boundary of domain II corresponds to a major strike fault (believed to be part of the Larder Lake deformation zone), which in this sector trends northeast across the entire grid.

Domain II contains a number of interpreted intermediate strike faults, with complementary oblique faults. The recently discovered 107 gold zone occurs at a sediment/ syenite porphyry contact corresponding to one of these faults.

Domain III, which lies immediately south of the inferred Larder Lake deformation zone, is a largely non-magnetic region traceable across the entire survey grid as a somewhat irregular ENE-trending band. Its character is consistent with a dominantly sedimentary environment, although in this district altered submarine basalts are also known to exhibit very low susceptibilities.

Domain IV, a compact region within the east-central portion of domain III, is characterized by short, discrete moderate magnetic sources of irregular form and orientation, suggesting a composite, heterogeneous intrusive. The domain is bounded by oblique, northeast-trending faults and also dissected by east-west faults. Its proximity to the LLDZ provokes additional interest in verifying its inferred intrusive character and discerned faults.

Domain V, located south of domains III and IV, is a band approximately 400m wide which extends east to east-northeast across the entire survey grid, with aeromagnetic evidence for its further persistence beyond the present grid limits. It has a composite character, with a considerable variety of linear magnetic sources.

Domain V is inferred to be separated from domains III and IV to the north by a complex series of strike and complementary transverse faults, and from domain VI to the south by a similarly persistent deformation zone.

In detail domain V is divided into a northern subdomain V_A, a southern subdomain V_B, and a western subdomain V_C, separated by a series of arcuate strike and oblique faults.

Subdomain V_A is characterized by moderate magnetic sources of linear aspect and irregular orientation, consistent with a series of intermediate volcanics and sediments disrupted by strike and transverse faulting. The 102 gold prospect occurs at the northern contact of this subdomain on a shear zone recognizable in the detailed magnetic data.

One of two ultra-detailed test magnetic surveys was conducted in this sector, on lines spaced at 25m intervals between 8275E and 8475E between 10175N and 10375N. (The gold occurrences are at 8300E, 10230N and 8360E, 10230N). Magnetic readings were taken at 2.5m intervals. The resulting data, presented at a scale of 1:500, provide better resolution of the magnetic sources (some of which have a strike extent of less than 50m) and the intervening important magnetic lows.

Subdomain V_B contains narrow, moderate-to-strong magnetic horizons of quasi-continuous character oriented dominantly east-northeast. Original continuity is judged to have been disrupted by strike and oblique faults. The 99 gold showing is associated with an intermediate shear zone within this subdomain, while the 100 and 101 gold occurrences are located in this subdomain at the western limit of the grid.

The second of the ultra-detailed test magnetic surveys was carried out in this sector, between 10150N and 10300N on lines spaced 20m apart from 7200E to 7280E, with readings again taken every 2.5m. The data, contoured at a horizontal scale of 1:500, help refine the detailed portrayal of the above features and enable more accurate determination of magnetic source depths and the important magnetic lows associated with the gold showings.

Subdomain V_C is defined by a strong, linear, continuous magnetic source outlined between lines 8800E and 9650E. The aeromagnetic data indicates that the source continues several kilometers to the east. This subdomain is separated from adjacent subdomains V_A and V_B to the west by the oblique Murdock Creek fault system. Subdomains V_C is viewed as a continuation of subdomain V_B, and apparently correlates with a distinct horizon containing coarse trachytic pyroclastics with syenite inclusions and fragments.

Additional aspects worth noting with respect to subdomain V_C are its very flat dip to the south-southwest and the gently plunging western extension bent to the south along the Murdock Creek fault. The flat dip is also likely the plate of the inferred bounding fault, suggesting displacement by thrusting has been the dominant movement.

Domain VI is a largely non-magnetic region several hundred metres in width which can be traced across the entire survey grid in a generally east-northeast fashion. It is bounded to the north by a major deformation zone separating it from domain V, and to the south by a series of intermediate faults from domain VII. In addition, the NE-trending Murdock Creek fault is projected to transect this domain near 8400E.

The characteristics of domain VI are consistent with Timiskaming sediments. However, the composite Murdock Creek stock extends into this domain; hence it may partly correspond to a non-magnetic phase of this intrusive.

Domain VII is a compact region defined between 7400E and 8100E south of 9700N in the southwest sector of the survey grid. This domain is characterized by weak to moderate, short, narrow magnetic sources of irregular aspect and variable orientation interpreted to have been dissected by a series of east and north-northwest faults. The domain is bounded to the north by intermediate strike faults separating it from domain VI, to the east by the Murdock Creek fault separating it from domain VI, and to the west by a further fault sub-parallel to the Murdock Creek fault separating it from domain VIII. It is speculated that this domain represents a sector of the Murdock Creek stock characterized by heterogeneous composition as well as possible remnants of ingested supracrustal lithologies.

Domain VIII consists of moderate to strongly magnetic sources partially glimpsed in the extreme southwestern corner of the survey, south of 9700N. The aeromagnetic data reveals this to be part of a strongly magnetic unit which extends several kilometers to the west, suggestive of a major mafic flow sequence or a syenodiorite body.

Domain IX designates an extensive area in the southeastern sector of the survey characterized by sporadic, moderate-to-strong, linear-to-compact anomalies with a variable orientation averaging east-northeast. This domain apparently extends further to the east beyond the limits of the present survey, while to the west the domain decreases rapidly in width and disappears as an identifiable unit by line 8200E. It is attributed to a portion of the Murdock Creek stock containing ingested supracrustal units, with some of the strongly magnetic sources probably discrete syenodiorites.

Additionally, there is a discernible but subtle decrease in average susceptibility and local anomalies west of 8700E; this transition, which is more readily seen in the corresponding aeromagnetic data, may mark a particular phase of the Murdock Creek stock.

Domain IX is separated from the non-magnetic terrain of domain VI to the north by a series of interpreted northeast strike faults, and from domain X to the south by a set of similarly oriented faults. A series of younger NNW transverse faults are inferred to account for the dissected character of the magnetic sources.

Domain X occupies the southern and southeastern margins of the Amalgamated Kirkland grid. It is characterized by weak-to-moderate, quasi-continuous magnetic sources dominantly oriented east-northeast. Intermediate strike faults are inferred to bound this domain to the north as well as to occur within it.

Domain X is inferred to extend several hundred metres to the south onto the adjoining Teck A grid. The description of that portion of the domain can be found in the separate report on the Teck A surveys.

Domain X is likely attributable to a portion of the Murdock Creek stock; however, the linear character of the magnetic anomalies supports the presence of Keewatin mafic volcanics and/or intrusives, although these may have been engulfed in an intrusive matrix.

Comparison of the aeromagnetic data with the detailed but areally restricted ground data indicates:

1) the persistence of the deformation zone separating domain V from domain VI;

2) The superior resolution and definition of the Murdock Creek fault in the ground data;

3) The persistence (as a magnetic feature) of the Larder Lake zone across the district.

Finally, the ultra-detailed magnetic surveys deserve additional mention. The high cost (mainly for line cutting) renders such coverage impractical for property-scale surveys, but its utility in detailed prospect evaluation is amply confirmed by the two test surveys.

5.0 CONCLUSIONS

Based on the preceding results and interpretation, it is concluded that the magnetic survey on the Amalgamted Kirkland property has provided significant information pertinent to the exploration of this property for gold deposits in that:

1) Ten specific lithomagnetic units have been identified, providing a means of extrapolating from scattered outcrop;

2) In particular, domains I through V correspond to ENE-trending subunits of the Timiskaming Group; the southern domains VI through X appear to identify differing sectors of the composite Murdock Creek Stock, perhaps reflecting incorporated supra-crustal lithologies;

3) The structural regime is dominated by major ENE-trending faults and/or shear zones which include the important Larder Lake deformation zone;

4) Intermediate ENE-trending faults or shear zones additional to those previously known are inferred; among these are ENE-trending shear zones correlating with the recently discovered 99, 100, 101, 102, 106 and 107 gold zones;

5) Detailed lithologic and structural features have been resolved by the ground surveys beyond that achievable by detailed airborne surveys alone; conversely, trends and features of district-wide significance are discernible in the broader perspective provided by airborne data.

6.0 RECOMMENDATIONS

Based on the above discussion and conclusions, it is recommended that additional exploration be undertaken on the Amalgamated Kirkland property and environs to establish the geological validity of the presently interpreted features, and their potential significance in terms of gold mineralization and its attendant alteration.

In particular, it is recommended that:

1) The inferred ENE-trending faults be carefully evaluated in terms of past exploration and geological information, and further mapping and trenching be undertaken on those of potential interest, as appropriate;

2) Ultra-detailed magnetic surveys be employed to assist in detailed prospect evaluation;

3) Additional IP/resistivity surveys be considered if significant disseminated sulphide zones with encouraging gold values cannot be readily pursued by trenching due to excessive overburden;

4) The present interpretation be reviewed and updated in the light of new information or prospects.

Respectfully submitted,

J. Roth

Senior Geophysical Consultant

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REFERENCES

Grant, F. and West, G., 1965, Interpretation Theory in Applied Geophysics, McGraw-Hill, 584p

Lowrie W. and West, G., 1965, The effect of conductive overburden on electromagnetic prospecting measurements, Geophysics v30, p624-632

MacNae, J.C., 1984, Survey design for multicomponent elctromagnetic systems, Geophysics, v 49, p 265-273

OMNDM/OGS, 1979, EM and Magnetic Survey, Kirkland Lake Area (KLIP), Questor Surveys

Palacky, G.J., 1972, Computer Assisted Interpretation of Multichannel Airborne Electromagnetic Measurements, PhD Thesis (unpub), Univ. of Toronto, 152p

Roth, J., 1989, Interpretive Report on Terraquest Aeromagnetic/VLF Surveys, Kirkland Lake, Ont. *for* Battle Mountain (Canada) Inc.

Terraquest, 1989, Logistics Report on Aeromagnetic and VLF Surveys, Kirkland Lake, Ont., *for* Battle Mountain (Canada) Inc.

Ward, S.H., 1967, The Electomagnetic Method: in *Mining Geophysics v.2,* Tulsa, SEG, p 274-306

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REPORT
on an
IP/RESISTIVITY SURVEY
AMALGAMATED KIRKLAND PROPERTY
KIRKLAND LAKE, ONT

for

BATTLE MOUNTAIN (CANADA) INC.

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REPORT

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IP/RESISTIVITY SURVEY

AMALGAMATED KIRKLAND PROPERTY

KIRKLAND LAKE

ONTARIO

for

BATTLE MOUNTAIN (CANADA) INC

Toronto, Ont.

J. Roth
STRATAGEX LTD

Toronto, Ont. November, 1990



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REPORT
on an
IP/RESISTIVITY SURVEY
AMALGAMATED KIRKLAND PROPERTY
KIRKLAND LAKE, ONTARIO

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Map A-3 Contoured Chargeability N =2 (& Interpretation) 1:2500

IP Pseudosections (App. B)

Line	a=12.5m	a=25m	a=50m
7350E	PS-1	PS-1a	
7400E	PS-2		
7500E	PS-3		
7600E	PS-4		
7700E	PS-5		
7800E	PS-6		
7900E	PS-7		PS-7a
8000E	PS-8		
8100E	PS-9		
8200E	PS-10		
8300E	PS-11	PS-11a	PS-11b
8360E	PS-12	PS-12a	
8400E	PS-13		
8500E	PS-14		
8600E	PS-15		
8700E	PS-16		
8800E	PS-17		PS-17a

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REPORT
on an
IP/RESISTIVITY SURVEY
AMALGAMATED KIRKLAND PROPERTY

SUMMARY

An IP/resistivity survey was executed by JVX Ltd. during June, 1990, over a portion of the 27 claims comprising the Amalgamated Kirkland property located south of Kirkland Lake, Ontario. This survey forms part of an integrated exploration program for structurally controlled gold deposits being conducted by Battle Mountain (Canada) Inc. within portions of this prolific gold district, under an agreement with HSK Minerals Ltd.

The Amalgamated Kirkland property is known from past geological mapping and prior exploration to be underlain by volcanics, sediments and subordinate syenitic intrusives of the Timiskaming Group in the north and a portion of the composite Murdock Creek Stock in the south. The supracrustal rocks, exposed in outcrop and recent trenches, exhibit considerable complexity as to strike and multiple episodes of deformation and shearing, but have an average ENE trend. Several major ENE-trending deformation zones, including the important Larder Lake DZ, are known to extend across the property. The northeast-striking Murdock Creek Fault transects the property, with an indicated 300m offset to the southwest. Younger transverse faults further disrupt both stratigraphy and early mineralized shear zones.

The Amalgamated Kirkland property lies immediately south of the principal gold mines of the Kirkland Lake camp, and several small deposits were developed and exploited on or adjacent to the present claims, among them the historic Hunton and Amalgamated Kirkland occurrences. A significant number of interesting gold prospects associated with shear

zones have been discovered by recent exploration on and adjacent to the claims, among them the '99', '100' and '102' showings, all located in the northern sector of the property.

The IP/resistivity survey was executed in the northern sector of the property which is principally underlain by Timiskaming volcanics and sediments containing several new gold occurrences.

In particular, the survey covered portions of 17 north-south lines between 7350E and 8800E, with coverage generally between 9800N and 10500N. Scintrex time-domain IP equipment was employed using the pole-dipole array, primarily with an 'a' spacing of 12.5m to achieve resolution of narrow horizons containing minor disseminated sulphides under shallow overburden. Selected lines were resurveyed with 25m or 50m dipoles, to search for deeper targets. In addition to the standard parameters of apparent resistivity and (M7) chargeability, the time constant and instantaneous chargeability were calculated from secondary aspects of the IP decay voltages for a simple Cole-Cole IP model in an effort to determine grain-size variations.

The results, integrated with the extensive geologic information as well as the detailed magnetic survey carried out earlier in 1990 by Val d'Or Geophysique Ltd, are interpreted to reflect fourteen weak to very weak chargeability zones designated A - P. These zones, which trend east-west to east-northeast, are accompanied by generally high resistivities, consistent with minor polarizable sulphides or magnetite.

Those IP sources with low to negligible magnetic susceptibility (zones B, E", G, H, L, M, N and P) are more likely to reflect disseminated sulphides in a silicified matrix and hence judged to be more favourable. Zone M, associated with two gold occurrences, is judged to be of particular interest; this correlation increases interest in zones H and N which exhibit common character and alignment.

Conversely, those IP sources such as C and E/E' which, although persistent, correlate with highly magnetic horizons are considered less favourable, since minor magnetite could account for the IP anomaly. The remaining sources (A, D, F, J, and K) are too short and/or weak to be of interest.

The resistivity data delineated thin, patchy overburden, and revealed the underlying bedrock units to be highly to very highly resistive, consistent with dominantly unaltered volcanics. A few restricted sectors in the northeastern and southeastern portions have resistivities below 2000 ohm-meters, probably reflecting sediments. Strike faults inferred from the magnetic data are observed to frequently occur beneath the overburden troughs, lending additional support to the validity of these structures.

The derived time constants were generally low (0.01 - 0.1 sec) both for background and anomalous chargeability values, indicating an average small grain size; hence the secondary IP parameters did not prove particularly diagnostic in this geologic setting.

Based on the geophysical results, taken in the context of pertinent geological information as well as the most recent drill program completed by Battle Mountain, it is recommended that:

1) Additional mapping, sampling and trenching be directed at the more favourable IP features, particularly where geological and/or geochemical encouragement is discerned;

2) Additional detailed IP/resistivity surveys be considered where gold mineralization associated with significant disseminated sulphides cannot be readily traced by trenching due to overburden depths;

3) The present interpretation be reviewed and revised as new information is obtained and/or new gold occurrences identified.

1.0 INTRODUCTION

This report describes the results of an IP/resistivity survey completed over the Amalgamated Kirkland property currently being explored by Battle Mountain (Canada) Inc. as part of its agreement with HSK Minerals Ltd. (now Queenston Mining Inc.)

The property is located in the south-central sector of the Kirkland Lake gold camp, approximately two kilometers south of the town of Kirkland Lake in the east-central Teck Township, as seen in Figure 1.

This property is one of several under intensive exploration by Battle Mountain (cf Fig. 1) for new gold deposits similar to the major deposits already discovered in this prolific district. The present geophysical surveys comprise one component of an integrated exploration effort which has included regional geophysical surveys and geological studies as well as detailed mapping, trenching, sampling and limited drilling on specific properties.

2.0 GEOLOGY & PRIOR EXPLORATION

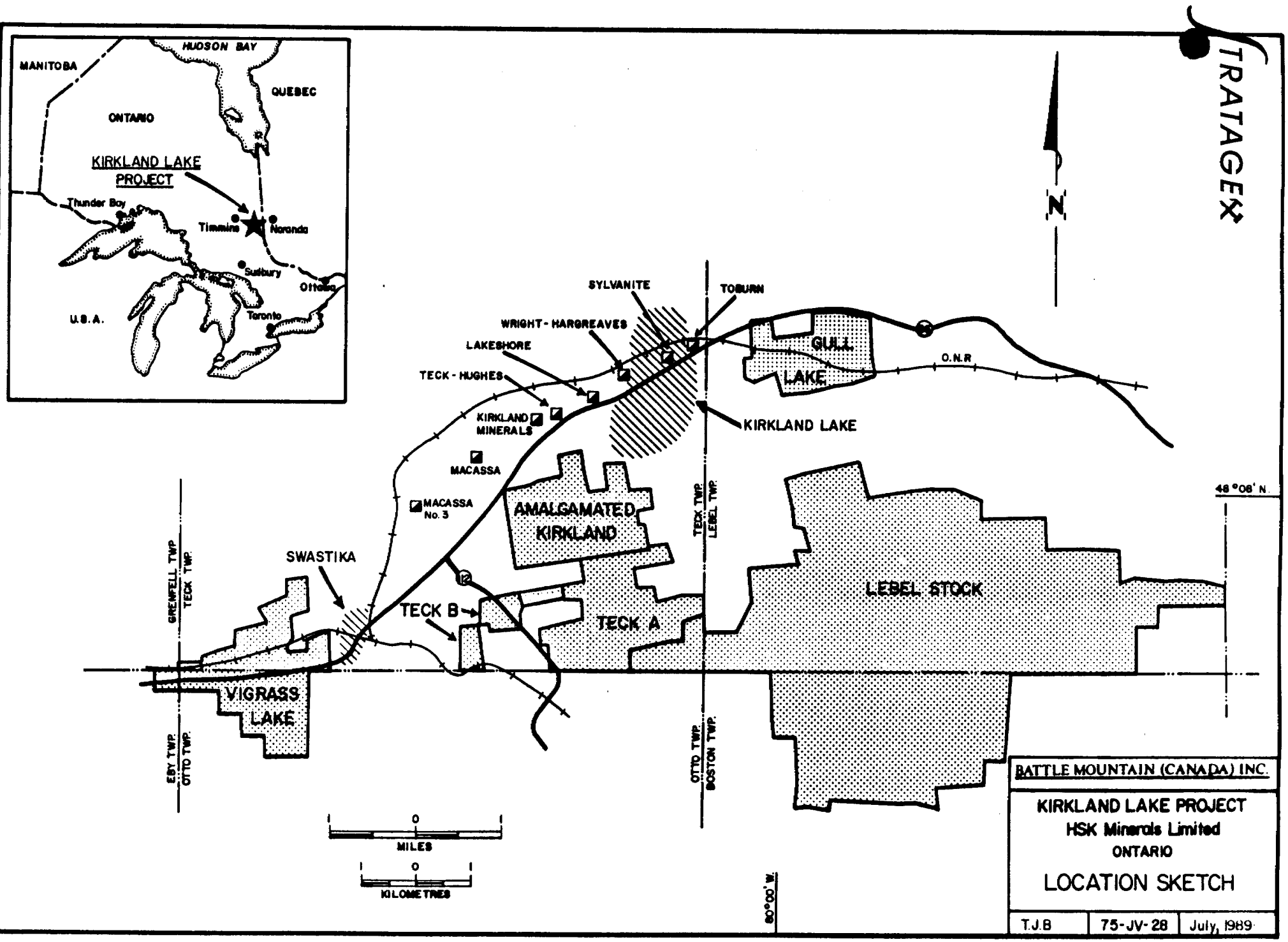
The Kirkland Lake sector of the Archean Abitibi greenstone belt is characterized by a distinct assemblage of Precambrian lithologies designated the Timiskaming Group. This unit is comprised of clastic sediments and subordinate trachytic volcanics which have been intruded by syenites and syenodiorites, all with a dominant orientation of east-northeast. Major deformation zones trending sub-parallel to stratigraphy host most of the significant gold deposits exploited in the Kirkland Lake camp.

The Larder Lake Group occupies the southern portion of the district. This unit, formerly termed the Keewatin, consists of mafic and ultramafic volcanics with subordinate sediments and intrusives.

Younger composite intrusives of varying composition, such as the Murdock Creek and Lebel stocks, have further complicated the geological setting.

The Amalgamated Kirkland property is known from considerable outcrop and prior exploration to be underlain by Timiskaming Group sediments and trachytic volcanics in the northern half, while the composite Murdock Creek Stock, nominally a syenite, occupies much of the southern half of the claims.

The important ENE-trending Larder Lake deformation zone traverses the property, separating the northern Timiskaming terrain from the southern Murdock Creek intrusive; other lesser ENE-trending shear zones have been mapped on the claims, including six which have associated gold mineralization. The younger Murdock Creek fault zone extends NE-SW across the centre of the property, and is indicated to offset lithologic units approximately 300m to


HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
STRATAGEX
N
SYLVANITE
TOBURN
WRIGHT-HARGREAVES
LAKESHORE
TECK-HUGHES
KIRKLAND MINERALS
KIRKLAND LAKE
GULL LAKE
O.N.R
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
VIGRASS LAKE
GRENFELL TWP.
TECK TWP.
EBY TWP.
OTTO TWP.
LEBEL TWP.
BOSTON TWP.
48°08' N.
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0
MILES
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KILOMETRES
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO
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July, 1989

the southwest. Other, still younger transverse faults oriented NNE are known to offset both stratigraphy and mineralized ENE-striking shear zones.

Exploration for and exploitation of gold deposits commenced in the Kirkland Lake district in the early 1900s, with the original discoveries near Swastika, followed by the subsequent discovery and development of the main Kirkland Lake camp.

In the post-war period, when gold prices were low, exploration throughout the Kirkland Lake camp was quite limited. Renewed exploration commenced with the advent of increased gold prices, with many exploration companies known to have been active in the Kirkland Lake district since 1974.

Early prospecting and exploration on or adjacent to the present Amalgamated Kirkland claims led to the discovery of several shear-hosted gold occurrences, including the Amalgamated and Hunton deposits, which saw limited underground development.

Among the recent exploration activities on and near the Amalgamated Kirkland property, Labrador Mining and Exploration Inc. carried out ground geophysics and limited drilling in the early 1980s for base metals; Rio Algom drilled three holes immediately to the south as part of a gold exploration program in the mid-1980s; and HSK Minerals Ltd. in 1987-88 carried out extensive soil geochemical, mapping, sampling and limited drilling for gold, leading to the discovery of the DK gold prospect on the adjacent Teck A property to the south.

Recent detailed mapping, sampling and trenching by Battle Mountain has led to the discovery of several new encouraging gold occurrences in the central and northern sectors of the claims. These showings are designated in terms of north and east grid locations as the '99-8030', '101-7290', '102-8350', '106-7350 and '107-7850' zones, and have been explored to date by trenching and mapping, and most recently by shallow drilling. The gold mineralization is associated with quartz-sericite-carbonate alteration and minor pyrite in a variety of Timiskaming lithologies, and has been shown to correlate with local linear magnetic lows.

Additionally, as part of its integrated exploration strategy, Battle Mountain has carried out regional aeromagnetic and VLF surveys (by Terraquest). Battle Mountain is also undertaking similar exploration on the Teck 'A' property immediately to the south of the Amalgamated Kirkland claims.

Finally, a very detailed ground magnetic survey was completed over the present claims in March and April, 1990 by Val d'Or Geophysique; as discussed in a prior report, the results outlined ten lithomagnetic domains transected by a series of east-west strike faults.

Full details as to the lithologic units, alteration and gold occurrences as well as the past exploration on and around the present claims may be found in various reports by Battle Mountain (Canada) and HSK Minerals.

3.0 SURVEY DESCRIPTION

Prior to commencing the present geophysical surveys, a metric cut line grid was established by Battle Mountain in 1989 for mapping purposes. This grid, cut by Fred Kiernicki of Kirkland Lake, has cross lines at 100m spacing oriented NNW (341^{o}) and a baseline at 10000N surveyed in by Northland Positioning Services of Kirkland Lake, for a total of 42.0 km. The grid extends from 8800N to 11200N (with the baseline designated 10000N) and from 7300E to 10000E. Fill-in lines at 50m intervals were subsequently added in the northern part of the grid

Minor departures from the intended ideal grid occurred during line cutting. The grid portrayed on the attached geophysical plans is an accurate version of the actual grid, as established in the course of geological mapping of the property.

The IP/resistivity survey was executed by JVX Ltd of Toronto during the period June 7 to June 23, 1990. The four-man survey crew, under the direction of Joe Mihelcic, staff geophysicist, utilized Scintrex time-domain IP equipment consisting of an IPR-11 6-channel receiver and an IPT-1 transmitter. A more complete description of the geophysical equipment employed may be found in Appendix A.

The pole-dipole array was employed for the entire survey. A specially designed multi-wire "snake" was employed to efficiently measure six dipoles (N=1 to 6) at a time from a single current electrode. All lines were surveyed with an 'a' spacing of 12.5m, selected to ensure resolution of narrow horizons or shear zones carrying minor sulphides under shallow overburden. Certain lines, chosen for their geological or geophysical interest, were resurveyed with 'a' spacings of 25m and/or 50m, in an effort to better define the distribution of sulphides at greater depths.

The survey was carried out in the northern sector of the property on seventeen north-south lines, from 7350E to 8800E, with line spacing varying between 50 and 100m, as seen in Fig. 1. The interval surveyed on each line was generally between 9800N and 10500N . Those lines surveyed with 25m or 50m dipoles are indicated on the attached survey plan maps (Maps 1, 2 and 3).

No particular problems were encountered in executing the survey, although the very high resistivities due to negligible overburden has in places led to slightly higher chargeabilities at N=1. Sporadic readings (predominantly chargeability) display characteristics incompatible with physically realizable sources; these have been indicated by question marks on the attached composite pseudo-sections.

A more complete description of IP theory and survey practices may be found in several of the indicated references.

4.0 DATA PROCESSING & PRESENTATION

The standard parameters of resistivity (in ohm-meters) and chargeability (in millivolts/volt) were determined from the observed primary and secondary decay voltages, respectively. In particular, from the secondary decay voltages measured at 10 logarithmically increasing time windows, the seventh window (M7) was selected for plotting as the principal indication of the IP effect.

The measured voltage decay curves were fitted to standard Cole-Cole IP models using the IPSOFT program developed by Scintrex. This program generates values for the time-constant and instantaneous polarizability for an ideal rock containing homogeneously distributed polarizable particles of a single grain size; despite these simplifying assumptions, these parameters can be useful in identifying secondary aspects of observed IP anomalies, since the time-constant is principally influenced by the grain size of the polarizable minerals.

The data are presented in a modified pseudosection format, with separate panels for observed chargeability (M7), apparent resistivity, calculated (instantaneous) chargeability and derived time-constant (PS-1 to 17, in Appendix B). Horizontal scales vary with 'a' spacing, from 1:2500 for 'a' = 12.5m to 1:10,000 for 'a' = 50m. Also shown at the top of the composite sections are the total field magnetic profiles*.

The IP survey coverage is shown in detail in Map 1, superimposed on the contoured magnetic data with the previously prepared interpretation at a scale of 1:2500. The apparent resistivity and chargeability (M7) are also displayed in plan contoured form at a scale of 1:2500 (Maps 2 and 3).

The interpreted IP and resistivity features are shown diagrammatically on the composite pseudosections as idealized chargeability sources and resistivity lows above the respective panels, and are also indicated in the interpretive cross-section panel. Also shown in the interpretive cross-section are the magnetic sources, characterized by susceptibility, along with faults inferred from the magnetic interpretation. Unfortunately, a full topographic profile was not available, so that likely topographic features corresponding to exposed outcrop and swampy areas have not been indicated. Finally, the interpreted IP zones are shown superimposed on the plan chargeability map.

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*Note that in this magnetic survey, carried out by Val d'Or Geophysique, readings were taken at 12.5m stations with fill-in readings at 6.25m; however, the pseudosections for 'a' = 25m and 50m show only the readings at these larger intervals, respectively, thus imparting some distortion to the displayed magnetic profiles. A more complete discussion of the magnetic survey and its interpretation can be found in a previous report for Battle Mountain by the author.

5.0 SURVEY RESULTS & INTERPRETATION

The survey detected a number of weak to very weak chargeability sources (generally less than 12 mv/v estimated intrinsic M7 chargeability) largely associated with resistivities in excess of 3000 ohm-m. The more significant and/or persistent IP sources have been designated as zones A through P, as seen in the attached Map 3. The strongest of these zones are K and L and a portion of zone E. All the IP sources are very shallow, generally within 5m of the surface, although several have indicated depths of 25-30m (in the 12.5m 'a' spacing data). Dips, while difficult to determine with the pole-dipole array data, appear to be dominantly quasi-vertical.

Calculated time constants, with a few exceptions, fall in the range of 0.01 to 0.1 seconds, consistent with very small average grain sizes, both for the very low background chargeabilities as well as for the weak anomalies. Exceptions indicative of possibly different grain sizes or character will be noted below. Because of the uniformity of derived time constants, the extrapolated instantaneous chargeability shows little difference in behaviour from the actually observed and plotted M7 values; accordingly the discussion will primarily utilize the measured parameters.

Detailed comments on the resistivity and IP features for each line follow below (see pseudosections PS-1 to 17 in Appendix B).

Line 7350E On line 7350E, the westernmost line surveyed, a thin layer of overburden is present over most of the traverse with highly resistive bedrock lithologies discerned beneath (PS-1).

Several very weak chargeability sources are indicated in the northern sector of the line. They do not appear to correlate with the 101-7290 gold occurrence.

In particular, zone A, which continues to the east and possibly to the west, is indicated by a narrow, near-surface source located near 10275N in a magnetic low and associated with high resistivities.

A broad, questionable IP feature is present north of 10300N at an estimated depth of 30m. However, this may reflect an undefined source west of this line. This feature is also accompanied by very high resistivities underneath a modest thickness of overburden.

Line 7350N was also surveyed with 'a'=50m (PS-1a). These data, with the poorer resolution inherent in the larger 'a' spacing, indicate very weakly anomalous chargeability between 10025N and 10250N. These data also tend to confirm the deeper, questionable IP source seen with the 12.5m array north of 10300N, as well as indicate a distinct contact between highly resistive lithologies south of 10150N and a slightly less resistive unit (approx. 5000 ohm-m) further to the north.

(Note that an anomalous IP effect attributed to a gas pipeline is observable at (or just beyond) the northern end of line 7350N and adjacent traverses to the east).

Line 7400E: The resistivity data on line 7400E, surveyed with only the 12.5m 'a' spacing, show limited patches of thin overburden overlying highly to very highly resistive lithologies.

Two very weak but probable chargeability features are indicated, constituting portions of zones A and B. Both are at surface with a maximum intrinsic M7 chargeability of less than 10 mv/v, consistent with 0.5 - 1.5% polarizable minerals.

Zone A, which continues to the east and west, is a narrow source near 10300N; it is associated with a magnetic unit of moderately high susceptibility and accompanied by very high resistivities, imparting some suspicion as to its validity.

Zone B, primarily indicated on this line (7400E) near 10162N, is also narrow, very weak and effectively at surface; it is associated with dominantly high resistivities, although one dipole immediately to the south exhibits distinctly lower resistivities, probably from a very local (overburden?) source. Zone B is located on the flank of a distinct magnetic anomaly, but is itself largely without any magnetic character.

Line 7500E: The resistivity data for line 7500E, surveyed with only the 12.5m 'a' spacing, show only limited patches of thin overburden, with the most persistent interval at the northern end of the traverse. Bedrock resistivities range from high to very high, with significantly lower values north of a contact at 10325N.

Chargeabilities are very low, with the exception of an interval from 10100N to 10187N, which is marginally higher. Within this interval is a discrete, weak, questionable source centered near 10175N and accompanied by high resistivities. This non-magnetic response is inferred to be an extension of zone B on adjacent line 7400E.

Line 7600E was surveyed with only 12.5m 'a' spacing. The resistivity data show limited patches of thin overburden and generally very high bedrock resistivities. Intervals of slightly lower but still high resistivity are discerned between 10062N and 10150N, as well as north of 10287N. The very high surface resistivities have likely caused the slightly elevated N=1 chargeabilities observed over several sectors of this line.

Apart from the slight enhancement in chargeabilities due to the very high resistivities, three very weak discrete chargeability sources are identified on line 7600E, constituting portions of zones B, C and G. all at shallow depths below the surface.

A questionable continuation of zone B is discerned between 10150N and 10160N in a non-magnetic area with slightly lower (but still high) resistivities.

Zone C is indicated between 9950N and 9975N. It is also accompanied by very high resistivities and is associated with a strongly magnetic unit. The combined magnetic and chargeability source continues further to the east.

Finally, zone G, which continues approximately 100m to the east, is a narrow weak source centered near 10335N; it is also associated with very high resistivities and occurs in a sector with effectively zero magnetic susceptibility, suggestive of possible silicification.

Line 7700E was surveyed with only 12.5m 'a' spacing. The resistivity data show limited patches of thin overburden and high to very high bedrock resistivities. The most extensive interval of slightly lower but still high resistivity is found north of 10037N.

The IP data on this line display a significant number of noisy dipoles, so that very weak chargeability features are identified and interpreted with diminished confidence. Recognizable chargeability features include portions of zones C, F and G.

Zone C, which extends east and west of line 7700E, is indicated by a weak but distinct IP source centered near 9985N at an estimated depth of 5m. It is associated with very high resistivities and a moderately magnetic unit, diminishing its discerned exploration potential.

Zone F, which is limited to this line, is defined by a very weak, shallow IP response centered near 10235N. It is characterized by very high resistivities and moderately high susceptibilities. Although located near a fault or shear zone inferred from the magnetic data, and along a trend defined by zones H and M to the east, its limited strike extent points to a similarly limited exploration potential.

Zone G, centered near 10325N and extending approximately 100m to the west, is a similarly very weak near-surface response. It has negligible susceptibility, and hence could reflect very minor sulphides accompanied by silicification.

Line 7800E, surveyed only with the 12.5m 'a' spacing, has a few scattered patches of thin overburden. Several interpreted faults lie beneath these modest overburden troughs. Bedrock resistivities are generally very high, with slightly lower but still high values primarily found in the northern sector, north of a distinct contact near 10270N.

Chargeability sources are limited to portions of zones C and H. Zone C, which extends east and west of this line, is represented by a broad, very weak but definite compound chargeability source between 9925N and 9975N. It is associated with very high resistivities. Its moderately high susceptibility diminishes exploration interest.

Zone H, which continues to the east, is reflected by a very weak, somewhat uncertain IP feature indicated between 10225N and 10275N at a shallow depth and associated with increased resistivities. It does correlate, however, with an interval of negligible susceptibility near a resistivity contact along an interpreted fault, and is part of an alignment of IP zones which includes the gold-associated zone M, so that it retains exploration interest.

Line 7900E was surveyed with both 12.5 and 50m pole-dipole arrays. As seen in the 12.5m data (PS-7), there are only restricted patches of thin overburden, possibly attaining 10m thickness locally. Bedrock resistivities are generally very high, with a few intervals of slightly lower but still high resistivities, principally north of 10200N, where values average 5000 to 6000 ohm-m.

Discrete chargeability features are limited to portions of zones C, H and J, which range from very weak to weak.

Zone C, which extends to the west, is represented on line 7900E by a narrow, weak response centered on 9940N; it has an estimated intrinsic M7 chargeability of 12 mv/v. It is associated with very high resistivities and high susceptibilities, so that this portion of zone C is judged to be of reduced exploration interest.

Zone J, principally defined by the IP response on this line, consists of several very weak anomalous sources between 10110N and 10200N; these tend to be associated with several moderately magnetic features as well as very high resistivities, thereby diminishing interest in this restricted IP source.

Zone H, which extends to the east and west of this line, is reflected by a narrow, very weak IP feature centered near 10235N. It is associated with slightly lower but still high resistivities in a non-magnetic region, and hence is viewed as of exploration interest.

The chargeabilities obtained with 'a'= 50m (PS-7a) present a rather blurred and displaced indication of the three local, narrow IP sources defined with the 12.5m array. In particular, very weak chargeability responses are seen, corresponding to zone C and to zones H+J, respectively.

Line 8000E was surveyed with only the 12.5m 'a' spacing. Gold occurrence '99-8030' is located just east of the southern limit of the IP coverage.

The resistivity data show several restricted patches of thin overburden, locally perhaps 7m in thickness, with the most extensive patch south of 9850N. Bedrock resistivities are generally very high, apart from several local intervals where they are slightly lower but still high, such as near 10000N and north of a distinct contact near 10315N. Several faults are interpreted from the magnetic data to occur beneath the local overburden troughs.

Chargeability features on line 8000E are limited to three very weak, shallow sources, constituting portions of zones D, H and K.

Zone D is a very weak IP source defined only on this line (8000E) between 9875N and 9905N, possibly correlating with gold occurrence '99-8030'. The IP source is associated with very high resistivities, and correlates with an interval of intermediate susceptibility lying on the northern flank of a very strong magnetic horizon. In addition, it is located near a fault interpreted from the magnetics near occurrence '99-8030'. However, zone D is of rather minor exploration interest due to its small extent.

Zone H, which extends to the west, is indicated on this line (8000E) between 10210N and 10240N as a very weak chargeability source at or very near the contact between very highly resistive lithologies to the south and a slightly less resistive lithologic unit to the north. This anomaly is also concealed by somewhat thicker overburden and is near a fault inferred from the magnetic data, and hence is of exploration interest.

Zone K, restricted to line 8000E, is suggested between 10275N and 10330N by slightly higher chargeabilities measured at N = 1 and 2. The strong correlation with very high surface resistivities raises suspicions as to its validity. The higher chargeabilities also correlate with a moderately strong magnetic source, thereby further reducing interest in this feature.

In addition, a very slight increase in chargeability near 10150N may reflect the presence of zone J on the adjacent line to the west.

Line 8100E was surveyed only with the 12.5m spacing. The resistivity data indicate scattered patches of conductive overburden, principally from 10180N to the northern end of the line. Several faults interpreted from the magnetic data occur beneath the local overburden troughs. Bedrock resistivities are alternating high to very high; north of 10250N a restricted interval of bedrock exhibits lower values (approximately 2000 ohm-m), succeeded by very high values at the northern limit of the traverse, associated with a moderately strong magnetic source.

Chargeability values are very low across the entire line. A very weak, compound source is suggested between 9960N and 9990N, along with a further weak response near 10240N. The compound source is attributed to portions of two separate zones, zone E to the south and zone L to the north, respectively. Zone E is associated with slightly lower surface resistivities, while zone L at an interpreted depth of 15m appears to correlate with very highly resistive bedrock. The entire compound anomaly occurs in a region of negligible susceptibility.

Line 8200E, surveyed with only the 12.5m 'a' spacing, has only a few local patches of overburden; several faults inferred from the magnetic data occur within these overburden intervals. Bedrock resistivities are generally high, with several intervals of very high values. A bedrock unit with distinctly lower resistivity occurs between 10290N and 10325N, possibly reflecting a wedge of sheared sediments. Further to the north bedrock with typically high resistivities (2000 - 5000 ohm-m) is again seen.

Chargeability features on line 8200E are limited to portions of zones E and L. Zone E, which extends to the east and west, is represented by a narrow, shallow, very weak IP source centered at 9955N associated with slightly lower resistivities and very high susceptibility. Although a fault is interpreted near 9975N, the zone is regarded as of limited interest, and cannot be readily correlated with gold occurrence '99-8030'.

Zone L is a compound chargeability feature principally indicated on this line (8200E). It extends from 10000N to 10050N, with its strongest portion (estimated intrinsic M7 chargeability of 20 mv/v) centered near 10045N. Calculated time constants are erratically higher (100 sec). The zone occurs in an interval exhibiting negligible susceptibility, near an interpreted shear zone, and hence retains exploration interest despite its limited extent.

Line 8300E was surveyed with 12.5, 25 and 50m 'a' spacings. As reflected in the detailed 12.5m data (PS-11), thin patches of conductive overburden occur sporadically along the traversed section, with the most extensive found near the northern and southern ends. Bedrock resistivities are variably high to very high; a broad interval of slightly lower but still high values is seen north of 10225N. Intervals of distinctly lower resistivity are seen south of 9910N and north of 10362N, and narrow resistivity lows are centered near 10000N and 10220N.

Chargeability sources in the 12.5m data on line 8300N comprise portions of zones E, L and M, all of which are stronger or better defined on adjacent lines.

Zone E, which extends east and west of this line, is represented by a narrow, very weak IP source centered near 9915N associated with high resistivity and high susceptibility, and hence of limited exploration interest.

Zone L is reflected by a narrow, very weak response centered near 10030N. Accompanying resistivities are slightly lower (but still high), while susceptibility is low. The derived time constants are again erratically higher (100 sec), but the zone is much weaker and more limited than the corresponding response on adjacent line 8200E.

Zone M is indicated by a very weak, questionable source centered near 10235N; the zone is stronger and better defined on adjacent lines to the east. Erratically lower resistivities and low susceptibilities accompany the IP feature. Zone M, although unimpressive on this line, is of distinct interest in view of associated gold occurrences.

Resurveying line 8300E with a 25m 'a' spacing PS-11a) yielded chargeability features which partially correlate with those detected with the 12.5m array. Zone E is again seen, but with an apparent depth of 20m, possibly reflecting an increase in sulphides at depth. Zones L and M, on the other hand, are too narrow and weak to be resolved with the larger array.

Resurveying line 8300E with a 50m 'a' spacing (PS-11b) produced several new chargeability features, but these are associated with individual dipoles and very high resistivities, and hence are judged to be artifacts of the survey and not of geological significance.

Line 8360N was surveyed with 12.5 and 25m dipole spacings. Gold occurrences are found on or very close to this line near 10200N and 10275N.

The resistivity data on line 8360N measured with the 12.5m array (PS-12) show a number of patches of thin overburden, with the most extensive found between 10375N and 10450N. Bedrock resistivities are variably high to very high; intervals with slightly lower but still high resistivities are found between 10300N and 10375N, and between 10075N and 10150N. Distinctly lower resistivities are seen between 10375N and 10450N, along with narrow lows centered near 9925 and near 10025N.

Chargeability features on line 8360E are limited to weak to very weak responses forming portions of zones E' and M.

Zone E', which extends to the east-northeast, is a weak but probable source centered between 9950N and 9975N at an apparent depth of 10m and associated with high resistivity and very high susceptibility. It is judged of very limited exploration interest.

Zone M, which extends to the east and west, is indicated by a weak, narrow, but well defined IP source centered near 10225N between the two gold occurrences. The IP anomaly is accompanied by very high resistivities and low to moderate susceptibility, suggesting possible silicification accompanied by minor sulphides.

The chargeability data taken with the 25m dipole on line 8360N (PS-12a) reflect zone M in a manner fully consistent with the 12.5m data. Zone E', on the other hand, appears wider, deeper and displaced to the north in the 25m data, with a location near 10070N and a possible depth of 35m suggested. The IP source remains associated with high resistivities but in its displaced position it is now partially coincident with a highly magnetic unit. These differences are explainable either in terms of an increase in sulphide content with depth or adjacent to the line, or to distortions imposed by the pole-dipole array.

Line 8400E, surveyed with only the 12.5m 'a' spacing, shows a few scattered patches of thin overburden; the most extensive are between 9975N and 10080N, and between 10350N

and 10475N. Bedrock resistivities are generally high to very high. Several narrow intervals with less resistive bedrock are seen between 10000N and 10050N, and near 10225N. A broad interval of lower values (approx. 2000 ohm-m) extends north of 10375N.

Chargeability features are limited to very weak to weak sources constituting part of zones E' and M. A slight decrease in the already very low background chargeabilities north of 10375N suggests a lithologic change; the corresponding decrease in resistivity suggest a probable sedimentary unit.

Zone E', which extends to the WSW and ENE, is characterized on line 8400E by a very weak IP source at an apparent depth of 25m between 9985N and 10015N. As on adjacent lines to the west, it remains associated with high resistivities and very high susceptibility, and hence has very limited exploration interest.

Zone M, which extends to the west, is reflected on line 8400E as a weak to very weak chargeability source between 10210N and 10240N; associated resistivities are generally high, although lower values are observed near 10225N. Susceptibilities are generally low across this interval, while the time constant is erratically higher. The association with known gold occurrences prompts particular interest in this zone, as noted in the prior discussion of the zone on lines 8300E and 8360E.

A possible weak chargeability source is also noted near 10062N; however, it is judged highly suspect since its presence is based on two anomalous IP readings observed at only a single receiver dipole.

Line 8500E, surveyed with only the 12.5m array, shows thin, patchy overburden, with the most extensive patches between 10050N and 10160N, and between 10460N and 10500N; thicknesses average less than 5m. Bedrock resistivities are generally high, and locally very high; distinctly lower resistivities (approximately 1500 ohm-m) are seen south of 10000N, as well as possibly at the northern end of the traverse.

Chargeability data on line 8500E exhibit a significant number of noisy or uncertain values, particularly at N=2, thereby decreasing the ability to recognize very weak IP features. The only IP response identified as valid is a moderate source centered near 10060N and forming part of zone E". The zone is accompanied by high resistivities but in this instance is associated with low susceptibility, in a gap in a persistent, highly magnetic unit; hence this sector of the trend formed by zones E and E' may be of greater exploration interest than the other portions.

Line 8600E, surveyed only with the 12.5m array, displays only a few patches of thin overburden. Bedrock resistivities are variably high to very high, with the average resistivity slightly lower north of 10275N.

Chargeability sources are limited to two very weak features forming part of zones E" and N.

Zone E", which extends to the west-southwest and east-northeast, is reflected on line 8600 by a narrow, very weak IP response centered near 10110N. It is associated with slightly lower resistivities and negligible susceptibility, and hence may represent a more favourable sector of this overall trend.

Zone N, which extends approximately 150m further to the east, is reflected on line 8600E by a narrow, shallow, very weak chargeability source centered near 10220N; it is associated with high resistivities and weak to moderate susceptibility. The zone is judged to be of interest in that it lies along a generalized trend formed by IP zones F, H and M.

Line 8700E, surveyed with only the 12.5m array, shows very limited patches of overburden, primarily between 10125N and 10210N. Bedrock resistivities are generally high (6000 to 9000 ohm-m), with several intervals of distinctly lower resistivities south of 10225N.

Chargeability features are limited to two weak, narrow sources which form part of zones E" and N.

The very weak, narrow IP anomaly constituting the eastern end of zone E" is centered near 10135N. It is accompanied by slightly lower resistivities near a distinct resistivity contact and is associated with low susceptibilities as well as a fault interpreted from the magnetics. Consequently this portion of the trend E/E'/E" may be of exploration interest.

Zone N, which extends approximately 150m to the west, is represented on line 8700E by a narrow, very weak chargeability source centered near 10230N and associated with high resistivities. The IP anomaly occurs on the southern flank of a magnetic source of low susceptibility, similar to the response observed on the adjacent line 8600E. As noted in the discussion of the results on line 8600E, zone N is of increased interest in that it lies along the trend formed by zones F, H and M.

Line 8800E, the easternmost line surveyed with IP, was traversed with both 12.5m and 50m dipole spacings. The 12.5m data PS-17) show a broad, thick patch of conductive overburden between 10110N and 10290N; its uniform character suggests that it reflects tailings from prior gold mining operations. Its significant thickness (approximately 20m), conductivity and very low chargeability rendered it impossible to calculate the time constants and extrapolated chargeabilities over this interval.

Chargeability features on line 8800E observed with the 12.5m array are limited to a very weak, uncertain, narrow source designated zone P centered at 10310N at the northern edge of the thick overburden. It is associated with high resistivities and occurs in an area of negligible susceptibility. Zone P may continue or possibly strengthen further to the east beyond the limits of the present survey.

Resurveying of line 8800E with an 'a' spacing of 50m (PS-17a) provides a better measure of the (high) intrinsic bedrock resistivities beneath the conductive overburden, and ensured that significant IP sources were not concealed underneath. The data again indicate the presence of zone P near 10350N, although the larger 'a' spacing further attenuates this narrow, weak source.

A single chargeability reading of 5.6 mv/v at station 10450N recorded with the 50m dipole re-survey on line 8800E is considered quite suspect and/or a possible cultural source, in that no corresponding response is observed in the 12.5m dipole survey data near this location.

Discussion: The IP anomalies detected in the survey of this portion of the Amalgamated Kirkland property are quite weak, and in many cases are recognizable only because of the very low background chargeabilities. Such low amplitude features could be caused by very minor amounts of disseminated sulphides, magnetite and/or graphite.

Most IP zones are associated with high to very high resistivities, consistent with unaltered lithologies or with silicified intervals. Conversely, these high resistivities point to the absence of significant graphite.

The detailed magnetic data have proven very useful in prioritizing the interpreted IP zones, since 1-3% disseminated magnetite (corresponding to high susceptibility) could readily give rise to IP responses of 5-10 mv/v. Conversely, those IP zones with low to negligible susceptibility are considered of greater interest, since they more likely arise from disseminated pyrite.

Those IP sources arising primarily from sulphides are consistent with a maximum of 2% sulphides over 5-10m width; in many cases the sulphide content may be no more than 0.5%. Zones with such a low sulphide content are indeed of interest in this geologic environment as possible indicators of accompanying silicification and gold mineralization. However, their presence may be difficult to recognize in drill core. In addition, several generations of pyrite may be anticipated in such a geologically complex camp as Kirkland Lake, only one of which may be related to gold mineralization.

Based on the above analysis, the IP zones outlined by the present survey with the more favourable characteristics are B, E", G, H, L, M, N and possibly P. Zone M is particularly noteworthy in view of its proximity to two gold occurrences; zones H and N li along a generalized east-west trend containing zone M (along with zone F which is magnetic and has a limited strike length) and are consequently also judged of particular interest.

Zones C and E/E', among the most persistent IP features, are consistently associated with a highly magnetic unit or units, and hence judged to be of diminished interest. The short zone A is variably magnetic and hence is also assigned a low priority.

The remaining IP zones (D, J, K) are of too limited strike extent to be rated as favourable targets.

The IP features of interest can be readily investigated and evaluated with shallow drilling and/or trenching, and in fact the recently completed drill program has included tests of several of the IP zones. In carrying out such an evaluation it should be borne in mind that gold mineralization may not be associated with the sulphides, or that it may be adjacent to the sulphides.

The variations in apparent resistivity, as seen in plan form in Map 2, primarily reflect the distribution of thin glacial overburden, and secondarily differentiate lithologic characteristics. The dominantly high to very high bedrock resistivities are consistent with unaltered volcanics (massive flows and intrusives). Two sectors with distinctly lower bedrock resistivities are seen in the northeast and southeast; these may well be metasediments. A general correlation is also observed between strongly magnetic units and very high bedrock resistivity, suggesting that these are massive, unaltered (Timiskaming) trachyte flows or syeno-diorite sills.

Additionally, it is of interest to note that strike faults inferred from the magnetic data display a frequent correlation with local overburden troughs, lending support to the validity of the magnetic interpretation, since sheared lithologies tend to be preferentially eroded.

Spectral IP did not prove particularly helpful in this geological setting. The fine-grained nature of most of the IP sources is indicated by the low values of the computed time constants. However, the general uniformity of the time constants (within the range 0.01 to 0.1 sec) makes it rather difficult to distinguish between types or character of IP sources based on this parameter. Zones L and M do display erratically higher time constants (approx. 100 sec), suggesting coarser (sulphide) grain size.

Finally, the virtues of very detailed IP surveying for subtle sulphide targets (where shallow overburden permits) is demonstrated by the present survey, in that many of the narrow, weak to very weak IP zones have been detected and resolved only because of the short dipole employed and the consistently high data quality achieved.

6.0 CONCLUSIONS

Based on the above survey results and discussion, it is concluded that the IP/resistivity survey has provided useful guidance and insight pertinent to the on-going exploration for additional gold deposits on the Amalgamated Kirkland property, although not in as diagnostic a manner as had been originally anticipated.

In particular, the interpreted IP/resistivity features, evaluated in conjunction with detailed ground magnetic data, indicate:

1) Fourteen weak to very weak chargeability sources zones A to P) accompanied by high to very high resistivities, consistent with a low tenor of disseminated magnetite or sulphides.

2) Seven largely non-magnetic IP zones (B, E", G, H, L, M and N) exhibiting significant strike length and/or intensity, and hence of interest as probable sulphide sources.

3) IP zone M exhibits a reasonably convincing spatial association with a gold occurrence (102-8350), imparting additional interest in the zones H and N which form a generalized east-west trend with zone M.

4) However, the correlation of IP anomalies and gold occurrences is inconsistent in that prospect '101-7290' does not correlate with any IP response on nearby line 7350E, while occurrence '99-8030' shows only a tenuous correlation with a very weak IP feature (zone D).

5) The weak but persistent IP zones C and E/E', which coincide with strongly magnetic horizons, are attributed to minor disseminated magnetite and hence judged of low exploration interest.

6) Most IP sources have low time constants consistent with a fine-grained character; however, the uniform character of the derived time constants limits its utility in this geologic setting.

7) Bedrock, where not actually exposed, is concealed by only limited patches of thin overburden, permitting further efficient evaluation via trenching and/or shallow drilling.

7.0 RECOMMENDATIONS

Based on the above discussion and conclusions, it is recommended that additional exploration be undertaken on the Amalgamated Kirkland property and environs to establish the geological validity of the presently interpreted features, and their potential significance in terms of gold mineralization and its attendant alteration.

In particular, it is recommended that:

1) The inferred IP zones of non-magnetic character be carefully evaluated in terms of past exploration and geological information, and further mapping and trenching be undertaken on those of potential interest, as appropriate;

2) Existing geological and geochemical data pertaining to the persistent magnetic IP zones be scrutinized to determine if minor magnetite in unaltered rocks satisfactorily explains these anomalies.

3) Additional detailed IP/resistivity surveys be considered if significant disseminated sulphide zones with encouraging gold values cannot be readily pursued by trenching due to excessive overburden;

4) The present interpretation be reviewed and updated in the light of new information or prospects.

Respectfully submitted,

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REFERENCES

Bertin J. and Loeb, J., 1976, Experimental and Theoretical Aspects of Induced Polarization, Vol I and II, Gebruder Borntrag, Berlin

Dolan, W.M., et al, 1967, Considerations concerning measurement standards and design of IP equipment *in* Proc. of the Symposium on Induced Electrical Polarization, Univ. of California, Berkeley, p2-31

Grant, F. and West, G., 1965, Interpretation Theory in Applied Geophysics, McGraw-Hill, 584p

Hallof P.G. and Pelton, W.H., 1980, The removal of inductive coupling effects from spectral IP data (abstr.), 50th Annual SEG Meeting, Houston

OMNDM/OGS, 1979, EM and Magnetic Survey, Kirkland Lake Area (KLIP), Questor Surveys

Pelton, W.H. et al, 1978, Mineral discrimination and removal of inductive coupling with multifrequency IP, Geophysics v43, p588-609

Roth, J., 1989, Interpretive Report on Terraquest Aeromagnetic/VLF Surveys, Kirkland Lake, Ont. *for* Battle Mountain (Canada) Inc.

Roth, J., 1990, Report on a Magnetic Survey, Amalgamated Kirkland Property, Kirkland Lake, Ont. *for* Battle Mountain (Canada) Inc.

Seigel, H.O., 1959, Mathematical formulation and type curves for induced polarization, Geophysics v24, p547-565

Terraquest, 1989, Logistics Report on Aeromagnetic and VLF Surveys, Kirkland Lake, Ont., *for* Battle Mountain (Canada) Inc.

Wait, J.R., ed., 1959, Overvoltage Research and Geophysical Applications, Pergamon Press

Ward, S.H., 1967, The Electomagnetic Method: in *Mining Geophysics v.2,* Tulsa, SEG, p 274-306

Webster, B and Johnson, I., 1987, Time-domain spectral induced polarization: some recent example for gold, JVX Ltd brochure, Exploration 87, Toronto

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APPENDIX A

GEOPHYSICAL EQUIPMENT

SCINTREX IPR-11 Broadband Time Domain IP Receiver



Operator using the IPR-11

The microprocessor-based IPR-11 is the heart of a highly efficient system for measuring, recording and processing spectral IP data. More features than any remotely similar instrument will help you enhance signal/noise, reduce errors and improve data interpretation. On top of all this, tests have shown that survey time may be cut in half, compared with the instrument you may now be using.

The IPR-11 Broadband Time Domain IP Receiver is principally used in electrical (EIP) and magnetic (MIP) induced polarization surveys for disseminated base metal occurrences such as porphyry copper in acidic intrusives and lead-zinc deposits in carbonate rocks. In addition, this receiver is used in geoelectrical surveying for deep groundwater or geothermal resources. For these latter targets, the induced polarization measurements may be as useful as the high accuracy resistivity results since it often happens that geological materials have IP contrasts when resistivity contrasts are absent. A third application of the IPR-11 is in induced polarization research projects such as the study of physical properties of rocks.

Due to its integrated, microprocessor-based design, the IPR-11 provides a large amount of induced polarization transient curve shape information from a remarkably compact, reliable and flexible format. Data from up to six potential dipoles can be measured simultaneously and recorded in solid-state memory. Then, the IPR-11 outputs data as: 1) visual digital display, 2) digital printer profile or pseudo-section plots, 3) digital printer listing, 4) a cassette tape or floppy disk record, 5) to a microcomputer or 6) to a modem unit for transmission by telephone. Using software available from Scintrex, all spectral IP and EM coupling parameters can be calculated on a microcomputer.

The IPR-11 is designed for use with the Scintrex line of transmitters, primarily the TSQ series of current and waveform stabilized models. Scintrex has been active in induced polarization research, development, manufacture, consulting and surveying for over thirty years and offers a full range of time and frequency domain instrumentation as well as all accessories necessary for IP surveying.

Major Benefits

Following are some of the major benefits which you can derive through the key features of the IPR-11.

Speed up surveys.

The IPR-11 is primarily designed to save you time and money in gathering spectral induced polarization data.

For example, consider the advantage in gradient, dipole-dipole or pole-dipole surveying with multiple 'n' or 'a' spacings, of measuring up to six potential dipoles simultaneously. If the specially designed Multidipole Potential Cables are used, members of a crew can prepare new dipoles at the end of a spread while measurements are underway. When the observation is complete, the operator walks only one dipole length and connects to a new spread leaving the cable from the first dipole for retrieval by an assistant.

Simultaneous multidipole potential measurements offer an obvious advantage when used in drillhole logging with the Scintrex DHIP-2 Drillhole IP/Resistivity Logging Option.

The built-in, solid-state memory also saves time. Imagine the time that would be taken to write down line number, station number, transmitter and receiver timings and other header information as well as data consisting of SP, Vp and ten IP parameters for each dipole. With the IPR-11, a record is filed at the touch of a button once the operator sees that the measurement has converged sufficiently.

The IPR-11 will calculate resistivity for you. Further time will then be saved when the IPR-11 data is dumped to a field computer in your base camp for processing. If no computer is available in the field then data can be output directly to a printer which will plot your data in profile or pseudo-section format. The same printer can also be used to make one or more copies of a listing of the day's results. If desired, an output to a cassette tape recorder or floppy disk drive can be made. Or, the IPR-11 data memory can be output directly into a modem, saving time by transmitting data to head office by telephone line.

If the above features won't save as much time as you would like, consider how the operator will appreciate the speed in taking a reading with the IPR-11 due to: 1) simple keyboard control, 2) resistance check of six dipoles simultaneously, 3) fully automatic SP buckout, 4) fully automatic Vp self ranging, 5) fully automatic gain setting, 6) built-in calibration test circuits, and 7) self checking programs. The amount of operator manipulation required to take a great deal of spectral IP data is minimal.



High production rates are obtained using Multidipole Potential Cables which permit measurement of six dipoles simultaneously.

Compared with frequency domain measurements, where sequential transmissions at different frequencies must be made, the time domain measurement records broadband information each few seconds. When successive readings are stacked and averaged, and when the pragmatic window widths designed into the IPR-11 measurement are used, full spectral IP data are taken in a minimum of time.

Improved interpretation of data.

The quasilogarithmically spaced transient windows are placed to recover the broadband information that is needed to calculate the standard spectral IP parameters with confidence. Scintrex offers its SOFTII software package which can take the IPR-11 outputs and generate the following standard spectral IP parameters: zero-time chargeability, M; time constant, TAU; and exponent, C.

Interpretability of spectral IP data are improved since time domain measurements are less affected by electromagnetic coupling effects than either amplitude or phase angle frequency domain measurements, due to the relatively high frequencies used in the latter techniques. In the field, coupling free data are nearly always available from the late time windows. Then, in the base camp or office, the Scintrex SOFTII software package may be used to resolve the EM component for removal from the IP signal. The electromagnetic induction parameters may also be interpreted in order to take advantage of the information contained in the EM component.

A further advantage of the IPR-11 in interpreting spectral IP responses is the amount of data obtainable due to the ability to change measurement windows and to allow for different transmitter pulse times.

Enhance signal/noise.

In the presence of random (non-coherent) earth noises, the signal/noise ratio of the IPR-11 measurements will be enhanced by $\sqrt{N}$ where N is the number of individual readings which have been averaged to

Major Benefits

arrive at the measurement. The IPR-11 automatically stacks the information contained in each pulse and calculates a running average for Vp and each transient window. This enhancement is equivalent to a noise decrease of $\sqrt{N}$ or a power increase of N. Since N can readily be 30 or more (a 4 minute observation using a 2 second on/off waveform), the signal/noise improvement realized by the IPR-11 cannot be practically achieved by an increase in transmitter power. Alternatively, one may employ much lower power transmitters than one could use with a non-signal enhancement receiver.

The automatic SP program bucks out and corrects completely for linear SP drift; there is no residual offset left in the signal as in some previous time domain receivers. Data are also kept noise free by: 1) automatic rejection of spheric spikes, 2) 50 or 60 Hz powerline notch filters, 3) low pass filters and 4) radio-frequency (RF) filters. In addition, the operator has a good appreciation of noise levels since he can monitor input signals on six analog meters, one for each dipole.

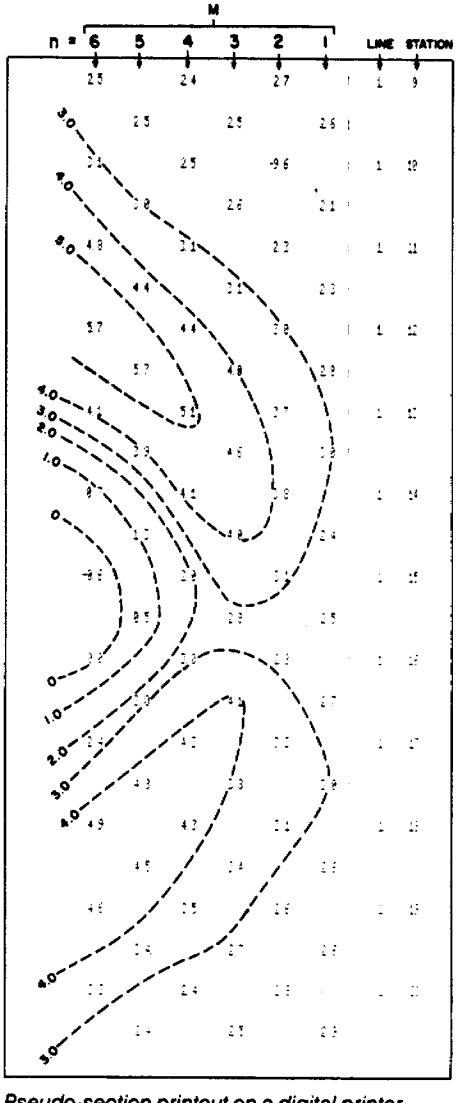
Observations can usually be made using the self-triggering feature of the IPR-11. The internal program locks into the waveform of the signal received at the first dipole (nearest a current electrode) and prevents mistriggering at any point other than within the final 2.5 percent of the current on time. In particularly noisy areas, however, synchronization of the IPR-11 and transmitter can be accomplished either by a wire link or using a high stability, Optional Crystal Clock which fits onto the lid of the instrument.

Reduce Errors.

The solid-state, fail-safe memory ensures that no data transcription errors are made in the field. In base camp, data can be output on a digital printer and/or some magnetic media such as floppy disks or cassette tapes and played back onto a digital printer for full verification. The fact that the IPR-11 calculates resistivity from recorded Vp and I values also reduces error.

The self check program verifies program integrity and correct operation of the display, automatically, without the intervention of the operator. If the operator makes any one of ten different manipulation errors, an error message is immediately displayed.

The Multidipole Potential Cables supplied by Scintrex are designed so there is no possibility of connecting dipoles to the wrong input terminals. This avoids errors in relating data to the individual dipoles. The internal calibrator assures the operator that the instrument is properly calibrated and the simple keypad operation eliminates a multitude of front panel switches, simplifying operation and reducing errors.



Pseudo-section printout on a digital printer. Chargeability data are shown for the sixth transient window (M_6) for the dipole-dipole array and six 'n' spacings. Line number and station number are also recorded. The contours have been hand drawn. Resistivity results can be plotted in a similar manner.

Features

Six Dipoles Simultaneously. The analog input section of the IPR-11 contains six identical differential inputs to accept signals from up to six individual potential dipoles. The amplified analog signals are converted to digital form and recorded with header information identifying each group of dipoles. Custom-made multi-dipole cables are available for use with any electrode array.

Memory. Compared with tape recording, the IPR-11 solid-state memory is free from problems due to dirt, low temperature, moving parts, humidity and mechanical shock. A battery installed on the memory board ensures memory retention if the main batteries are low or if the main batteries are changed. The following data are automatically recorded in the memory for each potential dipole: 1) receiver timing used, 2) transmitter timing used, 3) number of cycles measured, 4) self potential (SP), 5) primary voltage (Vp) and 6) ten transient IP windows (M). In addition, the operator can enter up to seventeen, four digit numerical headers which will be filed with each set of up to six dipole readings. The operator must enter at least four headers: line number, station number, current amplitude, and the K-factor. Other headers can include, for example, operator code, date, etc.

In the standard data memory, up to 200 potential dipole measurements can be recorded. Optional Data Memory Expansion Blocks can be installed in the IPR-11 to increase memory capacity in blocks of about 200 dipoles each to a total of approximately 800 dipoles.

Memory Recall. Any reading in memory can be recalled, by simple keypad entry, for inspection on the visual display. For example, the operator can call up sequential visual display of all the data filed for the previous observation or for the whole data memory.

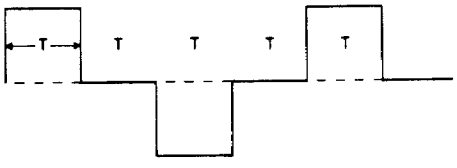
Carefully Chosen Transient Windows. The IPR-11 records all the information that is really needed to make full interpretations of spectral IP data, to remove EM coupling effects and to calculate EM induction parameters. Ten quasilogarithmically spaced transient windows are measured simultaneously for each potential dipole over selectable total receive times of 0.2, 1.0, 2.0 or 4.0 seconds.

After a delay from the current off time of t, the width of each of the first four windows is t, of the next three windows is 6t and of the last three windows is 12t. The smallest t values are 3, 15, 30 or 60 milliseconds. Thus, for a given dipole, up to forty different windows can be measured by using all four receive times. The only restriction is, of course, that the current off time must exceed the total measuring time. Since t is as low as 3 milliseconds and since the first four windows are narrow, a high density of curve shape information is available at short times (high frequencies) where it is needed for confident calculation of the EM coupling parameters.

Calculates Resistivity. The operator enters the current amplitude and resistivity geometry K-factors in the header with each observation. If the K-factors remain the same, only a code has to be entered with each observation. Then, using the recorded Vp values, the IPR-11 calculates the apparent resistivity value which can be output to the computer, printer, etc.

Normalizes for Time and Vp. The IPR-11 divides the measured area in each transient window by the width of the window and by the primary voltage so that values are read out in units of millivolts/volt (mils).

Signal Enhancement. Vp and M values are continuously stacked and averaged and the display is updated for each two cycles. When the operator sees that the displayed values have adequately converged, he can terminate the reading and file all values in memory.

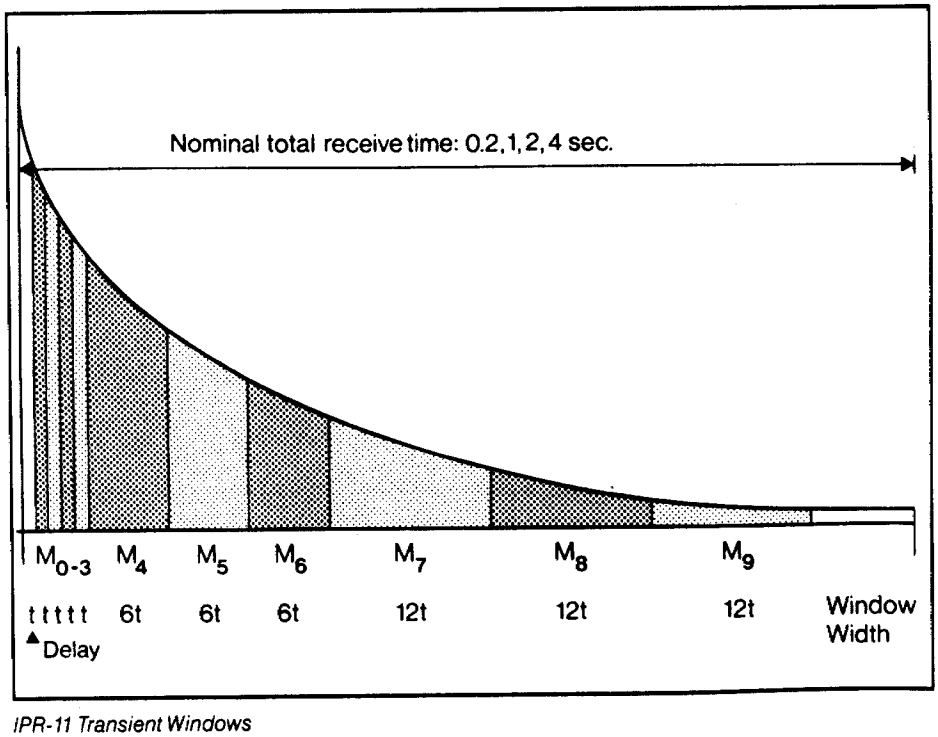


Time domain IP transmitted waveform

Vp Integration. The primary voltage can be sampled over 50 percent or more of the current on (T) time, depending on the transmit and receive programs selected. The integrated results is normalized for time. Long Vp integration helps overcome random noise.

Digital Display. Two, four digit LCD displays are used to display measured or manually entered data, data codes and alarm codes.

Automatic Profile Plotting. When connected to a digital printer with an industry standard RS-232C, 7 bit ASCII serial data port, data can be plotted in a base camp. The IPR-11 is programmed to plot any selected transient window and resistivity



IPR-11 Transient Windows

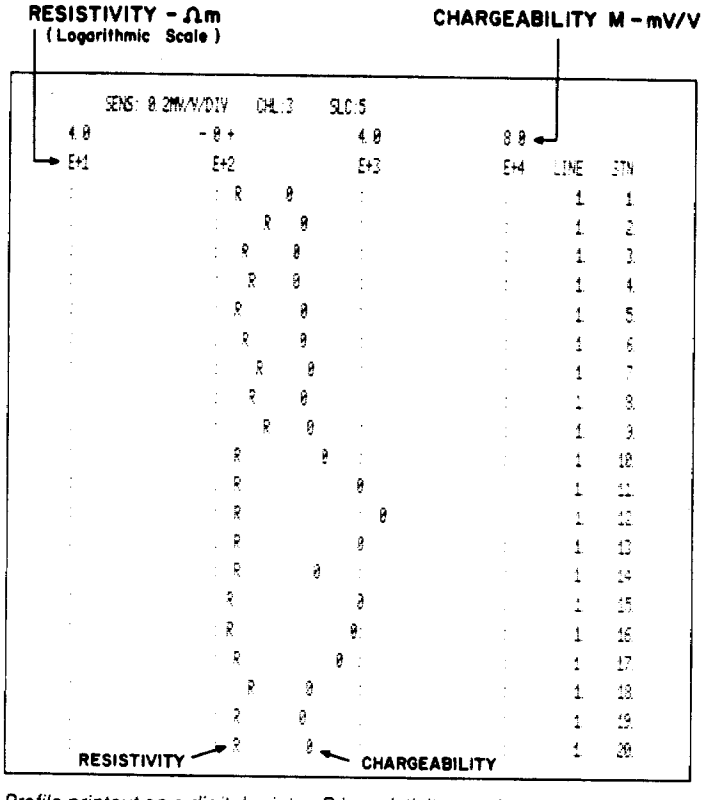
Features

in pseudo-section or profile form. In the profile plot, the scale of resistivity is logarithmic with 10 to 100,000 ohm-metres in four decades with another four decades of overrange both above and below. The chargeability scale is keypad selectable. In the pseudo-section plot, any one chargeability window can be presented in conventional pseudo-section form.

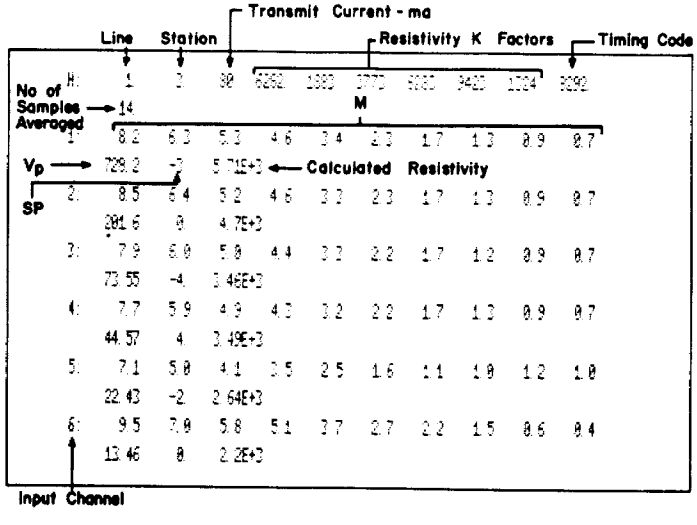
Printed Data Listing. The same digital printer can be used to print out listings of all headers and data recorded during the day's operation. Several copies can be made for mailing to head office or for filing in case copies are lost. Baud rate is keypad selectable at 110, 300 or 1200 baud, depending on the printer used.

Store Data. Data may be output from the IPR-11 and stored in computer compatible form in a microcomputer, on an independent floppy disk drive or on cassette tape, provided that these devices have the commonly available RS-232C, 7 bit ASCII serial interface.

Modem. Data in the IPR-11 memory can be output directly into a modem near the field operation and transmitted by telephone through a modem terminal in head office, where data can be output directly onto a computer, digital printer or digital storage device. In this way a geophysicist in head office can receive regular transmissions of data to improve supervision



Profile printout on a digital printer. R is resistivity on a logarithmic scale while Ø is one transient window (M_5) on a linear scale.



Data listing output on a dot-matrix printer. Header information is shown in the first two lines. In this case, data are for Line 1, Station 3. Transmitted current is 80mA. Next are the resistivity K-factors for the six dipoles. 8292 indicates that receive and transmit times are each 2 seconds. The last header item records that fact that 14 cycles were stacked. Following the header are the geophysical data for six dipoles which were measured simultaneously. For each dipole, the values for the 10 transient windows are shown on one line. The next line shows Vp and Sp in mV and resistivity. 5.71 E + 3 indicates that the calculated resistivity is 5.71 x 10^3 ohm-metres.

Features

and interpretation of the data from field projects and no output device other than the modem is required in the field.

External Circuit Check. Six analog meters on the IPR-11 are used to check the contact resistance of individual potential dipoles. Poor contact at any one electrode is immediately apparent. The continuity test uses an AC signal to avoid electrode polarization.

Self Check Program. Each time the instrument is turned on, a check sum verification of the program memory is automatically done. This verifies program integrity and if any discrepancy is discovered, an error code appears on the digital display. Part of the self check program checks the LCD display by displaying eight ones followed sequentially by eight twos, eight fours and eight eights.

Manipulation Error Checks. Alarm codes appear on the digital display if any of the following ten errors occur: tape dump errors, illegal keypad entry, out of calibration or failed memory test, insufficient headers, header buffer full, previous station's data not filed, data memory full, incorrect signal amplitude or excessive noise, transmit pulse time incorrect, and receiver measurement timing incorrect.

Internal Calibrator. By adjustment of the function switch, an internal signal generator is connected across the inputs to test the calibration of all six signal inputs for SP, Vp and all M windows simultaneously. If there is an error in one or more parameters, an alarm code appears on the display. The operator can then scan all parameters of all input channels to determine where the error is.

Automatic SP Correction. The initial self potential buckout is entirely automatic - no adjustment need be made by the operator. Then, throughout the measurement, the IPR-11 slope correction software makes continual corrections, assuming linear SP drift during two transmitted cycles. There is no residual SP offset included in the chargeability measurement as in some previous time domain receivers.

Automatic Vp Self Ranging. There is no manual adjustment for Vp since the IPR-11 automatically adjusts the gain of its input amplifiers for any Vp signal in the range 100 microvolts to 6 volts.

Spheric Noise Rejection. A threshold, adjustable by keypad entry over a linear range of 0 to 99, is used to reject spheric pulses. If a spheric noise pulse above the set threshold occurs, then the IPR-11 rejects and does not average the current two cycles of information. An alarm code appears on the digital display. If the operator continues to see this alarm code, he can decide to set the threshold higher.

Powerline and Low Pass Filter. An internal switch is used to set the IPR-11 for either 50 or 60 Hz powerline areas. The notch filter is automatically switched out when the 0.2 second receive time is used since the filters would exclude EM signals.

RF Filter. An additional filter in the input circuits ensures that radio-frequency interference is eliminated from the IPR-11 measurement.

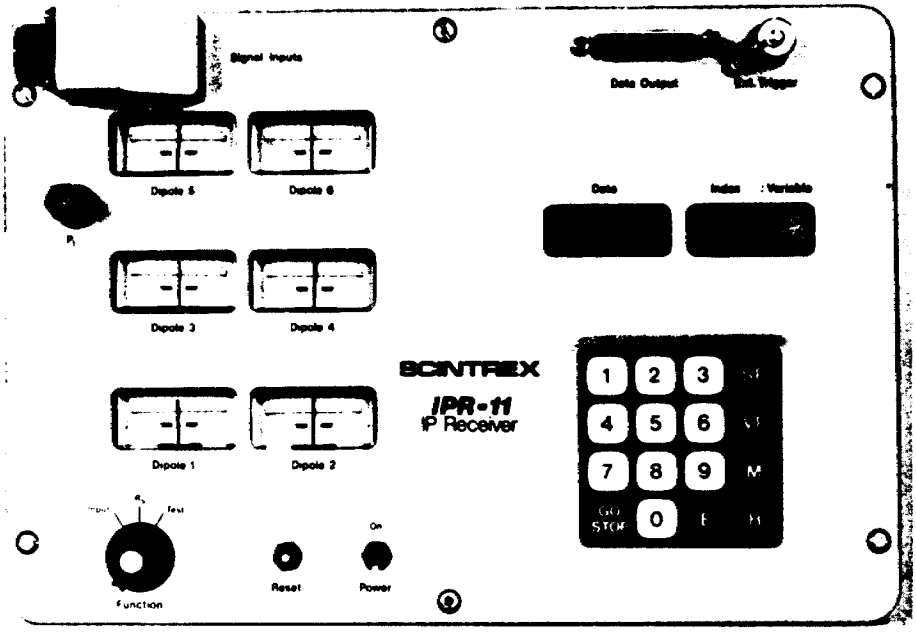
Input Protection. If signals in excess of 6V and up to 50V are applied to any input circuit, zener diode protection ensures that no damage will occur to the input circuits.

Synchronization. In normal operation, the IPR-11 synchronizes itself on the received waveform, limiting triggering to within 2.5% of the current on time. However, for operation in locations where signal/noise ratios are poor, synchronization can be done by using the Optional Crystal Clock which can be installed in the lid of the IPR-11.

Software for EM Coupling Removal. In transient measurements, the EM coupling component occurs closest to the current off time (i.e. it is primarily in the early windows). Thus, it is usually possible to obtain coupling-free IP data simply by using the later windows of the IPR-11 measurement program. If, however, full spectral information is desired, the data from the early windows must be corrected for the EM component. This can be done with confidence using a computer and the Scintrex SOFT II programs.

Software for Spectral IP Parameters. Using the chargeability data from the ten quasilogarithmically spaced IPR-11 windows, a computer and the Scintrex SOFT II programs, spectral IP parameters can be calculated. The basis for this calculation as well as for the EM coupling removal calculation is discussed in a technical paper by H.O.Seigel, R.Ehrat and I.Brcic, given at the 1980 Society of Exploration Geophysicists Convention, entitled "Microprocessor Based Advances in Time Domain IP Data Collection and In-Field Processing".

Operation



In relation to the efficiency with which it can produce, memorize, calculate and plot data, the IPR-11 is quite simple to operate, using the following switches and keypad manipulations.

Power On-Off. Turns the instrument on or off.

Reset. Resets the program to begin again in very poor signal/noise conditions.

Function Switch. Connects either the potential dipoles or the internal test generator to the input amplifiers or connects the external circuit resistance check circuitry to the potential dipoles.

Keypad. The ten digit and six function keys are used to: 1) operate the instrument, 2) enter information, 3) retrieve any stored data item for visual display, and 4) output data on to a computer, digital printer, digital storage device or modem. Examples of some of these manipulations, most of which are accomplished by three key strikes, follow. E is the general entry key.

A concise card showing the keypad entry codes is attached inside the lid of the IPR-11.

Example 1. Keying 99E commands the battery test. The result is shown on the digital display.

Example 2. Keying 90E tells the IPR-11 to use the 0.2 second receive time. 91, 92 and 94 correspond to the three other times.

Example 3. Keying 12M results in the display of the chargeability of the first dipole, window number 2. Similarly, 6SP or 4Vp would result in the display of the SP value of the sixth dipole or Vp of the fourth dipole respectively.

Example 4. Keying NNNNH, where N is any variable digit, records an item of header information. Seventeen such items can be entered with each file of up to six dipoles of data.

Example 5. 73E, 74E or 75E are used to output the data from the memory to the computer, digital printer or modem at 110, 300 or 1200 baud respectively.

IPR-11 Options

The following options are available for purchase with the IPR-11:

Multidipole Potential Cables. These cables are custom manufactured for each client, depending on electrode array and spacings which are to be used. They are manufactured in sections, with each section a dipole in length and terminated with connectors. For each observation, the operator need only walk one dipole length and connect a new section, in order to read a new six dipole spread. There is no need to move the whole spread. The connectors which join the cables are designed so that there is no possibility of connecting the wrong dipole to the wrong input amplifier. The outside jacket of these cables is flexible at low temperatures. About 5 percent extra length is added to each section to ensure that the cable reaches each station.

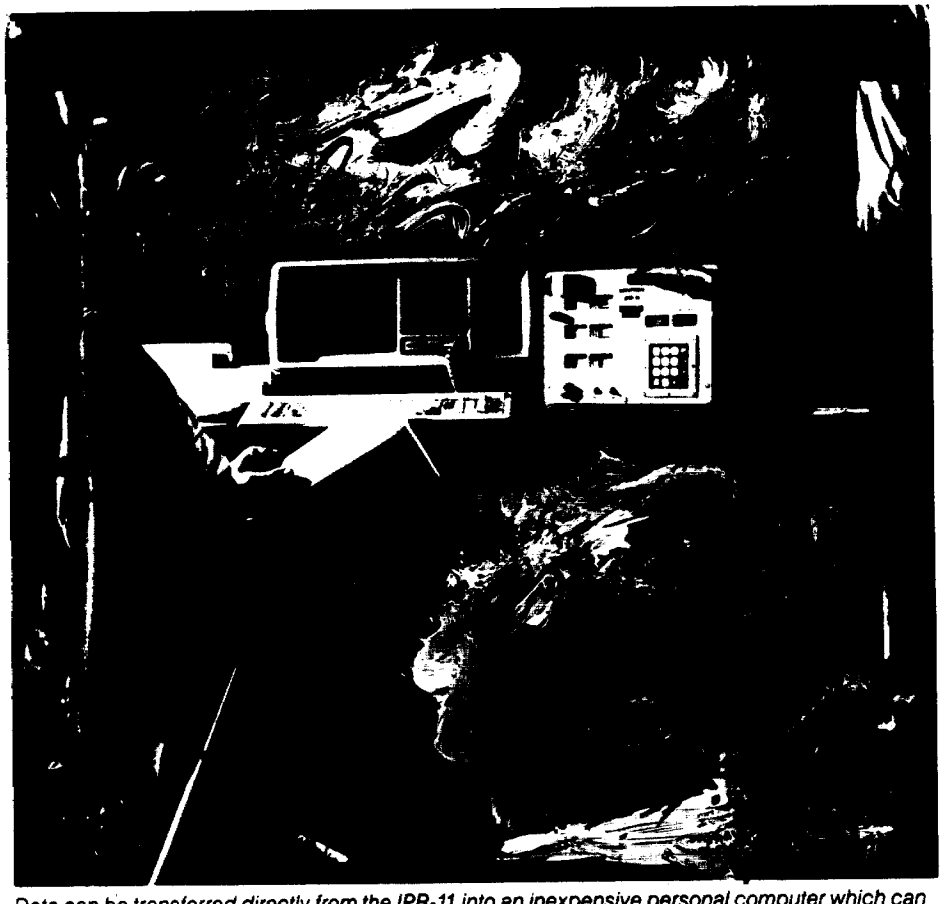
Field Wire Adaptor Kit. Depending on the survey method used, it may be preferable to connect the potential electrodes to the IPR-11 using standard single conductor wire rather than the Multidipole Potential Cables. When using the Field Wire Adaptor Kit each wire can be terminated on an individual binding post on a multi-pin receptacle. In this way, a set of electrodes are connected to the IPR-11 which can either lead or lag the current electrodes while advancing along a survey line.

Data Memory Expansion Blocks. The standard data memory of the IPR-11 allows for data for up to 200 dipole measurements to be recorded, assuming a common header for six dipoles. Up to three additional memory blocks can be installed in the instrument, each of about 200 dipole capacity.

Crystal Clock. Scintrex can provide a high stability clock to synchronize the IPR-11 with a similar clock in the TSQ series of transmitters. This option is, however, only required for work in extremely noisy and/or low signal environments.

Software. Scintrex offers its SOFT II software package for EM coupling removal, calculation of EM induction factors and calculation of the same spectral IP parameters as are in common use in frequency domain IP measurements.

Peripheral Devices. A number of printers, digital storage devices and modem units are available on the market which are compatible with the IPR-11. Scintrex stocks several of these peripheral devices which we would be pleased to supply and/or recommend other suitable equipment for your particular application.



Data can be transferred directly from the IPR-11 into an inexpensive personal computer which can use the SOFT II Programs to calculate spectral IP parameters, carry out other calculations, display data graphically on a video display and plot data.

IPR-11 SOFT II Time Domain Induced Polarization Data Processing and Spectral Analysis Software Package

The IPR-11 SOFT II Software Package comprises a cost effective series of programs designed to help you benefit from the fully automatic treatment of IP data collected by the IPR-11 Receiver. The following features describe what you can do with the SOFT II package running on an IBM PC or compatible computer.

Enter data many ways. The easiest way to use the SOFT II package is to enter data directly from the IPR-11 to the computer. This can be done in the field, resulting in data stored on floppy disks. Subsequent data processing may be done to ensure that data quality is high and to provide the possibility to immediate checking of anomalous conditions. Data can also be entered manually from data listings.

Data can be edited. Errors in header information such as line number, station number, resistivity constants and timing codes can be corrected. Data may be re-ordered for plotting. Dummy stations may be inserted if required.

Store data on floppy disks. Once in the computer, data is stored on a floppy disk. This increases the efficiency of data processing and management as well as transportation and long term storage. No longer will you have to sort through bulky paper records or scan through long tape recordings to access the data you need. A copy of a disk can easily be made to eliminate the possibility of loosing data in transportation.

Printouts can be formatted. Considerable time and effort are saved with the automatic tabulating and plotting programs. When compared with the plots directly output to the printer from the IPR-11, the SOFT II computer generated printouts and plots are more readable and of a quality more suitable for final reports.

Plot observed decay curves. IPR-11 decay curves can be plotted to provide a rapid means of ensuring data quality.

Compute spectral IP parameters. The SPCTRM program of the SOFT II package calculates the Cole-Cole spectral parameters. These parameters may be used to give information about the concentration and grain size of the IP responsive metallic mineralization in the subsurface. This may allow differentiation of sources of similar amplitude of IP response but which have different mineral textures. The standard example of such differentiation would be between sulphide mineralization and graphitic horizons.

Remove EM coupling. Depending upon the electrode array, electrode spacing, resistivity, and IP measuring time (or frequency), IP data may contain a component which is electromagnetically induced. The SPCTRM program may be used to calculate the residual EM effect and output a listing of parameters describing the EM contribution.

Plot and contour pseudo-sections. Like any dedicated software controlled device, the intelligence of the IPR-11 is limited. While it can adequately plot data listings and profiles directly on a simple printer, the pseudo-section printer plots can sometimes be erroneous. This occurs when an electrode array other than dipole-dipole has been used, since the IPR-11 can only plot this one array in pseudo-sections. Also, if more than one receive time or transmitted pulse time have been recorded for given station, the IPR-11 cannot sort the data.

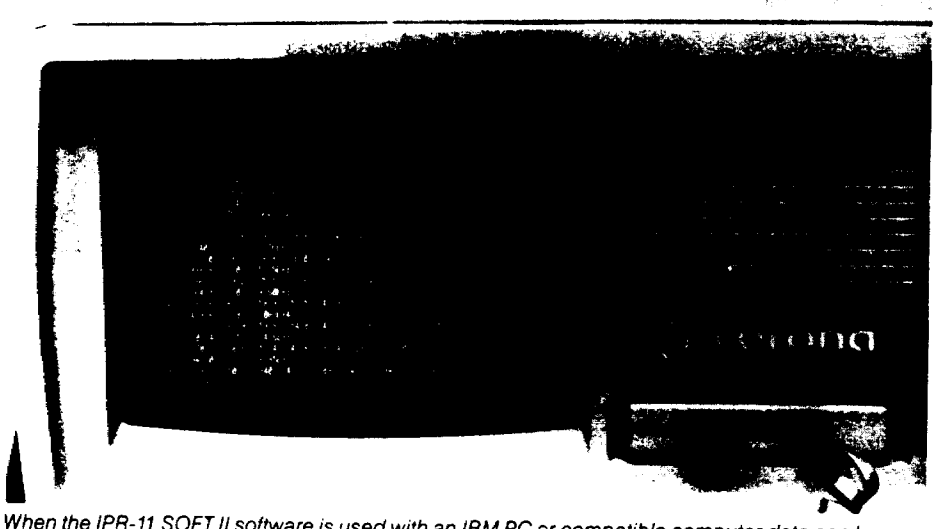
These inconveniences are removed when the SOFT II package is used with a microcomputer, since the software includes programs to sort, reformat and correctly plot pseudo-sections.

Two different programs in SOFT II can be used to plot pseudo-sections. PSEUDO posts that data at the correct plotting point for a dipole-dipole array so it may be hand contoured. CONTOUR draws contoured pseudo-sections for dipole-dipole or pole-dipole arrays on a dot-matrix printer or a pen plotter.

Runs on commonly available hardware. The SOFT II programs have been designed to run on microcomputer hardware which is readily available in many countries. The recommended system is as follows: 1) IBM PC or XT with 512K bytes of RAM, 2) 8087 math co-processor, 3) Two 5-1/4" flexible disk drives, 4) monochrome monitor, 5) parallel interface (for printer) 6) one or more serial interfaces, (2 suggested if a pen plotter is used), and 7) Epson FX-85 dot-matrix printer.

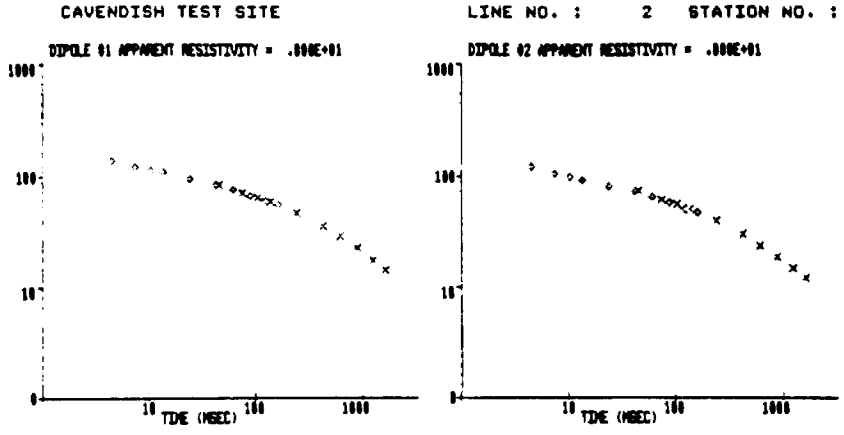
Other IBM compatible microcomputers using the PC/MS-DOS Version 2.1 or 3.0 Operating System may be used. Scintrex will be pleased to advise in this regard.

Complete with manual and diskettes. The SOFT II package consists of three program diskettes and a user's guide. The manual provides clear step-by-step instructions for running the package, as well as sample outputs and information on the microcomputer hardware and operating system.

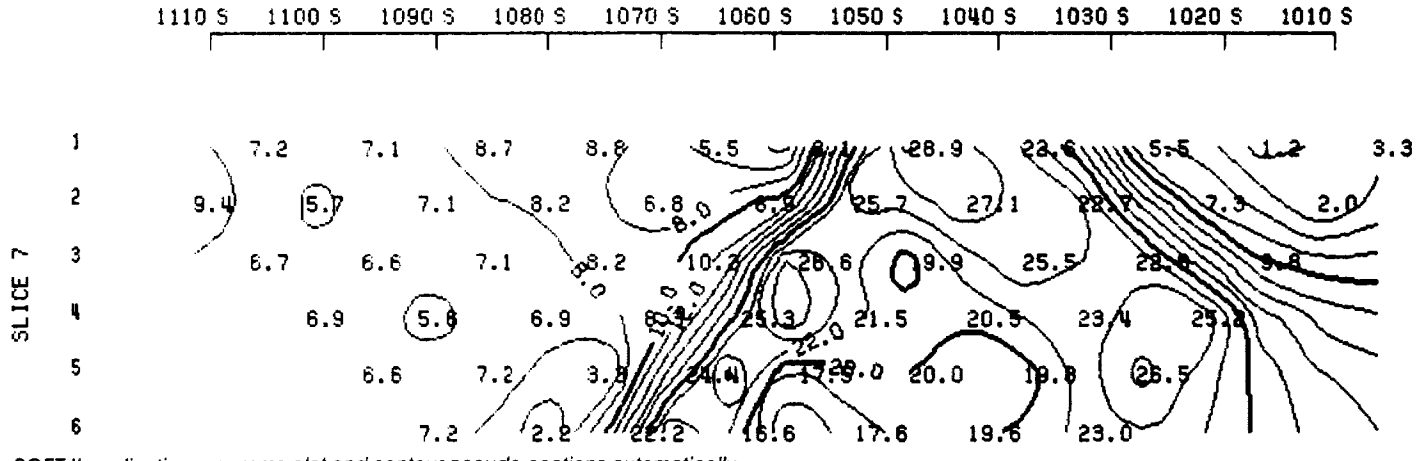


When the IPR-11 SOFT II software is used with an IBM PC or compatible computer data can be reviewed, edited, processed and archived.

IPR-11 SOFT II Time Domain Induced Polarization Data Processing and Spectral Analysis Software Package



The IPR-11 SOFT II allows plotting of chargeability decay curves for any given dipole in log-log space. This provides an excellent means of data quality control and visual determinations of the character of curve shapes to be made.



SOFT II application programs plot and contour pseudo-sections automatically.

LINE NO. : 351

Station	Dipole	Vp	Apparent Resist.	M7	Cole-Cole Parameters M-IP	TAU-IP	C-IP	M-EM	TAU-EM	Fit/IP	Fit/EM
1458	1	5205.0	4457.0	11.6	391.53	.30	.10	2.88	.100	.70	4.54
	2	1028.0	3520.0	24.1	382.30	10.00	.20	2.04	.100	.48	1.41
	3	406.8	3483.0	20.9	343.01	10.00	.20	3.35	.100	.41	3.46
	4	139.1	2370.0	24.8	394.57	10.00	.20	4.07	.100	.69	3.44
1459	1	6114.0	3893.9	11.8	404.96	.10	.10	2.56	.100	.69	4.59
	2	1369.0	3440.0	24.2	385.27	10.00	.20	2.97	.100	.42	2.01
	3	501.9	3151.0	23.8	379.63	10.00	.20	5.82	.030	.71	2.51
	4	189.2	2370.0	24.2	387.90	10.00	.20	7.75	.030	.96	3.33

Spectral analysis summary generated by the SPCTRM program of the SOFT II applications package and output on a digital printer. Header information is shown at the top of the printout. In this case, data are for Line 351 and Stations 1458 and 1459. Dipoles 1 thru 4 are listed for each station. At Station 1458, Dipole 1 has the following values: Vp is 5205.0 mV, Apparent Resistivity is 4457.0 ohm-metres and M7 is a chargeability slice of 11.6 mV/V taken approximately half way through the measured decay. Next are the Cole-Cole parameters, M-IP is 391.53 mV/V and TAU-IP is 0.30 seconds, C-IP is 0.10, M-EM is 2.88 mV/V and TAU-EM is 0.100 seconds. The Fit/IP and Fit/EM values describe the root mean square deviations between fitted curves and measured values.

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Input Potential Dipoles	1 to 6 simultaneously.
Input Impedance	4 megohms.
Input Voltage (Vp) Range	100 microvolts to 6 volts for measurement. Zener diode protection up to 50V.
Automatic SP Bucking Range	± 1.5 V.
Chargeability (M) Range	0 to 300 mV/V (mils or 0/00)
Absolute Accuracy of Vp, SP and M	Vp; ± 3% of reading for Vp > 100 microvolts. SP; ± 3% of SP bucking range. M; ± 3% of reading or minimum ± 0.5m V/V.
IP Transient Program	Ten transient windows per input dipole. After a delay from current off of t, first four windows each have a width of t, next three windows each have a width of 6t and last three windows each have a width of 12t. The total measuring time is therefore 58t. t can be set at 3, 15, 30 or 60 milliseconds for nominal total receive times of 0.2, 1, 2 and 4 seconds.
VP Integration Time	In 0.2 and 1second receive time modes; 0.51sec. In 2 second mode; 1.02sec. In 4 second mode; 2.04 sec.
Transmitter Timing	Equal on and off times with polarity change each half cycle. On/off times of 1, 2, 4 or 8 seconds with ± 2.5% accuracy are required.
Header Capacity	Up to 17 four digit headers can be stored with each observation.
Data Memory Capacity	Depends on how many dipoles are recorded with each header. If four header items are used with 6 dipoles of SP, Vp and 10 M windows each, then about 200 dipole measurements can be stored. Up to three Optional Data Memory Expansion Blocks are available, each with a capacity of about 200 dipoles.
External Circuit Check	Checks up to six dipoles simultaneously using a 31Hz square wave and readout on front panel meters, in range of 0 to 200k ohms.
Filtering	RF filter, spheric spike removal; switchable 50 or 60Hz notch filters, low pass filters which are automatically removed from the circuit in the 0.2 sec receive time.
Internal Calibrator	1000 mV of SP, 200 mV of Vp and 2.43 mV/V of M provided in 2 sec pulses.

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Digital Display	Two, 4 digit LCD displays. One presents data, either measured or manually entered by the operator. The second display: 1) indicates codes identifying the data shown on the first display, and 2) shows alarm codes indicating errors.
Analog Meters	Six meters for: 1) checking external circuit resistance, and 2) monitoring input signals.
Digital Data Output	RS-232C compatible, 7 bit ASCII, no parity, serial data output for communication with a computer, digital printer, digital storage device or modem.
Standard Rechargeable Power Supply	Eight rechargeable NiCad D cells provide approximately 15 hours of continuous operation at 25°C. Supplied with a battery charger, suitable for 110/230V, 50 to 400 Hz, 10W.
Disposable Battery Power Supply	At 25°C, about 40 hours of continuous operation are obtained from 8 Eveready E95 or equivalent alkaline D cells. At 25°C, about 16 hours of continuous operation are obtained from 8 Eveready 1150 or equivalent carbon-zinc D cells.
Dimensions	345 mm x 250 mm x 300 mm, including lid.
Weight	10.5 kg, including batteries.
Operating Temperature Range	-20 to +55°C, limited by display.
Storage Temperature Range	-40 to +60°C.
Standard Items	Console with lid and set of rechargeable batteries, RS-232C cable and adapter, 2 copies of manual, battery charger.
Optional Items	Multidipole Potential Cables, Data Memory Expansion Blocks, Crystal Clock, SOFT II Programs, Printer, Cassette Tape Recorder, Disk Drive or Modem.
Shipping Weight	25 kg includes reusable wooden shipping case.

At Scintrex we are continually working to improve our line of products and beneficial innovations may result in changes to our specifications without prior notice.

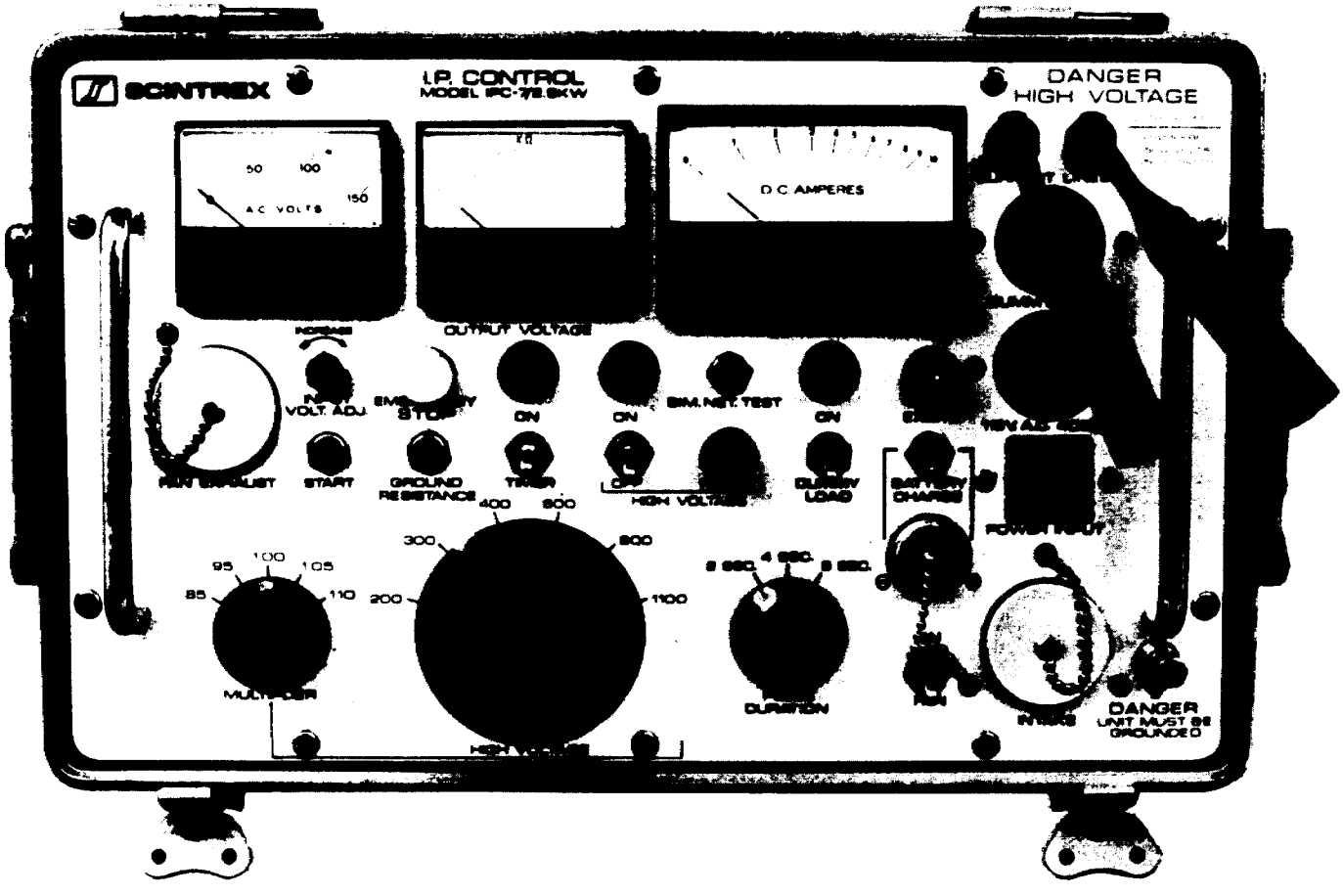
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Geophysical and Geochemical
Instrumentation and Services

SCINTREX IPC-7/2.5kW Induced Polarization and Commutated DC Resistivity Transmitter System



Function

The IPC-7/2.5 kW is a medium power transmitter system designed for time domain induced polarization or commutated DC resistivity work. It is the standard power transmitting system used on most surveys under a wide variety of geophysical, topographical and climatic conditions.

The system consists of three modules: A Transmitter Console containing a transformer and electronics, a Motor Generator and a Dummy Load mounted in the Transmitter Console cover. The purpose of the Dummy Load is to accept the Motor Generator output during those parts of the cycle when current is not transmitted into the ground, in order to improve power output and prolong engine life.

The favourable power-weight ratio and compact design of this system make it portable and highly versatile for use with a wide variety of electrode arrays.

Features

Maximum motor generator output, 2.5 kW; maximum power output, 1.85 kW; maximum current output, 10 amperes; maximum voltage output, 1210 volts DC.

Removable circuit boards for ease in servicing.

Automatic on-off and polarity cycling with selectable cycling rates so that the optimum pulse time (frequency) can be selected for each survey.

The overload protection circuit protects the instrument from damage in case of an overload or short in the current dipole circuit.

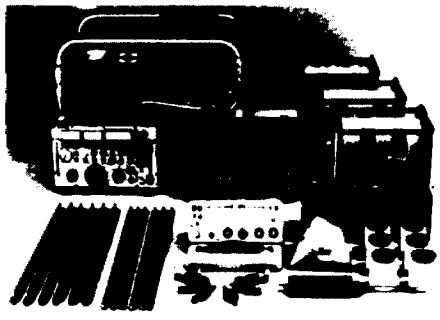
The open loop circuit protects workers by automatically cutting off the high voltage in case of a break in the current dipole circuit.

Both the primary and secondary of the transformer are switch selectable for power matching to the ground load. This ensures maximum power efficiency.

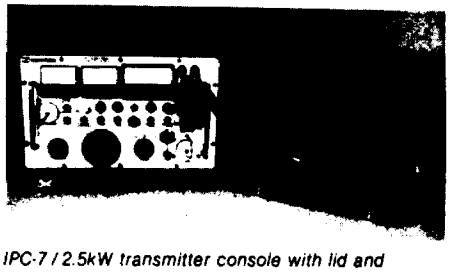
The built-in ohmmeter is used for checking the external circuit resistance to ensure that the current dipole circuit is grounded properly before the high voltage is turned on. This is a safety feature and also allows the operator to select the proper output voltage required to give an adequate current for a proper signal at the receiver.

The programmer is crystal controlled for the very high stability required for broadband (spectral) induced polarization measurements using the Scintrex IPR-11 Broadband Time Domain Receiver.

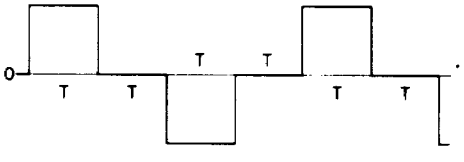
Technical Description of IPC-7/2.5 kW Transmitter System



Complete 2.5kW induced polarization system including motor-generator, reels with wire, tool kit, porous pots, simulator circuit, copper sulphate. IPR-8 receiver, dummy load, transmitter, electrodes and clips.



IPC-7 / 2.5kW transmitter console with lid and dummy load.



Time Domain Waveform

Transmitter Console	
Maximum Output Power	1.85 kW maximum, defined as VI when current is on, into a resistive load
Output Current	10 amperes maximum
Output Voltage	Switch selectable up to 1210 volts DC
Automatic Cycle Timing	T:T:T:T; on:off:on:off
Automatic Polarity Change	Each 2T
Pulse Durations	Standard: T = 2,4 or 8 seconds, switch selectable Optional: T = 1,2,4 or 8 seconds, switch selectable Optional: T = 8,16,32 or 64 seconds, switch selectable
Voltage Meter	1500 volts full scale logarithmic
Current Meter	Standard: 10.0 A full scale logarithmic Optional: 0.3, 1.0, 3.0 or 10.0 A full scale linear, switch selectable
Period Time Stability	Crystal controlled to better than .01%
Operating Temperature Range	-30°C to +55°C
Overload Protection	Automatic shut-off at output current above 10.0 A
Open Loop Protection	Automatic shut-off at current below 100 mA
Undervoltage Protection	Automatic shut-off at output voltage less than 95 V
Dimensions	280 mm x 460 mm x 310 mm
Weight	30 kg
Shipping Weight	41 kg includes reusable wooden crate
Motor Generator	
Maximum Output Power	2.5 kVA, single phase
Output Voltage	110 V AC
Output Frequency	400 Hz
Motor	4 stroke, 8 HP Briggs & Stratton
Weight	59 kg
Shipping Weight	90 kg includes reusable wooden crate

SCINTREX

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Telex: 06-964570

Geophysical and Geochemical
Instrumentation and Services

STRATAGEX

APPENDIX B

IP Pseudosections

Line	a=12.5m	a=25m	a=50m
7350E	PS-1	PS-1a	
7400E	PS-2		
7500E	PS-3		
7600E	PS-4		
7700E	PS-5		
7800E	PS-6		
7900E	PS-7		PS-7a
8000E	PS-8		
8100E	PS-9		
8200E	PS-10		
8300E	PS-11	PS-11a	PS-11b
8360E	PS-12	PS-12a	
8400E	PS-13		
8500E	PS-14		
8600E	PS-15		
8700E	PS-16		
8800E	PS-17		PS-17a

Battle Mountain (Canada) Inc.

VOLUME 2

KIRKLAND LAKE PROJECT

REPORT ON GEOLOGICAL MAPPING

AMALGAMATED KIRKLAND PROPERTY

July - December, 1989

TECK TOWNSHIP, LARDER LAKE MINING DIVISION

ONTARIO, CANADA

Kirkland Lake, Ontario
September, 1990

W. Benham

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PL-001	Claim Map	1:31680
GL-001	Geology	1:2500
GL-002	Geology	1:2500
GL-003	Geology	1:2500
GL-004	Geology	1:2500
GL-005	Geology	1:2500
GL-006	Geology	1:2500
GL-010	Geology	1:5000
GA-001	Grab Sample Assays	1:2500
GA-002	Grab Sample Assays	1:2500
GA-003	Grab Sample Assays	1:2500
GA-004	Grab Sample Assays	1:2500
GA-005	Grab Sample Assays	1:2500
GA-006	Grab Sample Assays	1:2500
GA-010	Anomalous Grab Samples	1:5000

L 74 E
L 76 E
L 78 E
L 80 E
L 82 E
L 84 E
L 86 E
L 88 E
L 90 E
L 92 E
L 94 E

L 571358
HUNTON SHAFT
L 500057
L 447912
CO-GENERATION PLANT
L 447913
L 491662
L 491650
L 491182
L 491663
L 491651
L 491183
L 477419
L 495277
L 500059
L 500058
L 477299
L 477300

INDUSTRIAL PLAZA
CANADIAN KIRKLAND SHAFTS
BL. 100 N
CREEK
MURDOCK

90-01 (-45°)
90-02 (-45°)
90-03 (-45°)
90-04 (-45°)
90-05 (-45°)
90-06 (-45°)
90-07 (-45°)
90-08 (-45°)
90-09 (-45°)
90-10 (-45°)
90-11 (-45°)
90-12 (-45°)
90-13 (-45°)
90-14 (-45°)
90-15 (-45°)
90-16 (-45°)
90-17 (-45°)
90-18 (-45°)
90-19 (-45°)
90-20 (-45°)
90-21 (-45°)
90-22 (-45°)
90-23 (-55°)
90-24 (-55°)
90-25 (-55°)
90-26 (-55°)
90-27 (-45°)
90-28 (-45°)

LEGEND

111.1m — Length of hole
90-01 — Hole Nº
Dip of hole — (-45°)

SCALE

0 100 200
metres

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
AMALGAMATED KIRKLAND PROPERTY
1990
D.D.H. PLAN

Project No. 75-JV-28	Scale 1:5000
N.T.S. 42 A/1	Data by: W. Benham.
Drawing No. DP-001	Date: DEC. 1990

#63. 6025

OM90-122

THIS SUBMITTAL CONSISTED OF VARIOUS REPORTS. SOME OF WHICH HAVE BEEN CULLED FROM THIS FILE. THE CULLED MATERIAL HAD BEEN PREVIOUSLY SUBMITTED UNDER THE FOLLOWING RECORD SERIES (THE DOCUMENTS CAN BE VIEWED IN THESE SERIES):

2.13956 W.9108.00081 - OVERBURDEN STRIPPING, DETAILED MAPPING + CHANNEL SAMPLES

2.13957 W.9108.00082 DRILLING LOGS, SECTIONS AND ASSAY

TECK REPORT # 79 W9108.B DRILL LOGS FOR AK90-1 to 28

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2013



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Battle Mountain (Canada) Inc.

KIRKLAND LAKE PROJECT

REPORT ON GEOLOGICAL MAPPING

OVERBURDEN STRIPPING AND CHANNEL SAMPLING

TECK "A" PROPERTY

(July, 1989 - August, 1990)

TECK TOWNSHIP, LARDER LAKE MINING DIVISION

ONTARIO, CANADA

W. Benham

Kirkland Lake, Ontario
September, 1990

OMIP 90-122

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FIGURES

1 Kirkland Lake Project, Location Map

1.0 SUMMARY

Geological mapping, overburden stripping and channel sampling was carried out on the Teck "A" property located in Teck Township, northeastern Ontario by Battle Mountain (Canada) Inc. (BMCI). This program was part of BMCI's Kirkland Lake project covering six properties in the area. All of the properties are presently held by BMCI under an option agreement with Queenston Mining Inc. dated June 15, 1989.

The property is underlain by the southern part of the Murdock Creek Stock and mafic to ultramafic volcanics of the Larder Lake Group. A 600 metre wide fault zone, named the Teck "A" Fault Zone, strikes 070° along the southern margin of the syenite stock. Quartz veining and altered pyritic syenites with anomalous gold contents are found associated with this fault zone which is sub-parallel to the Larder Lake Fault Zone.

The only significant mineralization was found at the "DK" showing which was discovered during a soil geochemical survey by HSK in 1988. The showing consists of up to 10% coarse euhedral pyrite in a carbonated, silicified syenite pod five metres long and four metres wide. Channel samples taken over the showing returned up to 6.44 g/t Au over 3.12 metres. Overburden stripping along strike did not locate any auriferous syenites similar to the "DK" showing.

Strongly jointed, altered syenite which was exposed in the 1032E stripped area, averages 276 ppb Au over an estimated true width of three metres. This carbonate zone is located along the western edge of a 120 metre long broad IP anomaly and parallels a northwesterly trending magnetic low.

The economic potential of the "DK" showing is limited by its short strike length at surface; however, diamond drilling is warranted to determine if the dimensions of this intriguing gold occurrence improves with depth. The gold geochemical anomaly located along the 1032E stripped area also warrants a drill hole to test it, as well as the associated IP and magnetic anomalies.

2.0 INTRODUCTION

This report describes the results of geological mapping, overburden stripping and channel sampling carried out by Battle Mountain (Canada) Inc. (BMCI) on the northern part of the Teck "A" property during the periods of July to November, 1989 and June to August, 1990. Mapping, which utilised the 1988 HSK Minerals Ltd. (HSK) imperial grid, was limited to the Murdock Creek Stock and a 600 metre wide deformation zone, named the Teck "A" Fault Zone, striking 060° to 075°, along the southern margin of the stock. Most of the overburden stripping and channel sampling was concentrated on claim 626766 around the "DK" gold showing which was discovered during a soil geochemical survey by HSK in 1988.

During 1990, the HSK grid was extended 1000 feet to the south and 2,200 feet to the west over the two newly acquired claims 6817 and 1111433 which connect the Teck "A" and "B" properties. A magnetic survey was completed on the new grid lines and the data was merged with the 1989 HSK magnetic survey. A VLF-EM survey was completed over claim 1111433. Results of the geophysical surveys are described in a separate report by J. Roth of Stratagex, 1990, (Roth, 1990).

2.1 Property, Location and Access

The Teck "A" property consists of 29 mining claims optioned by Queenston Mining Inc. (formerly HSK Minerals Ltd.) from J. Kidston and M. Dyment. The property is currently held by Battle Mountain (Canada) Inc. as part of an option agreement with Queenston Mining Inc. dated June 15, 1989.

An application to lease was submitted for three claims on December 22, 1988. Ten claims are presently being surveyed in order to apply for a lease before March 13, 1991. The remaining claims are in good standing with 200 days credit.

The property is located near the southeastern corner of Teck Township in the Larder Lake Mining Division about 5 km south of the town of Kirkland Lake NTS42A/1; UTM 571000E/532900N; (Figure 1 and Drawing PL-001).

Access is provided by Highway 112 which crosses the southwestern corner of the property at Murdock Creek and the Teck Township/Otto Township common boundary. An old winter wagon road from the highway leads to the southwest corner of claim 626766 and then along the southern margin of the Murdock Creek Stock. The northeastern part of the property is accessible by the Lakeshore slimes basin road.

2.2 Topography

The topography consists of low rounded knolls and steep-sided ridges up to 30 metres high. Two broad, open, grassy swamps, one trending 070° along the southern margin of the Murdock Creek Stock to the Lakeshore slimes pond; and the other at 010° along the western boundary of claim 545728, divides the property into four segments.

Most of the property is covered by second growth poplar bush with local small stands of birch, spruce, balsam and pine.

3.0 PREVIOUS WORK

There is no record of work carried out on the property prior to 1977 when the initial claims of the Teck "A" group were staked. Numerous historic trenches are found along the southern margin of the Murdock Creek Stock and on carbonate zones in the Larder Lake Group volcanics as shown on the published geology map of Teck Township (Thomson, 1950).

The following is a list of work carried out on the Teck "A" property since 1977:

1) Prospecting, VLF-EM and magnetic surveys and hand stripping by M. Dyment, J. Kidston, 1977-1981;

2) Mapping, magnetic and HEM surveys, rock geochemical survey and drilling (5 holes, 594 metres) by Labrador Exploration Ltd., 1982;

3) Prospecting, Induced Polarization survey and drilling (4 holes, 653.52 metres) by Rio Algom Exploration Inc., 1985;

4) Mapping, soil geochemical, magnetic, VLF-EM and Induced Polarization surveys by HSK Minerals Ltd., 1988.

The 1988 soil geochemical survey resulted in the discovery of the "DK" gold showing. Grab samples of strongly carbonatized and silicified mafic syenite with 3 to 10% euhedral, coarse-grained pyrite returned assays up to 13.66 g/t Au. The showing is flanked to the south by IP chargeability and magnetic anomalies.

The best previous drill intersection of 407 ppb Au over 3.4 metres obtained in Rio Algom hole 5 is located 500 feet to the east of the "DK" showing.

4.0 OVERBURDEN STRIPPING PROGRAMS

In 1989, six areas were stripped of overburden, washed, mapped and sampled. Most of this stripping was on claim 626766 around the "DK" showing and to the east of it in an attempt to trace this mineralization along strike.

Additional overburden stripping was completed in 1990 on claim 626766 to further explore for the strike extensions of the "DK" showing; to follow up anomalous gold assays at the north end of the 1032E stripped area; and to investigate a magnetic low anomaly along line 600E. The locations of the stripped areas are shown on Drawing PL-003.

5.0 GEOLOGY

5.1 Regional Geology

The Kirkland Lake area is situated in the central part of the Archean, Abitibi Greenstone Belt, on the south limb of a major east-west trending, east plunging synclinorium which is located approximately at the mid point between the Round Lake and Abitibi Batholiths Lake. The northern and southern limbs of this synclinorium are wide E-W trending deformation zones known as the Porcupine-Destor and Cadillac-Larder Lake Fault Zones, respectively. The Cadillac-Larder Lake deformation zone can be traced from Val d'Or, Quebec to the Matachewan area in Ontario.

On the southern limb of the synclinorium, to the south of Kirkland Lake, the Larder Lake Group consists of komatiitic and tholeiitic volcanics with thin interflow graywacke, argillite and iron formation sediments and intruded by dykes and stocks of pyroxenite, gabbro and syenite.

The Kerr Addison mine which is located 18 km to the east of Kirkland Lake, has produced over ten million ounces of gold. The orebodies are hosted by altered volcanics and sediments of the Larder Lake Group in structures associated with the Larder Lake Fault Zone.

The Teck "A" property is located 1.5 km south of the Larder Lake Fault Zone and it is underlain by Larder Lake Group rocks.

5.2 Property Geology

Geological mapping of the Teck "A" property during the 1989 and 1990 summer field season's was limited to the northern part of the claim group. The mapping utilised the 1988 HSK lines at 200 foot spacings. This grid was extended in 1990, and mapped 1000 feet to the south along lines at 400 foot spacings and 2200 feet to the west over the two newly acquired claims which connect the Teck "A" and "B" properties. Areas stripped of overburden on claim 626766 were mapped in detail.

The results of the grid mapping are presented on Drawings GL-007 to 009 at a scale of 1:2500, and Drawing GL-011 at a scale of 1:5000. Geology plans of the stripped areas are at a scale of 1:125 on Drawings TG-021-031. The location of the grid relative to the individual mining claims is shown on Drawing GL-011.

5.2.1 Lithology

The northern part of the Teck "A" property is underlain by the southern part of the Murdock Creek Stock as well as komatiitic and basaltic volcanics of the Larder Lake Group along the south side of the stock. The volcanics are intruded by syenite and pyroxenite dykes.

The komatiitic volcanics consist of polysutured and spinifex textured flows and talc-carbonate-chlorite schists. The basaltic volcanics were mapped as fine to coarse grained, massive to pillowed flows with finely laminated, interflow sediments. Locally the pillowed basalts are variolitic.

The Murdock Creek syenite has been subdivided into leuco-, meso- and mela-syenite facies. Contacts between the facies are very irregular and subjective. The more mafic syenites are found along the margin of the stock. Xenoliths, roof pendants or windows of amphibolite-bearing and spinifex-textured komatiites are observed within the Murdock Creek syenite.

Locally aphanitic, pink, fractured, strongly jointed phases of the syenite have a shear fabric which strikes 005° to 035° sub-parallel to the Lakeshore Fault set.

Narrow irregular, carbonated, pyritic syenite dykes off the Murdock Creek Stock intrude the volcanics.

Irregular pods and dykes of strongly magnetic micaceous, coarse grained pyroxenites are found within the deformation zone along the southern margin of the Murdock Creek stock and intruding the stock itself. Locally the pyroxenites are strongly sheared to friable masses of exfoliated mica.

5.2.2 Structure

The Larder Lake Group volcanics strike 045° to 065° and dip steeply to the south. Pillow facing directions indicate a south-facing volcanic sequence.

Numerous faults, shear zones and areas of closely spaced foliation fabrics were observed on the northern part of the Teck "A" property. These structures are divided into two sets at 015° (Lakeshore set) or 070° (Teck"A" Fault Zone set)

The Teck "A" Fault Zone strikes 060° to 075°, centred along the southern margin of the Murdock Creek Stock. The fault zone consists of discrete sharp faults and zones of chlorite-talc-carbonate schists which are well exposed in stripped areas from 300E to 1032E, north and south of the baseline. Observed and magnetically interpreted faults and shear zones are found up to 150 metres north of the baseline within the syenite stock and up to 450 metres to the south within the basaltic volcanics.

The Teck "A" Fault Zone is a regional structure sub-parallel to the Larder Lake Fault Zone. From the aeromagnetic data, this fault zone is interpreted to extend 5 km to the east where it cuts through the Lebel Stock and merges with the Larder Lake Fault. It is possible that 5 km to the west the alteration and shearing, which is located along the south shore of Vigrass Lake, is the westerly extension of the Teck "A" Fault Zone.

Murdock Creek, which passes through patented claim 6817, follows the Lakeshore fault at 015° to 025°. A sub-parallel structure is interpreted to pass through the swamps on claim 545128, 600 metres to the east of the Lakeshore Fault. To the north, on the Amalgamated Kirkland property, carbonated syenites are found along this structure. The Lakeshore fault offsets the Teck "A" Fault Zone an estimated 300 metres to the south on its west side, west of the claim group.

Areas of closely spaced foliation fabrics striking 005° to 040° were observed in the syenite stock and the basalts. These fabrics are related to splays off the above structures.

6.0 ALTERATION & MINERALIZATION

6.1 Alteration

Zones of intense chlorite-talc-carbonate alteration are developed along the Teck "A" Fault Zone within the mafic and ultramafic volcanics. Only minor quartz-carbonate veins were found in these chlorite schist zones, with the exception of *en-echelon* quartz veining in Trench 300E at 300S.

Narrow, irregular, pyritic syenite dykes and pods within the Teck "A" Fault Zone are silicified and carbonatized, such as at the "DK" showing. This alteration is of different intensity along various parts of the structure.

A 20 metre wide zone of strong carbonate alteration is located along lines 2000E and 2200E, 380 metres south of the baseline. Quartz-carbonate veins containing minor amounts of pyrite are exposed in several historic trenches.

Zones of aphanitic, pink, silicified, carbonated, strongly jointed syenite containing minor pyritic, quartz veins were found in the Murdock Creek syenite. One such zone was uncovered in the 1032E stripped area. Numerous pits and trenches are scattered through out the stock, especially along its southern margin.

Weak to moderate carbonate alteration is associated with a fault striking 075° in the syenite stock 150 metres north of the baseline.

6.2 Mineralization

Channel and/or grab samples were taken of altered rocks, quartz-carbonate veining and/or pyrite mineralization exposed by the overburden stripping and located during the mapping surveys. The assay results for the grab samples are presented on Drawings GA-007 to 009 while the channel assays from the stripped areas are shown on Drawings TA-021 to 029.

6.2.1 The "DK" Showing

The only significant mineralization was found at the original "DK" showing, where seven channel samples were cut at five foot intervals, with samples 36" long, or shorter, depending upon the lithology and intensity of mineralization. The original showing, consisting of up to 10% pyrite in a quartz plus sericite plus carbonate gangue, was seen to be limited to a strike length of about five metres and a maximum width of four metres, lying parallel to the local bedding as seen in the adjacent pillow-lavas and inter-flow sediments. The reasons for its limitations along strike are not obvious, but could include high-angle normal faults.

Samples from the four channel samples taken over the showing returned:

Channel 15W	0.40 g/t Au over 1.85 metres
Channel 10W	6.70 g/t Au over 3.12 metres
Channel 05W	4.39 g/t Au over 4.09 metres
Channel 00	1.81 g/t Au over 2.20 metres

During the 1990 overburden stripping program the magnetic high anomaly associated with the "DK" showing, was stripped 30 metres along strike to the east and to the west. A 10 m metric grid was established to control mapping and sampling. A one to two metre wide chloritic shear zone, located three metres south of this showing, was traced the entire length of the stripped area. From 22 m W to 33 m W, this shear contains 2-4% coarse euhedral pyrite. Channel samples of this pyritic mineralization assayed nil gold. The 1990 stripping did not locate any auriferous, altered syenites similar to the "DK" showing.

One sample in a locally sheared area 3.8 metres north of the "DK" sulphide body assayed 1.78 g/t Au over 1.07 metres but the other sheared areas and the inter-volcanic sediments (including cherty-tuffites) were not significantly anomalous. see Drawing TA-032

6.2.3 Other Mineralized Areas

Two channel samples, collected in a foliated area northwest of an old pit on line 500E returned 1.3 g/t Au over 0.91 metres and 1.68 g/t Au over 0.30 metres, but this area was otherwise only weakly anomalous.

A trench to investigate a magnetic low located 60 metres north of the baseline along line 6E exposed sheared komatiitic basalts in contact with basic syenite containing 1-2% disseminated euhedral pyrite. No anomalous assays were returned.

In 1989, channel samples at the north end of the 1032E stripped area averaged 280 ppb Au over a width of 3.34 metres. Sampling in 1990, extended the anomalous zone by 453 ppb Au over 0.90 metres to the north. This geochemically anomalous gold mineralization occurs in strongly jointed, carbonated syenite with irregular, narrow quartz veining and less than 1% euhedral pyrite. The carbonate zone and jointing strikes 320° and averages 276 ppb Au over an estimated true width of three metres. This carbonate zone is located along the western edge of a 180 metre by 90 metre high-resistivity and weak-chargeability IP anomaly and parallel to a northwesterly trending magnetic low.

A linear, magnetic low anomaly, trending 070° within the Murdock Creek Stock, was prospected. Weakly carbonatized syenites with minor amounts of pyrite were found in the vicinity of this anomaly. Grab samples assayed from trace to 210 ppb Au.

The highest assay from 39 grab samples of altered, sheared, pyritic basalts, located south of the Teck "A" Fault Zone, was 79 ppb Au.

7.0 DISCUSSION OF RESULTS

The northern part of the Teck "A" property is underlain by the southern part of the Murdock Creek syenite and mafic to ultra- mafic volcanics of the Larder Lake Group. The 600 metre wide Teck "A" Fault Zone strikes 070° along the southern margin of the syenite stock. Quartz veining and altered pyritic syenites with anomalous gold contents were found associated with this fault zone. This structure is sub-parallel to the Larder Lake Fault Zone, which has produced several million ounces of gold from mines such as the Kerr-Addison Mine.

The "DK" showing is interpreted to be a strongly altered, silicified, carbonated, pyritic mafic syenite pod intruded along the Teck "A" Fault Zone. Similar less altered pyritic syenite bodies were found in stripped areas along strike at 500E and 600E south of the baseline and in the southeast corner of claim 626766. Sampling of these syenites return assays of nil to 254 ppb Au.

The "DK" showing has a limited strike length of only five metres at surface. The dimensions of the highly anomalous "DK" syenite would have to increase substantially at depth to have any economic potential.

The geochemically anomalous in gold, aphanitic, strongly jointed syenite found in the stripped area at 1032E is of some interest since it is located along the western edge of a broad IP anomaly. There may be some potential for a low grade open pit target here.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The economic potential of the "DK" showing is difficult to evaluate due to its limited strike length but highly anomalous gold content. Diamond drilling is warranted to determine if the dimensions of this intriguing gold occurrence improve with depth.

The gold geochemical anomaly located in the 1032E stripped area warrants a drill hole to test the associated induced polarization and magnetic anomalies.

FL: KL\TECKAGEO.RPT

REFERENCES

Assessment work files, Resident Geologist's office, Kirkland Lake, Ontario, Ministry of Northern Development and Mines.

Basu, A. R., Goodwin, A. M. and Tatsumoto, M., 1984
Sm-Nd study of Archean alkalic rocks from the Superior province of the Canadian Shield: Earth Plan. Sci. Let., 70, p. 40-46.

Bottrill, T. J., 1990a
Report on a fixed-wing airborne magnetic and VLF-EM survey, Kirkland Lake Project, Larder Lake Mining Division, Ontario, September, 1989, Volume 1: Assessment File Report - Teck Twp.

Cameron, E. M., 1990
Alkaline magmatism at Kirkland Lake, Ontario: product of strike-slip orogenesis: in current Research, Part C, Geol. Surv. Can., Paper 90-1C, p. 261-269.

Colvine, A. C., Fyon, J. A., Heather, Marmont, S., Smith, P.M. and Troop, D. G., 1988
Archean lode gold deposits in Ontario: Ontario Geological Survey, Miscellaneous Paper, 139, 136 p.

Hattori, K. and Levesque, G., 1989
Hydrothermal activity in the Kirkland Lake intrusive complex: in Geoscience Research Grant Program, Summary of Research 1988-1989, edited by V. Milne, Ontario Geological Survey, Miscellaneous Paper 143, p. 59-67.

Jackson, S. L., 1988
The Abitibi greenstone belt near Larder Lake: structural and stratigraphic studies: in Summary of Field Work and other activities 1988, by the Ontario Geological Survey, edited by A. C. Colvine, M.E. Cherry, B. O. Dressier, P.C. Thurston, C. L. Baker, R. B. Barlow, and C. Riddle, Ont. Geol. Surv., Misc. Paper 141, 498 p.

Jensen, L. S., 1978
Regional stratigraphy and structure of the Timmins-Kirkland Lake area, District of Cochrane and Timiskaming and the summary of Field Work, 1978, by the Ontario Geological Survey, edited by V. G. Milne, O. L. White, R. B. Barlow, and J. A. Robertson, Ontario Geological Survey, Miscellaneous Paper, 82, p. 235.

Jensen, L. S. and Langford, F. F., 1985
Geology and petrogenesis of the Archean Abitibi Belt in the Kirkland Lake area: Ontario Geological Survey, Misc. Paper 123, 130 p.

Kishida, A. and Kerrich, R., 1987
Hydrothermal alteration zoning and gold concentration at the Kerr-Addison Archean lode gold deposit, Kirkland Lake, Ontario: Econ. Geol., 82, pp. 649-690.

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Battle Mountain (Canada) Inc.

VOLUME 2

KIRKLAND LAKE PROJECT

REPORT ON GEOLOGICAL MAPPING

OVERBURDEN STRIPPING AND CHANNEL SAMPLING

TECK "A" PROPERTY

(July, 1989 - August, 1990)

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ONTARIO, CANADA

Kirkland Lake, Ontario
September, 1990

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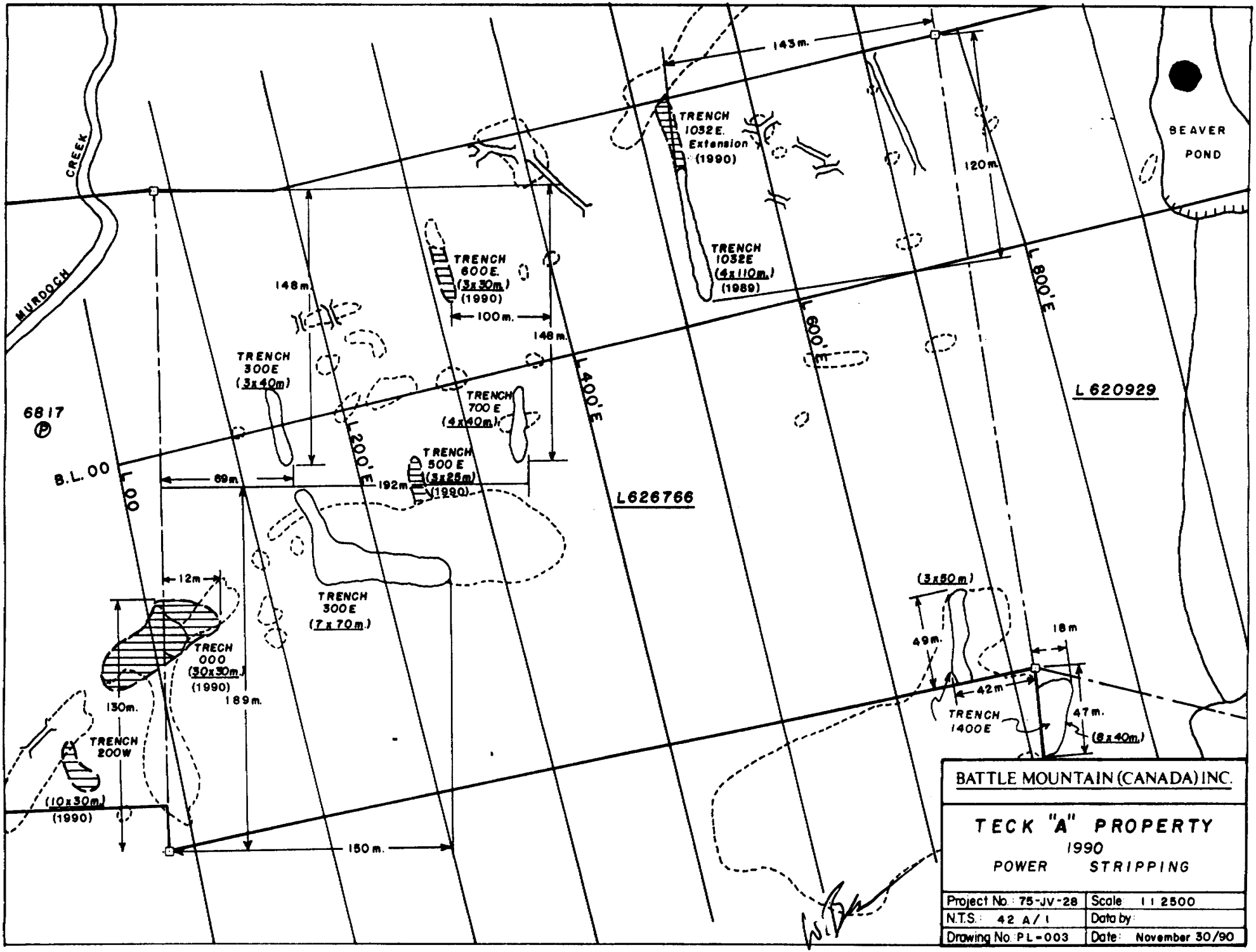
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BATTLE MOUNTAIN (CANADA) INC.

TECK "A" PROPERTY

1990

POWER STRIPPING

Project No.: 75-JV-28	Scale: 1:2500
N.T.S.: 42 A/1	Data by:
Drawing No.: PL-003	Date: November 30/90

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Battle Mountain (Canada) Inc.

VOLUME 3

KIRKLAND LAKE PROJECT

REPORT ON GEOLOGICAL MAPPING

OVERBURDEN STRIPPING AND CHANNEL SAMPLING

TECK "A" PROPERTY

(July, 1989 - August, 1990)

TECK TOWNSHIP, LARDER LAKE MINING DIVISION

ONTARIO, CANADA

Kirkland Lake, Ontario
September, 1990

W. Benham

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MacLean, A., 1956
Geology of Lebel Township: Ont. Dept. Mines Bull., 150, p. 63

Ontario Geological Survey, 1979
Airborne EM and magnetic survey, Kirkland Lake area (KLIP), by Questor Surveys.

Rowins, S. M., Lalonde, A. E. and Cameron, E. M., 1989
Geology of the Archean Murdock Creek intrusion, Kirkland Lake, Ontario: in Current Research, Part C, Geological Survey of Canada, Paper 89-1C, p. 313-323.

Roth, J., 1990
Report on a Magnetometer Survey, Teck "A" Property, Kirkland Lake, Ontario for Battle Mountain (Canada) Inc.; Stratagex Ltd.

Thomson, J. E., 1950
Geology of Teck Township and the Kenogami Lake area, Kirkland Lake Gold Belt: Ontario Department of Mines, Annual Report for 1948, Vol. 57, Part 5, p. 1-53. Reprinted 1989.

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REPORT

on a

MAGNETOMETER SURVEY

TECK A PROPERTY

KIRKLAND LAKE

ONTARIO

for

BATTLE MOUNTAIN (CANADA) INC

Toronto, Ont.

J. Roth

STRATAGEX LTD

October, 1990 Toronto, Ont

STRATAGEX LTD.
Geophysical Consulting

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REPORT

on a

MAGNETOMETER SURVEY

TECK A PROPERTY

KIRKLAND LAKE, ONTARIO

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STRATAGEX

REPORT
on a
MAGNETOMETER SURVEY
TECK 'A' PROPERTY

SUMMARY

A magnetometer survey was executed by JVX Ltd during June, 1990, over claims comprising the Teck A property located south of Kirkland Lake, Ontario. This survey, complementing prior coverage, forms part of an integrated exploration program for gold deposits being conducted by Battle Mountain (Canada) Inc. within portions of this prolific gold district, under an agreement with HSK Minerals Ltd.

The Teck A property is known from past geological mapping and substantial prior exploration to be underlain mainly by mafic and ultramafic volcanics of the Larder Lake Group together with syenitic intrusives, all of which exhibit a general east-northeast fabric. The Murdock Creek Stock extends southwards onto the northern margin of the claims. Several persistent ENE strike faults are known to trend across the property. Although no past gold producers are found on the Teck A claims, a number of interesting gold prospects have been located associated with ENE to NE shear zones. Among these, the DK showing located on line 0+00 near 300S is the most interesting; it is hosted by a complex assortment of altered basaltic volcanics and syenitic intrusives proximate to a shear zone and immediately south of the southern contact of the Murdock Creek Stock.

The present magnetic survey, totalling 10.5 km, was carried out in detailed fashion, reading total field variations at no greater than 100 foot (16m) stations on lines averaging 200 feet (65m) apart, with fill-in readings at 50 foot stations and 100 foot lines as appropriate.

The results, integrated with the prior magnetic survey by HSK Minerals, are interpreted to define eight lithomagnetic domains (X through XVII) which primarily define ENE-trending subunits of the Larder Lake Group. Domains XII and XVI, however, are attributed to possible high-level felsic stocks. A series of dominantly east-northeast strike faults are discerned, with subordinate north-south and north-northwest transverse faults. These strike faults, which include the designated Teck A deformation zone, are of interest as potentially favourable loci for gold mineralization.

Comparison and correlation of the detailed ground survey data with district-wide aeromagnetic surveys has enabled identification of the more persistent structural and lithologic features. The detailed ground data, however, is required for full definition of the multiple, shallow magnetic sources and the complex structural regime beyond the resolving capability of the airborne survey data.

Based on the geophysical results, taken in the context of pertinent geological information, it is recommended that:

1) Additional mapping, sampling and trenching be directed at interpreted strike faults, particularly where geological and/or geochemical encouragement is discerned, followed by drilling where warranted;

2) Additional detailed IP/resistivity surveys be considered if encouraging new gold mineralization associated with significant disseminated sulphides is encountered under overburden too thick to trench;

3) The present interpretation be reviewed and revised as new information is obtained and/or new gold occurrences identified.

1.0 INTRODUCTION

This report treats the results of a magnetometer survey completed over the Teck A property currently being explored by Battle Mountain (Canada) Inc. as part of its agreement with HSK Minerals Ltd. (now Queenston Mining Inc.)

The property is located in the south-central sector of the Kirkland Lake gold camp, approximately four kilometers south of the town of Kirkland Lake in the southeast corner of Teck Township, as seen in Figure 1.

This property is one of several (cf Figure 1) under intensive exploration by Battle Mountain for new gold deposits similar to those already discovered in this prolific district. The present geophysical surveys comprise one component of an integrated exploration effort which has included regional geophysical surveys and geological studies as well as detailed mapping, trenching and sampling programs and limited drilling on specific properties.

2.0 GEOLOGY & PRIOR EXPLORATION

The Teck A property is underlain by a portion of the Larder Lake Groups,

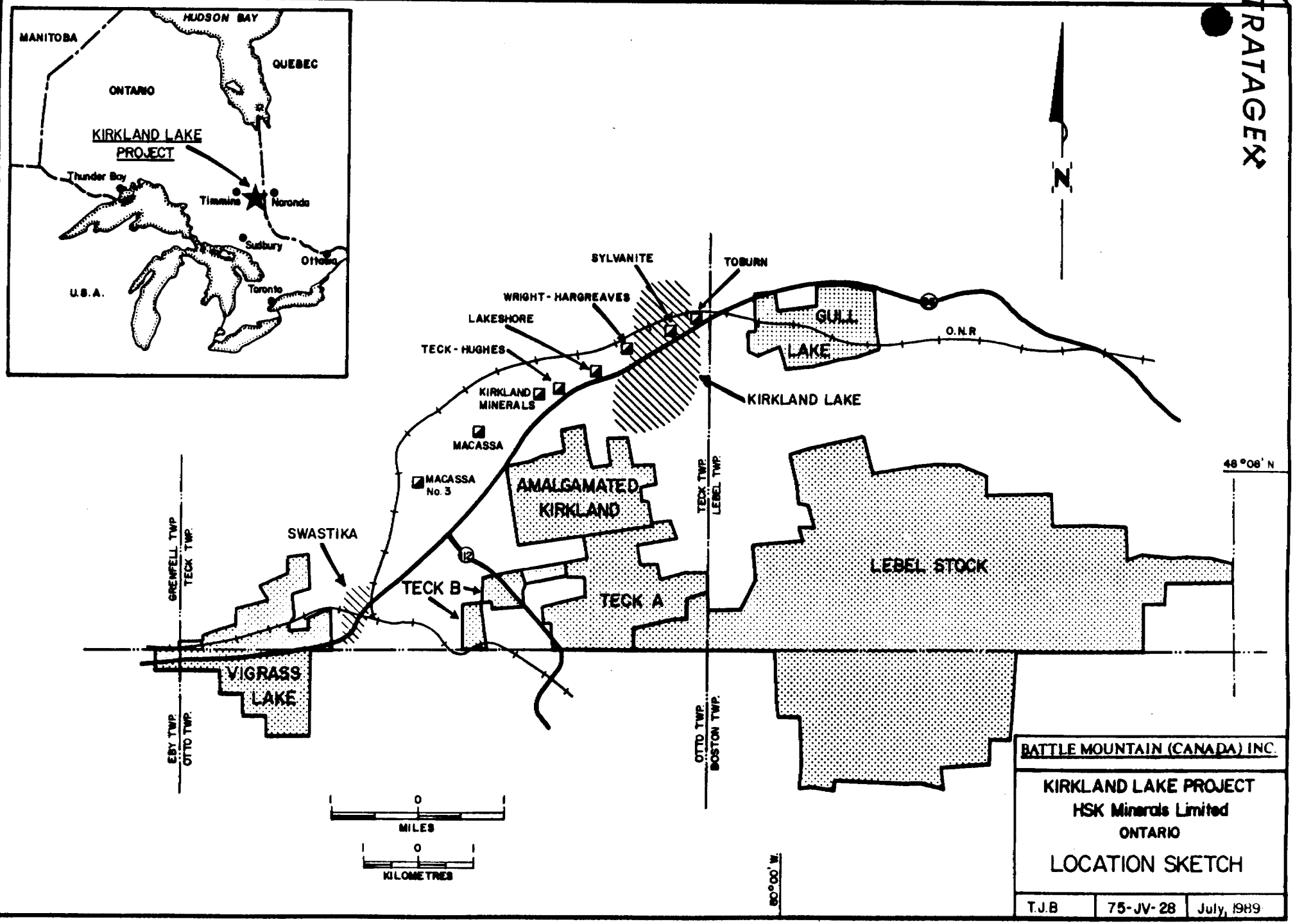
The Kirkland Lake sector of the Archean Abitibi greenstone belt is characterized by a distinct assemblage of Precambrian lithologies designated the Timiskaming Group. This unit is comprised of clastic sediments and subordinate volcanics (including trachytes), which have been intruded by syenites and syenodiorites, all with a dominant orientation of east-northeast. Major deformation zones oriented subparallel to stratigraphy host most of the significant gold deposits exploited in the Kirkland Lake camp.

The Larder Lake Group occupies the southern portion of the district. This unit, formerly designated as the Keewatin Group, consists of mafic and ultramafic volcanics with subordinate sediments and intrusives.

The Teck A property is primarily underlain by a portion of the Larder Lake Group mafic and ultramafic volcanics. The composite Murdock Creek Stock extends onto the northern margin of the claims.

The Teck A property lies south of the important Larder Lake deformation zone; other lesser ENE-trending shear zones have been mapped on the claims, including the persistent Teck A deformation zone which traverses most of the property.

Exploration for and exploitation of gold deposits commenced in the Kirkland Lake district in the early 1900s, with the original discoveries near Swastika, followed by the subsequent discovery and development of the main Kirkland Lake camp.


HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
N
SYLVANITE
TOBURN
WRIGHT-HARGREAVES
LAKESHORE
TECK-HUGHES
KIRKLAND MINERALS
KIRKLAND LAKE
GULL LAKE
O.N.R
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
VIGRASS LAKE
GRENFELL TWP
TECK TWP
EBY TWP
OTTO TWP
TECK TWP
LEBEL TWP
OTTO TWP
BOSTON TWP
48°08' N
80°00' W
0
MILES
0
KILOMETRES
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO
LOCATION SKETCH
T.J.B
75-JV-28
July, 1989

In the post-war period, when gold prices were low, exploration throughout the Kirkland Lake camp was quite limited. Renewed exploration commenced with the advent of increased gold prices, with many exploration companies known to have been active in the Kirkland Lake district since 1974.

Among the recent exploration activities on and near the Teck A property, Labrador Mining and Exploration Inc. carried out ground geophysics and limited drilling in the early 1980s for base metals; Rio Algom drilled three holes as part of a gold exploration program in the mid-1980s; and HSK Minerals Ltd. in 1987-88 carried out soil geochemical, IP and magnetic surveys for gold, leading to the discovery of the DK gold prospect.

No prior producers or significant gold deposits are known on the Teck A property. The major producers of the Kirkland Lake camp lie approximately four kilometres to the north, and lesser deposits with modest production are known along the Harvey Fault system to the northeast.

A number of showings with anomalous gold values are known on and adjacent to the claims. One showing of particular interest, known as the DK, is located near line 0 at 300S. Explored to date by trenching and mapping, the prospect contains encouraging gold values over a short strike length in a complex setting characterized by altered basalts and syenitic intrusive immediately adjacent to a NE-trending shear zone.

Full details as to the lithologic units, alteration and gold occurrences as well as the past exploration on and around the present claims may be found in various reports by Battle Mountain (Canada) and HSK Minerals.

3.0 SURVEY DESCRIPTION

Prior to commencing the present geophysical surveys, an existing (imperial) cut line grid, originally established by Jomi Minerals for HSK Minerals circa 1988, was refurbished and extended in 1990 by Native Exploration Services of Chibougamau, Quebec. The grid has its baseline oriented at 085 degrees with cross lines spaced originally at 400 foot intervals. The grid was extended to the west from 200E to 2200W, generally with lines at 200 foot intervals, but in places with 100 foot fill-in lines. Additionally, over the eastern half of the grid fill-in lines at 200 foot intervals were added. A total of 10.8 km of survey lines were completed, augmenting the prior nine kilometres. The survey grid contains quite a few departures and distortions from the intended ideal grid; the geophysical plans incorporate an accurate version of the actual grid, as established in the course of geological mapping of the property.

The magnetic survey was conducted by Joe Mihelcic of JVX Ltd of Toronto from June 10 to 12,1990, employing a Scintrex IGS2 proton magnetometer reading the total magnetic field

with a sensitivity of 1.0nT. A digital Scintrex MP2 base station magnetometer was used to record diurnal variations for subsequent removal.

Because magnetic sources were anticipated to be complex and shallow, the survey was conducted in a very detailed fashion, with readings taken on cross lines and tie lines at 50 foot (16m) intervals, for a total of 10.8 km of new survey. Fill-in readings were taken at 25 foot intervals in areas of significant magnetic relief. Those survey lines read by JVX are indicated by an asterisk (*) on Map T-1.

The total field magnetic data were processed to remove the diurnal variations, and merged with prior data collected by Jomi Exploration by comparing repeat readings and calculating the statistical best fit between the two surveys. The adjusted merged values were posted along the grid lines, and gridded and contoured at 25 nT intervals where appropriate. The resulting map for the total field data (Map T-1) displays good coherency and good ties at tie line intersections. However, subdued mislevelling errors between the two surveys remain, causing in places apparent disruptions to continuous magnetic features

The magnetic data for the Teck A property was originally compiled on several separate 1:2500 map sheets, corresponding to geologic map sheets. However, for the present report, the data has been composited by Urquhart-Dvorak Ltd to form one map sheet; local trending was applied during this phase to improve line-to-line coherency.

The magnetic features indicated by the survey have been interpreted in terms of simplified sources, distinguished in terms of generalized susceptibility (low, moderate, high and very high) as seen in the attached map T-1. Regions with similar magnetic characteristics have been designated as magnetic domains X through XVII. (Note that the domains have been designated in this manner so as to be consistent with the magnetic domains I through X on the adjoining Amalgamated Kirkland property to the north.)

Faults and shear zones identifiable from the magnetic data have also been indicated on the attached maps. These zones are of particular importance in view of the structurally controlled nature of most gold mineralization in the Kirkland Lake camp.

4.0 MAGNETIC SURVEY RESULTS

The magnetic interpretation is portrayed superimposed on the contoured total field magnetic data (Map T-1).

The magnetic survey on the Teck A property revealed alternating bands of low and moderate-to-high susceptibilities, with a general alignment of east-northeast, interrupted in places by compact, ovoid features.

Virtually all the magnetic sources lie within ten metres of the surface. Most of the sources are inferred to be quasi-vertical in orientation; however, several of the magnetic features appear to have moderately dipping contacts, as indicated in the interpretation.

The regions of differing magnetic characteristics have been designated as magnetic domains X through XVII, as seen in Map T-1 and as described in greater detail below. Strike faults, also generally trending east-northeast, are inferred to bound most of these domains.

Magnetic domain X, only partially disclosed in the northernmost portion of the survey on the Teck A claims, is best defined between 1600E and 4200E, and is inferred to extend to the west to at least 1800W. It is composed of moderate, linear anomalies embedded in a weakly magnetic terrain, exhibiting a generally east-northeast strike. The domain as a whole is revealed by data on the adjoining Amalgamated Kirkland property to constitute a comparatively narrow band.

Domain X is divided into a slightly less magnetic subdomain X_A to the north, a narrow band of moderate linear magnetic sources designated subdomain X_B to the south, and a considerably more magnetic subdomain X_C centred on 1200N, 1800E. It is judged to be a border phase of the Murdock Creek Stock with admixed sediments and volcanics of the Larder Lake Group.

Domain XI is a narrow, primarily non-magnetic band extending ENE immediately south of domain X in the north-central portion of the Teck A grid. In detail, the domain is divided into eastern and western subdomains XI_A and XI_B, respectively. A major strike fault or deformation zone is readily inferred to strike ENE through domain XI, and in fact the absence of any magnetic sources may reflect alteration attendant on this fault.

Domain XII is a compact, ovoid, non-magnetic region centred on 2600E, 1200E. Its form suggest a possible high-level felsic intrusive or apophyse to the larger Murdock Creek Stock to the north which has bowed the supracrustal rocks northward.

Domain XIII consists of narrow, strong, semi-continuous magnetic sources which extend east-northeast from 1400E to 5000E centred on 400N. This domain is inferred to be separated from domain XI to the north by a major fault, while to the south a lesser arcuate strike fault is

interpreted to separate it from adjacent domain XIV. Other strike faults likely extend through this domain, whose overall form suggests a disrupted fold structure. In detail domain XIII is divided into a more magnetic northern subdomain $XIII_A$ and a less magnetic southern subdomain $XIII_B$. The latter subdomain is magnetically similar to domain XI to the northeast and may be geologically related to it.

Domain XIV is a broad, gently flexed region which contains numerous moderate to strong linear magnetic sources and which extends across most of the south-central portion of the Teck A grid. It is interpreted to bounded by strike faults and to contain strike, oblique and transverse faults which have perturbed but not erased the original continuity of magnetic units.

In detail, the domain is divided into a less magnetic portion (subdomain XIV_A) in the northeast and a strongly magnetic subdomain XIV_B in the south and west. The interesting DK gold prospect is found in the latter subdomain, near line 0+00 at 300S and close to a recognizable secondary NE-trending shear zone.

The overall characteristic of domain XIV suggest predominantly mafic volcanics, possibly with ultramafic intrusives or flows. The northward bowing of the magnetic horizons around a non-magnetic region to the south (domain XVI) suggests the influence of high-level intrusive, a potential source of heat and auriferous fluids.

Domain XV is a sporadically magnetic region partially delineated along the southeastern margin of the survey grid. A major strike fault of regional character is inferred to separate this domain from domain XIV to the north. Embedded in this largely non-magnetic environment is a very strongly magnetic ovoid source at the southern end of line 4600E, reported to correlate with a gabbroic intrusive.

Domain XVI is a compact region devoid of magnetic sources in the south-central portion of the grid centred on line 600E. Its form and evident bowing of the magnetic lithologies to the north support a probable high-level felsic intrusive, whose presence adds interest to this sector.

Domain XVII, a partially disclosed region of high susceptibility at the western limit of the survey, is known from aeromagnetic coverage to form an extensive feature which continues several kilometers to the west. A syenodioritic sill or major trachytic flow probably accounts for this regional source. Although the data is limited, it appears that the Teck A deformation zone continues into domain XVII near the base line.

In addition to the strike faults enumerated above, persistent transverse faults trending NNW to north are inferred 200E, 600W and 1200W. Lesser transverse faults are also recognized, although some caution is advised several such features are merely artifacts of the mislevelling between the surveys.

5.0 CONCLUSIONS

Based on the preceding results and interpretation, it is concluded that the magnetic survey on the Teck A property has provided significant information pertinent to the exploration of this property for gold deposits in that:

1) Eight specific lithomagnetic units have been identified, providing a means of extrapolating from scattered outcrop; in particular, six domains correspond to ENE-trending subunits of the Larder Lake Group, while two are attributed to small, high-level felsic intrusives;

2) The structural regime is dominated by a network of faults and/or shear zones trending east-northeast, comparable to those recognized as important in controlling known gold mineralization;

3) Potentially interesting faults additional to those previously known are inferred;

4) The DK gold prospect near 0+00, 300S occurs close to a recognizable NE-trending shear zone;

5) Detailed lithologic and structural features have been resolved by the ground surveys beyond that achievable by detailed airborne surveys alone; conversely, trends and features of district-wide significance are discernible in the broader perspective provided by airborne data.

6.0 RECOMMENDATIONS

Based on the above discussion and conclusions, it is recommended that additional exploration be undertaken on the Teck A property and environs to establish the geological validity of the presently interpreted features and their potential significance in terms of gold mineralization and its attendant alteration.

In particular, it is recommended that:

1) The inferred faults be carefully evaluated in terms of past exploration and geological information, and mapping and trenching be undertaken as appropriate where encouragement is discerned;

2) Additional IP/resistivity surveys be considered if significant disseminated sulphide zones with encouraging gold values are encountered under overburden too thick to pursue by trenching;

3) The present interpretation be reviewed and updated in the light of new information or prospects.

Respectfully submitted,

J. Roth

Senior Geophysical Consultant

STRATAGEX

REFERENCES

Grant, F. and West, G., 1965, Interpretation Theory in Applied Geophysics, McGraw-Hill, 584p

Lowrie W. and West, G., 1965, The effect of conductive overburden on electromagnetic prospecting measurements, Geophysics v30, p624-632

MacNae, J.C., 1984, Survey design for multicomponent elctromagnetic systems, Geophysics, v 49, p 265-273

OMNDM/OGS, 1979, EM and Magnetic Survey, Kirkland Lake Area (KLIP), Questor Surveys

Palacky, G.J., 1972, Computer Assisted Interpretation of Multichannel Airborne Electromagnetic Measurements, PhD Thesis (unpub), Univ. of Toronto, 152p

Roth, J., 1989, Interpretive Report on Terraquest Aeromagnetic/VLF Surveys, Kirkland Lake, Ont. *for* Battle Mountain (Canada) Inc.

Terraquest, 1989, Logistics Report on Aeromagnetic and VLF Surveys, Kirkland Lake, Ont., *for* Battle Mountain (Canada) Inc.

Ward, S.H., 1967, The Electomagnetic Method: in *Mining Geophysics v.2,* Tulsa, SEG, p 274-306

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Battle Mountain (Canada) Inc.

KIRKLAND LAKE PROJECT

REPORT ON GEOLOGICAL MAPPING OVERBURDEN STRIPPING, CHANNEL SAMPLING AND DIAMOND DRILLING VIGRASS LAKE PROPERTY

TECK, 0TT0, EBY AND GRENFELL TOWNSHIPS

LARDER LAKE MINING DIVISION

ONTARIO, CANADA

W. Benham
K. Barron

Kirkland Lake, Ontario
September, 1990

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1 Kirkland Lake Project, Location Map

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GA-012	Grab Sample Assays	1:2500
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DRAWINGS

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TG-034	Geology Plan, Trench 107E-S 1/2	1:500
TA-032	Assay Plan, Trench 105E-106E	1:500
TA-033	Assay Plan Trench 107E N 1/2	1:500
TA-035	Assay Plan, Trench Highway Zone	1:500
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DC-002	Drill Section, DDH VA90-02	1:500

1.0 SUMMARY

Geological mapping, overburden stripping, channel sampling and the drilling of two holes for a total of 302.4 metres was carried out on the Vigrass Lake property located in Teck, Otto, Eby and Grenfell Townships, northeastern Ontario by Battle Mountain (Canada) Inc. (BMCI). This program was part of BMCI's Kirkland Lake project covering six properties in the area. All of the properties are presently held by BMCI under an option agreement with Queenston Mining Inc. dated June 15, 1989.

The property is underlain by Timiskaming Group trachytic volcanics and sediments and Larder Lake Group mafic to ultramafic volcanics with interbedded graphitic sediments.

The Larder Lake and Blanche River Fault Zones cross the property. Sub-parallel and splay faults, altered pyritic syenites, volcanics and sediments associated with these structures are present on the property.

Although no high priority targets were located by the 1989-90 exploration program, some weakly to moderately anomalous gold mineralization was found along the Larder Lake Fault and south of Vigrass Lake which warrant additional work.

Diamond drilling is recommended to test shear zones and some unexplained geophysical anomalies located along the south shore of Vigrass Lake.

2.0 INTRODUCTION

This report describes the results of geological mapping, overburden stripping, channel sampling and diamond drilling carried out by Battle Mountain (Canada) Inc. (BMCI) on the Vigrass Lake property during the periods of July to November, 1989 and May to August, 1990. The claims south of Vigrass Lake were mapped by H. Dillon-Leitch and V. Sheen under the supervision of D. Boucher during 1989. The majority of the northern part of the property was mapped by K. Barron during the 1990 summer field season. Some mapping between the highway and the Blanche River was carried out by S. Dawson in 1989 and M. Masson in 1990. Descriptions of the Timiskaming rock units underlying the North Vigrass claims are taken from an internal memo by K. Barron dated August 27, 1990.

A metric grid with lines at 100 metre intervals and pickets every 25 metres, was cut over the entire property. The lines were turned off a surveyed baseline along the east-west common boundary between Teck and Otto Townships.

The overburden stripping south of Vigrass Lake was to follow-up mineralized carbonate zones exposed by HSK Minerals during their 1987 power stripping program.

Ground total field and vertical gradient magnetic surveys were completed over the entire property. The magnetic data was used to interpret geological contacts in overburden covered areas and to define shear and fault zones.

A horizontal-loop electromagnetic survey was carried out along lines 96E to 112E south of the baseline. Results of these geophysical surveys are described in a separate report by Stratagex, Ltd. (Roth, 1990).

Two holes were drilled during July, 1990 to test two H.E.M. conductors on the Allsop-Zabudsky claims.

2.1 Property, Location and Access

The Vigrass Lake property consists of 33 mining claims optioned by Queenston Mining Inc. (formerly HSK Minerals Ltd.) from seven vendors: C. Forbes, M. Leahy and J. Forbes (3 claims); R. Condie (3 claims); D. Strome (Trust) (7 patents); Premier Exploration Inc., R. Chrichton, M. Leahy and J. Forbes (6 claims); F. Kiernicki, T. Obradovich, J. Forbes, and Premier Exploration (6 claims); J. Kidston (4 claims); and A. Allsop and D. Zabudsky (5 claims). The property is currently held by Battle Mountain (Canada) Inc. as part of an option agreement with Queenston Mining Inc. Dated June 15, 1989.

A mining rights lease (#105470) was issued for three Forbes/Leahy/Forbes claims on January 1, 1990 and an application to lease was submitted for the four Kidston claims on June 9, 1989. The remaining unpatented claims are in good standing with 200 days credit each.

The property is located close to the common corners of Teck, Otto, Grenfell and Eby Townships in the Larder Lake Mining Division about 8 km west southwest of the Town of Kirkland

Lake and 0.5 km west of the village of Swastika (NTS 42 A/1; UTM 564750E / 5327450N; See Figure 1 and Drawing PL-001).

Access to the central part of the property is provided by Highway 66 which crosses the claim group. The southern claims are accessible by tractor roads leading from the Otto Lake road which passes through the southeastern corner of the property. Access to the claims north of the Blanche River is provided by a trail from Athena Blvd. in Swastika. Right of ways for hydro, natural gas and railway lines cross the central part of the property.

2.2 Topography

The property consists of low rounded knolls and steep-sided outcrop ridges up to 30 metres high. The Blanche River passes through the northern part of the property.

The property is covered by balsam, spruce and poplar bush. Jack-pine forest covers the central part of the property along highway 66. Cedar and tag alder swamps are found south and west of Vigrass Lake and between outcrop ridges on the property.

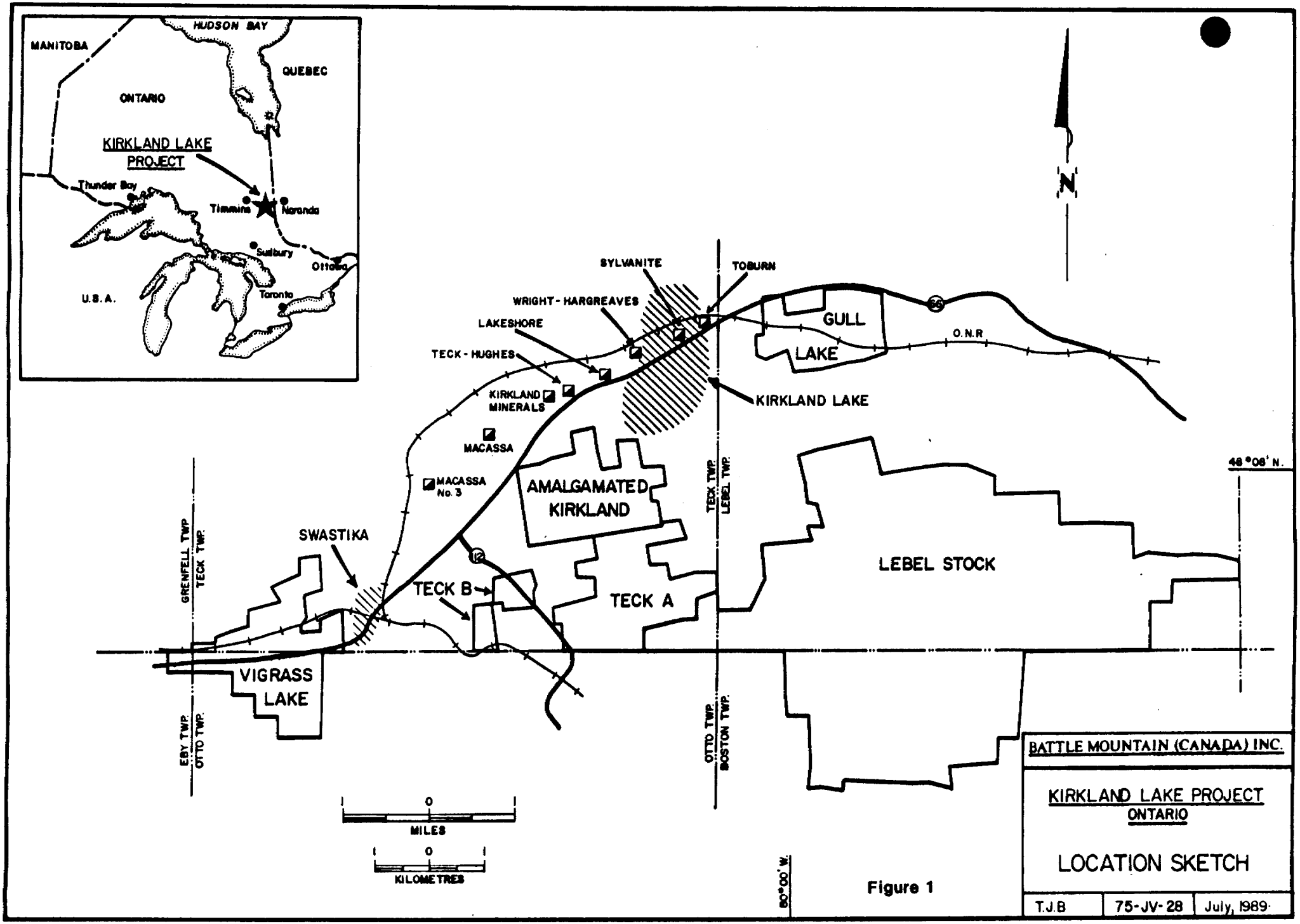

HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
N
SYLVANITE
TOBURN
WRIGHT-HARGREAVES
LAKESHORE
TECK-HUGHES
KIRKLAND MINERALS
KIRKLAND LAKE
GULL LAKE
O.N.R
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
VIGRASS LAKE
GRENFELL TWP.
TECK TWP.
EBY TWP.
OTTO TWP.
TECK TWP.
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BOSTON TWP.
48°08' N.
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MILES
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KILOMETRES
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
ONTARIO
LOCATION SKETCH
T.J.B
75-JV-28
July, 1989

Figure 1

3.0 PREVIOUS WORK

The Vigrass - Otto Lakes area was one of the first areas which was prospected in the Kirkland Lake district around about 1906. The Golden Crescent and Golden Gate Mines (the present Gateford-Crescent property) were developed between 1911 and 1928 along the north shore of Otto Lake to the east of the Vigrass Lake property. Numerous historic pits, adits and trenches were found on the property. Details of exploration work carried out on the property prior to 1980 are poorly recorded. The area north of Vigrass Lake in Teck Township was mapped by Thomson (1950).

During the 1980's, various exploration programs, which consisted of prospecting, mapping, geophysical surveys, hand and power stripping and diamond drilling have been carried out by the vendors of the individual claim groups which make up the present Vigrass Lake property.

The following is a list of work carried out on the Vigrass Lake property.

1. A 60 metre ling adit on claim 891860 was driven on the Larder Lake Fault Zone by Homestead Mining Company in 1912.

2. A 50 foot deep shaft was sunk on claim 16425 by Matabanick Kirkland Gold Mines in 1929.

3. Three short holes were drilled to test the syenite in the Homestead adit and some other small syenite bodies along and south of the Larder Lake Break (results and date unknown).

4. Kerr Addison drilled a hole to test a massive pyrite showing in a highway 66 road-cut on claim 9880, in 1966.

5. Hand stripping, prospecting, magnetic and VLF-EM surveys on the Kidston claims by Jomi Minerals in 1984.

6. A 162 metre drill hole from the island in Vigrass Lake by Rio Algom Exploration Inc., 1985.

7. Stripping and sampling of the "Highway Zone" south of highway 66 and north of Vigrass Lake on claim 843400 by H.S.K. Minerals Ltd., 1986

8. Magnetic, HEM, VLF-EM and IP surveys over the area south of Vigrass Lake by H.S.K. Minerals Ltd., 1987.

9. Diamond drilling of 11 holes (1223 metres) to test the "Highway Zone" and geophysical anomalies and alteration zones located south of Vigrass Lake by H.S.K. Minerals Ltd. in 1987/88.

10. Power stripping by H.S.K. Minerals Ltd. south of Vigrass Lake in 1987.

11. Geological mapping south of Vigrass Lake and core re-logging by A. Workmen for H.S.K. Minerals Ltd. in 1988.

Drilling of the "Highway Zone" intersected up to 348 ppb Au over six metres (V1-87-2). Surface channel samples from this zone assayed up to 12.3 g/t Au over 1.5 metres. Hole VI-88-8, which tested a carbonate zone south of Vigrass Lake, intersected 125 ppb Au over a core length of 56 metres. Grab samples from the surface showing near the collar of this hole returned 5185 ppb Au.

4.0 OVERBURDEN STRIPPING

During October, 1989, overburden stripping was carried out in two areas south of Vigrass Lake. One area was around H.S.K. drill hole VI-88-8 in an attempt to expose the surface expression of the anomalous gold intersections in this hole which is located to the west of H.S.K.'s 1987 stripping. The other area was along Line 107E from 9100N to 8760N across the northern bedrock ridge on the Allsop-Zabudsky claims where previous stripping by H.S.K. had exposed quartz veining, carbonate alteration, lamprophyre and feldspar porphyritic dykes.

The locations of the stripped areas are shown on Drawing GL-016.

5.0 REGIONAL GEOLOGY

The Kirkland Lake district is situated in the central part of the Archean, Abitibi greenstone belt on the south limb of a major east-west trending, east plunging synclinorium. The northern and southern limbs of this synclinorium are cut by the Destor-Porcupine Fault Zone and the Larder Lake-Cadillac Fault Zone which form two of the most historically significant gold-controlling structures in the Abitibi belt. The southern limb of the synclinorium in the Kirkland Lake area consists of mafic to ultramafic volcanics with interbedded sediments of the Larder Lake Group and tholeiitic volcanics of the Kinojevis Group, as well as trachytic volcanic rocks and sediments of the Timiskaming Group which unconformably overlies the Kinojevis and Larder Lake Groups. The boundary between the Larder Lake and Timiskaming Groups is marked by the Larder Lake Fault Zone.

The majority of gold production in the district has been from a structure in Timiskaming rocks known as the "Kirkland Lake Main Break" which together with its major splays has produced about 25 million ounces of gold from mines such as the Wright-Hargreaves, Lakeshore, Teck Hughes and Macassa. Only the Macassa is still in production from a 7,000 foot deep shaft at the western, down plunge extent of this structure. Typical grades have been greater than 0.5 opt Au, from narrow quartz veins and quartz breccia orebodies. Another important deposit in the Timiskaming rocks is the Upper Canada Mine located 18 km further to the east, which produced about 4.7 million tons at a grade of 0.32 opt Au.

The Kerr-Addison mine, which is located 36 km to the east in the Larder Lake district, produced in excess of ten million ounces. This ore deposit is hosted by altered mafic to ultramafic volcanics with interflow sediments of the Larder Lake Group in mineralized structures associated with the Larder Lake Fault Zone.

6.0 PROPERTY GEOLOGY

Geological mapping of the Vigrass Lake property was carried out by traversing the 100 metre spaced metric grid lines. The results of the mapping are presented on Drawings GL-012 to GL-016 at a scale of 1:2500 and Drawings GL-017 and GL-018 at a scale of 1:5000. The geology of the stripping areas is shown on Drawings TG-032 to TG-034 at a scale of 1:500. The location of the grids relative to the individual mining claims is shown on Drawings GL-017 and GL-018.

6.1 Lithology

The Vigrass Lake property can be divided into two parts: the southern, underlain by mafic to ultramafic volcanics with interbedded sediments of the Larder Lake Group; and the northern underlain by Timiskaming Group rocks consisting of trachytic flows and tuffs, conglomerates, graywacke and basal grits. The two parts are separated by the Larder Lake Fault Zone.

The northern part can be further subdivided into two parts by the Blanche River Fault. Small irregular syenite bodies and lamprophyre dykes have been intruded along the Blanch River and Larder Lake Fault Zones as well as related sub-parallel structures.

6.1.1 Timiskaming Group

The Timiskaming Group rocks underlying the northern part of the property were mapped, and are described below, by K. Barron.

The very base of the Timiskaming, adjacent to the Larder Lake Break, consists of graphitic laminated argillites which can be seen in the road cuts on the north side of Highway 66, just north of the power line. These give way north to a poorly sorted matrix-supported conglomerate/graywacke. This unit has been seen on the north edge of the Timiskaming series in contact with Kinojevis volcanics (see Thomson, 1950, p. 7) where it is termed the "basal grit". This basal unit has not been previously recognized along the southern edge of the Timiskaming except on the highway near Lake Kenogamis some two kilometres west of the property boundary (Thomson, 1950, p. 14) where it is also north dipping and facing. The rock is grey in colour and locally bedded although generally massive and unstratified. Clasts are fine grained sediment, basaltic volcanics and rarely, komatiitic, spinifex-textured clasts. Clasts are sub-rounded to angular and generally less than one centimetre in size. Trachytic, syenitic and jasper clasts are conspicuously absent.

Commonly the grit contains 2-3% disseminated pyrite, in otherwise unaltered rock. The pyrite is rounded, and is of the "shot" variety as seen in the Elliot Lake and Witwatersrand conglomerates.

The grit unit fines to the north into a lithic arenite unit and ultimately to laminated mud and siltstones. It appears to be much thicker here, at approximately 300 metres, than where recognized elsewhere in the Timiskaming. In one place, L105E, 101+50N, an overturned Bouma sequence was seen.

The basal grit is capped by Timiskaming-type polymictic conglomerate, which is repeated in section northwards across the property. This unit is comprised of cobble and pebble-sized, and rarely boulder clasts, which are generally rounded to sub-rounded in shape. The rock is typically clast supported with clasts from a wide spectrum of rock types. It is most easily recognized by the presence of granitic textured and porphyritic pink syenite, trachyte, quartz feldspar porphyry, vein quartz and conspicuous red jasper clasts. The jasper clasts make up only about 2% of the rock but these are a convenient diagnostic feature for the unit. The conglomerates are crudely bedded, and locally graded. Cross beds were seen in one or two places.

South of the Blanche River, the unit grades both northwards and eastwards into jasper-bearing graywacke and to mudstones and siltstones near the contacts. North of the river, a very coarse boulder conglomerate was found. The conglomerate unit here is bisected by an extensive graywacke and argillite unit. Arenites within this unit are locally cross bedded. The conglomerate north of the river is not as extensive as that recorded by Thomson (1950), and has been confused with coarse, trachyte tuff-breccia. In places it is intimately interbedded with slightly reworked tuffs. These "epiclastic" tuffs are composed of sub-rounded but essentially monolithic trachyte clasts. The proportion of trachyte clasts in polymictic conglomerate increases northwards towards trachyte flows. The conglomerate also becomes poorly sorted and matrix supported.

Alkaline volcanics are represented by trachyte tuffs and flows. the volcanics south of the Blanche River are large predominantly water-lain ash and lapilli tuffs. North of the Blanche River, the tuffs are much coarser and are generally blocky tuff-breccia and lapilli-tuff. Almost all outcrops are essentially unaltered and massive.

The tuffs are generally well-bedded to laminated. Both trough and normal cross bedding are common. Ripple marks are occasionally seen on bedding planes. Frequent, thin laminae of magnetite grains probably represent winnowed material. The tuffs are generally quite mafic and dark green in colour with pink tinged feldspars. Clasts are often trachytoid textured internally.

This rock has been examined in thin section from a sample taken at L112E, 103+75N and is consists of non-vesicular juvenile fragments and crystal shards. Concentrically zoned hornblende and augite is common with occasional euhedral albite and orthoclase grains. The grains sit in a groundmass of very finely trachytic-aligned, alkali-feldspar microlites.

All trachytes are moderately magnetic. Notably, a few grains of angular quartz were seen as well as one or two fragments of mafic basement rock. A proportion of exotic fragments of basement rock are always expected in tuff units, but the quartz probably represents a sedimentary component. These rocks were probably laid down in a basin where active sedimentation was ongoing as indicated by the interbedded polymictic sequences Thomson, 1950, p.10).

A few outcrops of tuff with one or two quartz, quartz-feldspar porphyry and even jasper clasts were seen in the mapping. Understandably, this can lead to confusion during mapping. Rock names could only be assigned after the overall fragment composition was considered.

On the north extremity of the property, on the north side of the Blanche River, as well as at the east end of the property immediately south of the River are some unusual augite porphyritic units. Thomson (1950, p.16) was reluctant to call these augite syenite and instead termed them "augite porphyrite". He comments that they resemble trachyte flows near Larder Lake, but that they have intrusive contacts. Cooke (1966) refers in his thesis to "mafic trachyte" west of Amikougami Creek. These trachytes are presumably part of the extensive "porphyrite" body mapped by Thomson.

It appears that these augite porphyritic units have caused considerable consternation among geologists in the camp. They have been considered too coarsely porphyritic to be flow rocks and so have been mapped as "syenites". The augite syenite along the Kirkland Lake Break is a different rock type altogether and is granitoid in appearance. Alkaline rocks in general have low viscosities due to their high fluorine and chlorine contents and so can flow with a higher percentage of phenocrysts than the 50-55% "locking point" of calc-alkaline lavas. Therefore, trachytes can carry larger or more numerous phenocrysts in flows than sub-alkaline flow types.

Recent mapping north of the Blanche River has located some excellent examples of scoriaceous flow top breccias and agglomerates. These are highly vesicular rocks with abundant augite (± feldspar) phenocrysts up to 5 mm in size. Bombs up to a metre or so in size were seen. The breccias lie immediately south of massive flows which rapidly become non-vesicular northwards. To the south, polymictic conglomerates become flooded with trachyte clasts, so that within several tens of metres south of the contact the conglomerates are essentially monolithic. Here the difference between conglomerate and slightly reworked tuff breccia becomes somewhat of a moot point. The rock types suggest several rapidly denuded coalesced trachyte domes. Facing directions are therefore indicated to be to the south, compared to the north facing sequence south of the River.

South of the river similar augite porphyritic but non-vesicular rocks were seen. These flows are again conformable to bedding, and a possible flow top breccia was seen at L114E, 105+75N. An intrusive contact of a similar unit was seen at L100E, 102+60N. In thin section these rocks, which are massive in hand sample, appear to be moderately chloritized, carbonatized and sericitized, probably as a result of autometasomatism, and not gold-related alteration. Tuff breccia units in contact with these flows contain abundant augite porphyritic clasts (eg. L105E, 111+75N). This would seem to indicate that these porphyritic bodies have both intrusive and extrusive character and may be sub-volcanics feeding short flows. They are mapped as porphyritic trachyte flows.

6.1.2 Larder Lake Group

The volcanic rocks of the Larder Lake Group, south of the Larder Lake Fault Zone, consist of komatiitic to basaltic flows with interbedded graphitic, pyritic sediments. The flows are massive, pillowed, variolitic, polysutured and spinifex textured. North west of Vigrass Lake is a type area for komatiites as described by L. Jensen (1985), and frequently used as a stop during field trips.

Massive, fine grained basalts form east-west trending outcrop ridges separated by a broad low-lying swamps at 87N and at Vigrass Lake (96N). These swamps are probably underlain by komatiitic units.

The graphitic interflow sediments are best observed in drill core and the stripped area between lines 105E and 107E at 9250N. They consist of finely bedded argillites locally grading to fine grained graywacke. Semi massive pyrite lenses and 1 to 2 cm pyrite nodules were found in the sediments.

6.1.3 Intrusives

Feldspar porphyritic syenite, augite syenite and mafic syenite intrusives are found throughout the property but are preferentially sited along structural zones. Most common are brick red feldspar porphyritic leuco-syenite dykes and pods in and adjacent to both the Larder Lake Break and Blanche River Fault. A parallel east-west shear has localized three possible bodies in the centre of the map

area. This constitutes an important rock type, since historically gold was mined from veins in red syenite at both the Baldwin Consolidated property to the west and the Gateford Crescent Mine to the east.

Almost all syenite is highly ankeritic and sericitized with green mica phenocrysts. The only exception is north of the Blanche River, where it is unaltered. Veinlets of specular hematite are common. Chalcopyrite and pyrite are sporadic but often seen. These intrusives are fractured but rarely sheared. The enclosing volcanic and sedimentary rock is strongly hematized and also brick red, making discrimination of contacts difficult. This is particularly so on the south bank of the Blanche River.

Hosting the old Homestead Mine adit (114+50E, 101+30N) is a composite meso- and leuco-syenite body (syenodiorite), which is quite mafic in places. Generally it is grey rather than pink and non-porphyritic. In the vicinity of the adit it is almost completely carbonatized and buff coloured, with 3-5% pyrite.

Several small syenite dykes, from meso- to augite syenite, were seen south of the Larder Lake Fault Zone. They are weakly to moderately magnetic, granitic in texture and clearly of a different nature to those north of the fault. Medium-grained to coarse euhedral pyrite is frequent up to several percent. These intrusives are weakly to moderately ankeritic.

Lamprophyre dykes intruded the Larder Lake Fault Zone and the altered, carbonated komatiites and basalts south of the Lake. Lamprophyre "boulder dykes" at 107E and 10850E, 8930N are 1 to 5 metres wide and contain rounded xenoliths of ultramafic to granitoid composition in a medium grained, biotite-amphibole matrix.

6.2 Structure

The major structure on the property is the Larder Lake Fault Zone which separates the Timiskaming Group to the north from the Larder Lake Group to the south. It consists of a poorly exposed, east-west belt of talc + chlorite + carbonate schist.

Warps along the Larder Lake Fault Zone probably provided dilational sites for syenite intrusions. The Homestead adit syenite is situated in such a warp. The adit follows a sub-vertical fault splay at 45° to the Larder Lake Fault.

A fault splay at 250° in basalts south of the Larder Lake Fault is interpreted from the ground magnetic data to pass through the Matabanick historic shaft area at 8900E, 9900N.

The Blanche River Fault can be traced as a linear magnetic low along the Blanche River. To the east this fault is interpreted to be the Amalgamated Kirkland Fault. Strong brittle deformation within syenites and ductile deformation in volcanics and sediments which are related to the Blanche River Fault are found in cuts along the railway. This fault marks the boundary between the south facing sequence north of the River from the north facing sequence to the south. As such, it may represent the trace of the major synclinal axis within the Timiskaming "basin".

Late north, northwest and northeast striking faults are interpreted from the magnetics and from abruptly truncated units within the Timiskaming and Larder Lake rocks.

The Timiskaming Group rocks strike 075° to 90° except in the northeastern corner of the map area where they strike 110° to 130°. South of the Blanche River, dips are 65° - 85° to the north, although locally the beds have been overturned and tilted to the south. Bedding north of the river is steep, but dips are predominantly to the south.

East-west trending shear zones, sub-parallel to the Larder Lake Fault Zone, cross the property in a number of locations, for example: at 102N within the Timiskaming rocks; along the south shore of Vigrass Lake at 95N; and along the southern edge of the northern outcrop ridge at 88N within the Larder Lake rocks along a contact between basalts and komatiites.

North of the Blanche River at 105E, 109N, a three metre wide shear zone at N50°E follows a conglomerate/mudstone contact. The magnetic data indicates that this shear continues across the entire property. A structure striking 070°, centred at 110E, 115N within trachyte flows, is inferred from a magnetic linear low. This structure follows a topographical lineament.

The Larder Lake Group rocks strike 065° to 110° and dip steeply to the south at 75° to 90°. Top determinations from pillowed basalts indicate a southerly facing sequence.

Strongly altered, carbonated and silicified shear zones, with finely disseminated sulphides and irregular quartz veins, are located within the Larder lake Group volcanic rocks, up to 1000 metres south of and sub-parallel to the Larder Lake Fault Zone. These shear zones usually mark the contacts between komatiitic and basaltic flows, e.g. along the north and south shores of Vigrass Lake and at 107E, 8675N.

A complex zone of shearing and faulting, with associated carbonatization and silicification, is located along the south shore of Vigrass Lake. This complex structural zone is part of a regional feature which is sub-parallel to the Larder Lake Fault Zone. It is the western extension of the Teck "A" fault zone which is located 5 km to the east on the Teck "A" property.

A triangular-shaped, fault-bounded block of altered, pyritic volcanic rocks with geochemically anomalous gold mineralization, is centred along line 106E from 92N to the south shore of Vigrass Lake, i.e. the Vigrass Lake Fault Zone.

Linear, low magnetic susceptibility anomalies indicate the possibility of some additional shear zones located south of the chain of islands in Vigrass Lake and to the east of the above mentioned altered triangular fault block.

7.0 ALTERATION AND MINERALIZATION

7.1 Alteration

The Timiskaming rocks on the Vigrass Lake property are relatively fresh with strong carbonate alteration found only in proximity to the Larder Lake and Blanche River Faults and related sub-parallel shear zones. Shearing is marked by strong foliation and local zones of sericitization and carbonatization up to 25 metres, but usually less than two metres, wide. Hematite-carbonate altered syenite intrusives are located along the railway tracks in close proximity to the Blanche River Fault. Syenites along the Larder Lake Fault are strongly carbonate altered.

Strongly altered, carbonated and silicified shear zones with finely disseminated sulphides are found in the Larder Lake volcanics up to 1000 metres south of and parallel to the Larder Lake Fault Zone. A complex area of shearing, carbonatization, silicification and altered lamprophyre dykes and faulting is located along the southern shore of Vigrass Lake.

7.2 Mineralization

Channel and/or grab samples were taken of altered, sheared rocks, quartz-carbonate veining and/or sulphide mineralization exposed in the stripped areas and located during the mapping survey. The assay results for the grab samples are presented in Drawings GA-012 to 016 while channel samples from the stripped areas are shown on Drawings TA-032, 033 and 035.

Channel sampling along two lines 7.5 metres apart at 0.3 metre intervals in the area of a previous 1.52 metre anomalous sample on the Highway Zone returned single anomalous samples of 4.37 g/t Au over 0.3 metres and 1.90 g/t Au over 0.3 metres on each line.

Along the highway, at 8900E, 9915N, semi-massive pyrite in strongly altered, quartz veined mafic volcanics returned assays of 290 to 1440 ppb Au.

Grab samples of pyritic quartz veins in altered mafic volcanics along the southern edge of an outcrop ridge at 109E, 8800N, assayed 100 to 320 ppb Au.

Overburden stripping around H.S.K. drill hole (VI-88-8), which intersected 125 ppb Au over a core length of 56 metres, exposed highly altered, carbonated, silicified and pyritic mafic volcanics, lamprophyre and feldspar porphyritic dykes and graphitic sediments with semi-massive pyrite. Channel sampling returned anomalous gold assays of 100 to 680 ppb Au over widths of one to seven metres. Grab samples of the semi-massive sulphides returned assays up to 223 ppb Au, 1.4 ppb Ag, 528 ppm Cu and 518 ppm Zn.

Narrow, northerly flat-dipping carbonatized zones in the stripped area along line 107E at 90N returned grab sample assays of 180 to 670 ppb Au in 1989. Channel samples cut during the 1990 field season assayed up to 179 ppb Au over widths of 1 to 2 metres.

Altered syenites, with minor pyrite and chalcopyrite, located along the Blanche River and Larder Lake Faults, assayed trace to 130 ppb Au.

Shear zones in the Timiskaming rocks, associated with pyritic quartz + carbonate veins, assayed nil to trace Au.

8.0 DRILLING

Two holes were drilled during July, 1990, to test two H.E.M. conductors on the Allsop-Zabudsky claims, and to fulfil the March, 1990 vendor agreement work commitment. A total of 302.4 metres were drilled and 176 samples were assayed. No economic mineralization was intersected.

Hole VA90-01 tested a strong H.E.M. anomaly, striking 305°, and crossing the Allsop-Zabudsky/Kidston common boundary at 10530E, 9200N. The hole intersected highly altered, carbonated, silicified basalts, graphitic sediments, lamprophyre dykes and komatiites. There is finely disseminated pyrite, locally up to 15%, throughout the hole. Locally intense fuchsite, sericite and siliceous alteration were encountered, as well as multiple phases of quartz veining. Up to 2% sphalerite was intersected in the graphitic sediments, quartz veining, and silicified basalts.

The source of the EM conductor is the graphitic sediments. A fault zone was intersected at 20 to 23 metres down the hole. This fault, with an apparent dip of 30° NE, has offset the conductive sediments an estimated 35 metres to the northeast.

The entire hole VA90-01 was cut and sent for assay. Only four (4) samples returned gold assays greater than 100 ppb Au. Selected samples assayed up to 7080 ppm Zn, 418 ppm Cu and 1.6 ppm Ag.

Hole VA90-02 tested a weak H.E. M. anomaly along the sheared southern edge of a bedrock ridge at 8770N 10900E. It intersected sheared, altered komatiites and basalts intruded by lamprophyre dykes. The basalts are weakly silicified and carbonated from 89 to 110 metres down the hole. This section was cut and sent for assay; no anomalous gold assays were returned. The weak conductor is probably due to the sheared contact between the komatiites and the basalts and/or the overburden/bedrock interface.

Drill logs for the two holes are located in Appendix I. The holes are shown in cross section on Drawings DC-001 and DC-002.

9.0 DISCUSSION OF RESULTS

The Vigrass Lake property is underlain by trachytic volcanics and sediments of Timiskaming Group in the north part and mafic to ultramafic volcanics with interbedded sediments of the Larder Lake Group in the south part. The historically productive Larder Lake Fault Zone and sub-parallel structures cross the property. Altered, pyritic syenites have been intruded along these structures. However, previous drilling of these intrusives has failed to intersect any economic mineralization.

The highly altered, silicified, carbonated, pyritic mafic to ultramafic volcanics intersected in hole VA90-01 possibly could be indicative of deeper seated mineralized zones. The geological setting, host rocks, alteration and structure is comparable to the near surface geology associated with the Kerr Addison deposit in the Larder Lake district.

It is possible that the structures inferred from the magnetic data, located at 115N within Timiskaming trachyte flows is similar to the gold-bearing structures presently being explored on the Amalgamated Kirkland property or the Kirkland Lake Main Break. Assuming an easterly camp plunge, gold exploration targets are probably at considerable depths.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Mapping and prospecting of the Timiskaming rocks underlying the North Vigrass claims did not locate any high priority targets for follow-up at this time. Hematitic syenites along the Blanche River Fault may warrant some future consideration.

Anomalous gold mineralization was found in altered basalts 100 metres south of the Larder Lake Fault along line 89E. A splay fault off the Larder Lake is interpreted to cut through a magnetic high anomaly in this area. Further work is required to determine if any drilling is warranted.

The extensive area of geochemically anomalous gold mineralization, carbonatization, silicification and shearing located along the south shore of Vigrass Lake warrants further drilling. A 700 metre drill hole is proposed to test this alteration zone at a vertical depth of 300 metres.

REFERENCES

Assessment Work Files, Resident Geologist's Office Kirkland Lake, Ontario, Ministry of Northern Development and Mines.

Allard, M., 1984, Geophysical Report - Induced Polarization Survey for HSK Minerals Ltd., Otto and Teck Townships; an internal geophysical report.

Barron, K., 1990 Report on North Vigrass Geological Mapping, internal BMCI memorandum to W. Benham. August 27, 1990

Basu, A. R., Goodwin, A.M. and Tatsumoto, M., 1984, Sm-Nd study of Archean alkalic rocks from the Superior province of the Canadian Shield; Earth Plan. Sci. Let., 70, p. 40-46.

Bois, D., 1987, Magnetic and Horizontal Loop EM Survey for HSK Minerals Ltd.; an internal geophysical report.

Bottrill, T.J., 1990a, Report on a fixed-wing airborne magnetic and VLF-EM survey, Kirkland Lake Project, Larder Lake Mining Division, Ontario, September, 1989, Volume 1; Assessment File Report - Teck TWP, Resident Geologists File, Kirkland Lake. 9 p.

Cameron, E.M., 1990, Alkaline magmatism at Kirkland Lake, Ontario: product of strike-slip orogenesis; in Current Research, Part C, Geol. Surv. Can., Paper 90-1C, p.261-269.

Charlewood, G.H., 1964, Geology of deep developments on the Main Ore Zone at Kirkland Lake, Ont.; Dept. of Mines, Geol. Circ. 11, 49p.

Colvine, A.C., Fyon, J.A., Heather, Marmont, S., Smith, P.M. and Troop, D.G., 1988, Archean lode gold deposits in Ontario; Ontario Geological Survey, Miscellaneous Paper, 139, 136 p.

Cooke, D.L. and Moorhouse, W.W., 1969, Timiskaming volcanism in the Kirkland Lake area, Ontario, Canada; Can. J. Earth Sci., 6, p. 117-132.

Fisher, R.V. and Schminke, H.U., 1984, Pyroclastic rocks; Springer Verlag, Berlin, 472 p.

Hattori, K. and Levesque, G., 1989, Hydrothermal activity in the Kirkland Lake intrusive complex; in Geoscience Research Grant Program, Summary of Research 1988-1989, edited by V. Milne, Ontario Geological Survey, Miscellaneous Paper 143, p. 59-67.

Hyde, R.S., 1978, Sedimentology, volcanology, stratigraphy, and tectonic setting of the Archean Timiskaming Group, Abitibi greenstone belt, northeastern Ontario, Canada; unpubl. Ph.D. thesis, McMaster University, 422 p.

Hyde, R.S., 1980, Sedimentary facies in the Archean Timiskaming Group and their tectonic implications, Abitibi greenstone belt, northeastern Ontario Canada; Precambrian Research, 12, p. 161-195.

Jackson, S.L., 1988, The Abitibi greenstone belt near Larder Lake: structural and stratigraphic studies; in Summary of Field Work and other activities 1988, by the Ontario Geological Survey, edited by A.C. Colvine, M.E. Cherry, B.O. Dressler, P.C. Thurston, C.L. Baker, R.B. Barlow, and C. Riddle, Ont. Geol. Surv., Misc. Paper 141, 498 p.

Jensen, L.S., 1978, Regional stratigraphy and structure of the Timmins-Kirkland Lake area, District of Cochrane and Timiskaming and the Kirkland Lake-Larder Lake area, District of Timiskaming; p. 67-72 in Summary of Field Work, 1978, by the Ontario Geological Survey, edited by V.G. Milne, O.L. White, R.B. Barlow, and J.A. Robertson, Ontario Geological Survey, Miscellaneous Paper, 82, p.235.

Jensen, L.S. and Langford, F.F., 1985, Geology and petrogenesis of the Archean Abitibi Belt in the Kirkland Lake area; Ontario Geological Survey, Misc. Paper 123, 130 p.

Kerrich, R., and Watson, G.P., 1984, The Macassa mine Archean lode gold deposit, Kirkland Lake, geology, patterns of alteration, and hydrothermal regime; Econ. Geol., 79, pp. 1104-1130.

Kishida, A. and Kerrich, R., 1987, Hydrothermal alteration zoning and gold concentration at the Kerr-Addison Archean lode gold deposit, Kirkland Lake, Ontario; Econ. Geol., 82, pp. 649-690.

LaRiviere, D., 1987, A series of geophysical plans; HSK Minerals Ltd. internal report.

MacLean, A., 1956, Geology of Lebel Township; Ont. Dept. Mines Bull., 150, p. 63.

Ontario Geological Survey, 1979, Airborne EM and magnetic survey, Kirkland Lake area (KLIP), by Questor Surveys.

Page, C.E., 1986, Report on the 1986 Stripping, Mapping, and Sampling Programme on Claim L-843400, Otto Township; an internal report for HSK Minerals Ltd. (Homestake Explorations Ltd.)

Roth, J., 1990, Report on Magnetic and HLEM surveys (Val D'Or Geophysique Ltee.), Vigrass Lake Property, Kirkland Lake, Ontario for Battle Mountain (Canada) Inc. , September, Stratagex Ltd.

Thomson, J.E., 1950, Geology of Teck Township and the Kenogami Lake area, Kirkland Lake Gold Belt; Ontario Department of Mines, Annual Report for 1948, Vol. 57, Part 5, p. 1-53. Reprinted 1989.

Thomson, J.E., Charlewood, K.G., Hawley, J.E., Hopkins, H., MacIntosh, C.E., Ogrizlo, S.P., Perry, O.S., and Ward, W., 1950, Geology of the Main Ore Zone at Kirkland Lake; Ontario Department of Mines, Annual Report for 1948, Vol. 57, Part 5, p. 1-53. Reprinted 1989.

Workman, A., 1988, A Report on Exploration Activities on behalf of HSK Minerals Limited for the Vigrass, Teck-A and Teck-B properties, Swastika area, Ontario: August to October, 1988; HSK Minerals Ltd.

APPENDIX I

DIAMOND DRILL LOGS

BATTLE MOUNTAIN (CANADA) INC.

ASSAY CERTIFICATES

KIRKLAND LAKE PROJECT
JULY, 1989 - DECEMBER, 1990

LARDER LAKE MINING DIVISION
ONTARIO, CANADA

Kirkland Lake, Ontario
January, 1991

Swastika Laboroatories Ltd.
Swastika, Ontario

Bondar-Clegg & Company Ltd.
Ottawa, Ontario

SWASTIKA LABORATORIES LIMITED
P.O. BOX 10, SWASTIKA, ONTARIO P0K 1T0
TELEPHONE: (705) 642-3244
ANALYTICAL CHEMISTS • ASSAYERS • CONSULTANTS

Routine Sample Preparation and Gold Assay Methods as applied to Ore and Core Samples

Samples are crushed through a #1 Woodstock crusher, and further reduced to approximately 6-mesh using a Sturtevant rolls. The rolls are then cleaned with a combined wire brush and air jet spray. Samples weighing less than 1 lb. are crushed through a Sturtevant Roll-Jaw crusher. A Jones riffle is used to cut a 400g portion for pulverizing. When requested the reject portion is bagged and stored.

After reducing to nominal -100 mesh with a Braun pulverizer the samples are thoroughly blended and sent to the fire assay department. A 0.5 assay portion (14.583g) is used for fire assaying. This process results in a particle of gold which in the normal assay method is weighed on a Huesser assay balance or a Cahn 25 Electrobalance.

To lower detection limits for Geochemical work or where required the gold particle is dissolved and determined by Atomic Absorption Spectrophotometry. This is done after collecting the precious metals with a fire assay fusion and should not be confused with Ketone extraction--Atomic Absorption Method.

Repeat or check assays are done regularly. Standard pulps are also used for control samples.

Results from replicate determinations using both methods of "finish" agree favourably. By far the greatest spreads occur when free gold is present making sampling difficult.

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Assaying - Consulting - Representation

Established 1928

Certificate of Analysis

Certificate No. 75667 Date July 24, 1989

Received July 21, 1989 9 Samples of Chip

Submitted by Battle Mountain Canada Inc., Kirkland Lake, Ontario.

Proj. #75JV28 ATTENTION: V. Shein

entered

SAMPLE NO.	GOLD PPB
8001	Nil
8002	160/110
8003	Nil
8004	Nil
8005	10
8006	20/10
8007	Nil
8008	Nil
8009	30

pms

add 8010 190/140

Per G. Lebel

G. Lebel - Manager /hs

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Certificate of Analysis

Certificate No. 75686 Date July 25, 1989

Received July 24, 1989 10 Grab Samples

Submitted by Battle Mountain Canada Inc., Kirkland Lake, Ontario.

Proj. #75-JV-28

SAMPLE NO.	GOLD PPB
B-8301	40
8302	30/60
8303	210
8304	10
8305	Nil
8306	10
8307	70
8308	40
8309	Nil
8010	190/140

Per G. Lebel

G. Lebel - Manager /ns

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AUG 8 1989

O.K.L.

FILE: KIRKLAND LAKE 75-JV-28

Certificate of Analysis

Certificate No. 75778 Date Aug. 4, 1989

Received Aug. 1, 1989 17 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #7SJV28

SAMPLE NO.	GOLD PPB
8201	10
8202	30
8203	10
8204	Nil
8205	10
8310	30
8311	50
8312	Nil
8313	30
8314	160/170
8315	40
8316	30
8317	30
8318	40
8319	40/40
8320	20
8321	Nil

Kirkland Lake

Per G. Lebel

G. Lebel - Manager /ns

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AUG 11 1989

FILE: KIRKLAND LAKE - MISC ASSAYS

Certificate of Analysis

Certificate No. 75806 Date August 9, 1989

Received August 4, 1989 17 Samples of Rock

Submitted by Battle Mountain Canada Inc., Toronto, Ontario PO# 75J V28

75-JU-28

SAMPLE NO.	GOLD PPB
8206	Nil
8322	40
8323	150/140
8324	Nil
8325	Nil
8326	Nil
8327	10
8328	Nil
8329	90/90
8330	Nil
8331	10
8332	10
8333	10
8334	80/100
8335	Nil
8336	Nil
8337	30

75-JU-38-101-779
Kirkland Lake.

Per G. Lebel

G. Lebel-Manager/rl

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75-JV-28
AUG 21 1989
KIRKLAND LAKE/KSH
ASSAYS

Certificate of Analysis

Certificate No. 75879 Date Aug. 17, 1989

Received Aug. 14, 1989 26 rock samples

Submitted by Battle Mountain (Canada) Inc., Toronto, Ontario proj#75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
8207	Nil	8225	Nil
8208	30/40	8226	Nil
8209	Nil	8227	Nil
8210	Nil	8228	Nil
8211	Nil	8229	Nil
8212	30/20	8230	Nil
8213	Nil	8231	Nil/Nil
8214	Nil	8232	Nil
8215	Nil		
8216	Nil		
8217	Nil		
8218	20		
8219	20/20		
8220	10		
8221	Nil		
8222	Nil		
8223	Nil		
8224	Nil		

Per G. Lebel

G. Lebel, Manager/dg

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75-JV-28 [illegible] ASSAYS

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AUG 28 1989

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Certificate of Analysis

Certificate No. 75941 Date Aug. 24, 1989

Received Aug. 21, 1989 12 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
8233	100
8234	400/440
8235	20
8236	40
8237	10
8238	20
8239	Nil
8240	20
8241	20
8242	10/10
8243	Nil
8244	30

Per G. Lebel

G. Lebel - Manager /ns

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7.55.28 : KIRKLAND LAKE/ASH ASSAYS

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Certificate of Analysis

Certificate No. 75942 Date Aug. 24, 1989

Received Aug. 21, 1989 30 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
8401	80/80	8416	Nil
8402	50	8417	10
8403	30	8418	Nil
8404	Nil	8419	Nil
8405	20	8420	30/30
8406	Nil	8421	Nil
8407	Nil	8422	Nil
8408	Nil	8423	10
8409	Nil	8424	Nil
8410	Nil	8425	10/10
8411	Nil	8426	Nil
8412	60/80	8427	20
8413	Nil	8428	10
8414	Nil	8429	40
8415	10	No Tag	Nil

Per G. Lebel

G. Lebel - Manager /ns

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SEP 11 1989

FILE
KIRKLAND LAKE ASSAY
75.JV.28

Certificate of Analysis

Certificate No. 76052 Date Sept. 6, 1989

Received Aug. 31, 1989 22 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75JV28 Kirkland Lake 75-JV-28

SAMPLE NO.	GOLD PPB
8245	10
8246	10
8247	Nil
8248	Nil
8249	10
8250	Nil
71501	10
71502	Nil
71503	20
71504	10/Nil
71505	10
71506	Nil
71507	10
71508	Nil
71509	10
71510	Nil
71511	10
71512	Nil
71513	10
71514	30/40
71515	Nil
71516	Nil

Per G. Lebel

G. Lebel - Manager /ns

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SEP 13 1989

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Certificate of Analysis

Certificate No. 76110 Date Sept. 11, 1989

Received Sept. 5, 1989 16 Trench Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75-8V28 75-JV-28

SAMPLE NO.	GOLD PPB
8262	20
8264	10
8265	Nil
8266	Nil
8267	Nil/Nil
8268	Nil
8269	Nil
8270	Nil
8271	20
8272	10/10
8273	Nil
8274	20
8275	10
8276	10
8277	Nil
8278	10

Per G. Lebel

G. Lebel - Manager /ns

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File: Markland Lake assay

SEP 18 1989

25-30-28

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Certificate of Analysis

Certificate No. 76186 Date Sept. 15, 1989

Received Sept. 13, 1989 20 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
8279	Nil
8280	Nil
8281	Nil
8282	Nil
8283	10/Nil
8284	Nil
8285	Nil
8286	10
8287	Nil
8288	Nil
8289	Nil
8290	Nil
8291	Nil
8292	Nil
8293	Nil/Nil
8294	Nil
8295	10
8296	Nil
8297	Nil
8263	Nil

Per G. Lebel

G. Lebel - Manager /ns

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SEP 20 1989

File: Revalidated Lake Assays

Certificate of Analysis

Certificate No. 76187 Date Sept. 18, 1989

Received Sept. 13, 1989 20 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75JV28

SAMPLE NO.	GOLD PPB
71517	20
71518	30/30
71519	20
71520	Nil
71521	Nil
71522	Nil
71523	20/40
71524	Nil
71525	Nil
71526	Nil
71527	Nil
71528	Nil
71529	10
71530	Nil
71531	Nil
71532	Nil
71533	Nil
71534	Nil
71535	20
71536	50/30

Per G. Lebel - Manager /ns

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SEP 22 1989

File RECHECK GOLD ASSAYS

Certificate of Analysis

Certificate No. 76196 Date Sept. 20, 1989

Received Sept. 14, 1989 8 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
71537	150
71538	20
71539	80/50
71540	10
71541	Nil
71542	10
71543	30
71544	30

Per G. Lebel

G. Lebel - Manager /ns

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SEP 25 1989

Certificate of Analysis

Certificate No. 76240 Date Sept. 22, 1989

Received Sept. 18, 1989 11 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
71601	Nil
71602	Nil
71603	20
71604	Nil/Nil
71605	Nil
71606	Nil
71607	Nil
71608	Nil
71609	Nil
71610	Nil
71611	Nil

Per G. Lebel - Manager /ns

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SEP 28 1989

F:lo

ICI RELAND LAKE ASSAYS

Certificate of Analysis

Certificate No. 76239 Date Sept. 25, 1989

Received Sept. 18, 1989 17 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75JV28

SAMPLE NO.	GOLD PPB
71545	Nil
71546	20
71547	10
71548	20/30
71549	Nil
71550	Nil
71612	Nil
71613	Nil
71614	Nil
71615	Nil
71616	Nil
71617	20
71618	Nil
71619	Nil
71620	Nil
71621	Nil
71622	30/40

Per G. Lebel

G. Lebel - Manager /ns

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SEP 29 1989

File: Standard Lake Assays

Certificate of Analysis

Certificate No. 76253 Date Sept. 26, 1989

Received Sept. 18, 1989 25 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario proj#75-JV-28

SAMPLE NO.	GOLD PPB	GOLD g/t	SAMPLE NO.	GOLD PPB
H-71551	Nil		71569	Nil
71552	Nil		71570	Nil
71553	Nil		71571	20
71554	5690	7.27	71572	50/30
second pulp	6240	6.10	71573	Nil
71555	Nil		71574	20
71556	30		71575	Nil
71557	10			
71558	Nil			
71559	10			
71560	10			
71561	20			
71562	Nil			
71563	Nil			
71564	Nil			
71565	10			
71566	Nil			
71567	Nil			
71568	Nil			

Per G. Lebel

G. Lebel, Manager/dg

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File: Hartland Lake Assays

OCT 2 1989

Certificate of Analysis

Certificate No. 76285 Date Sept. 27, 1989

Received Sept. 21, 1989 12 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	GOLD g/t
8430	7410	8.23
8431	5280	6.38
8432	5070	4.70
8433	10290	10.22
8434	10490	9.74
Second Pulp	11110	11.66
8435	100	---
8436	110	---
8437	510	---
8438	1920	1.99
8439	60	---
8440	200	---
8441	Nil	---

Tech "A"

Per G. Lebel

G. Lebel - Manager /ns

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Assaying - Consulting - Representation

1978 File: Inchkeith Lake drill-gs

OCT 5 1989

Certificate of Analysis

Certificate No. 76337

Date October 2, 1989

Received September 25, 1989 25 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario P.O. #75JV28

SAMPLE NO.	GOLD PPB
8351	90
8352	10
8353	620/610
8354	Nil
8355	Nil
8356	Nil
8357	Nil
8358	Nil
8359	90
8360	Nil
8361	Nil
8362	Nil
8363	Nil
8364	Nil
8365	70/50
8366	10
8367	Nil
8368	Nil
8369	Nil
8370	Nil
8371	Nil
8372	10
8373	Nil
8374	Nil
8375	1040/0.98(gt)

Per G. Lebel

G. Lebel-Manager/rl

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OCT 6 1989

File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76324 Date October 3, 1989

Received September 22, 1989 80 Chip Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario Proj.#75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71710	20	71734	10/10	71757	Nil
71711	Nil	71735	10	71759	10/20
71712	10	71736	Nil	71760	Nil
71713	10	71737	Nil	71761	Nil
71714	10/Nil	71738	10	71762	Nil
71715	20	71739	Nil	71763	Nil
71716	Not Received	71740	Nil	71764	Nil
71717	Nil	71741	Nil	71765	Nil
71718	10	71742	Nil	71766	Nil
71719	10	71743	Nil	71767	Nil
71720	Nil	71744	Nil/10	71768	10
71721	Nil	71745	Nil	71769	10
71722	Nil	71746	10	71770	Nil
71723	Nil	71747	Nil	71771	Nil
71724	10/10	71748	Nil	71772	Nil
71725	20	71749	Nil	71773	Nil
71726	10	71750	Nil	71774	10/30
71727	10	71751	Nil	71775	Nil
71728	Nil	71752	Nil	71776	Nil
71729	Nil	71753	Nil	71777	10
71730	Nil	71754	Nil		
71731	10	71755	Nil		
71732	Nil	71756	Nil		
71733	Nil				

Per G. Lebel-Manager/rl

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SAMPLE NO.	GOLD PPB
71778	Nil
71779	10
71780	Nil
71781	50
71782	580/630
71783	190
71784	90
71785	10
71786	40
71787	80/60
71788	70
71789	10
71790	20
71791	10

Per G. Lebel-Manager/rl

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A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76343 Date Oct. 4, 1989

Received Sept. 25, 1989 24 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

TS-JD-28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
8338	190/160	8251	Nil
8339	Nil	8252	10
8340	30	8253	Nil
8341	Nil	8254	20
8342	10	8255	Nil
8343	20	8256	Nil
8344	Nil	8257	Nil
8345	30/20	8258	Nil
8346	30	8259	Nil
8347	Nil	8260	Nil
8348	Nil	8261	150/120
8349	Nil		
8350	Nil		

Per G. Lebel - Manager /ns

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OCT 10 1989

Certificate of Analysis

Certificate No. 76384 Date Oct. 5, 1989

Received Sept. 29, 1989 60 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P. O. #75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71801	Nil	71822	20	71843	Nil
71802	Nil	71823	Nil	71844	20
71803	10/20	71824	Nil	71845	10/Nil
71804	Nil	71825	Nil	71846	Nil
71805	Nil	71826	Nil	71847	Nil
71806	Nil	71827	10	71848	10
71807	Nil	71828	Nil	71849	Nil
71808	Nil	71829	Nil	71850	Nil
71809	Nil	71830	Nil	71701	Nil
71810	Nil	71831	Nil	71702	Nil
71811	10	71832	20	71703	20/10
71812	Nil	71833	Nil	71704	Nil
71813	Nil	71834	Nil	71705	10
71814	10	71835	Nil	71706	Nil
71815	Nil	71836	30/20	71707	Nil
71816	Nil	71837	Nil	71708	Nil
71817	Nil	71838	Nil	71709	Nil
71818	10	71839	Nil	71716	Nil
71819	20/10	71840	Nil		
71820	Nil	71841	20		
71821	10	71842	10		

Per G. Lebel - Manager /ns

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Assaying - Consulting - Representation

RUSH - ANY CHANCE OF ASSAYS

OCT 12 1989

Certificate of Analysis

Certificate No. 76403 Date Oct. 10, 1989

Received Oct. 2, 1989 25 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71576	10	71595	10
71577	10	71596	Nil
71578	10	71597	Nil
71579	Nil	71598	10
71580	10/Nil	71599	10
71581	10	71600	60/80
71582	Nil		
71583	10		
71584	20		
71585	20		
71586	Nil		
71587	10		
71588	10		
71589	Nil		
71590	30		
71591	10		
71592	Nil		
71593	70/50		
71594	Nil		

Per G. Lebel

G. Lebel, Manager/dg

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OCT 16 1989

ICELAND GOLD ASSAYS

Certificate of Analysis

Certificate No. 76413 Date Oct. 11, 1989

Received Oct. 3, 1989 37 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71858	10	71880	Nil
71859	Nil	71881	10/Nil
71860	10/10	71882	Nil
71861	Nil	71883	Nil
71862	Nil	71884	Nil
71863	Nil	71885	20
71864	Nil	71886	Nil
71865	Nil	71887	20
71866	Nil	71888	Nil
71867	10	71889	10/20
71868	20/10	71890	Nil
71869	Nil	71891	10
71872	Nil	71892	20
71873	Nil	71893	Nil
71874	10	71894	Nil
71875	Nil	71895	Nil
71876	Nil	71896	Nil
71877	Nil		
71878	Nil		
71879	Nil		

Per G. Lebel - Manager /ns

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YS
KIRKLAND LAKE ASSAYS

Certificate of Analysis

Certificate No. 76441 Date oct. 12, 1989

Received Oct. 4, 1989 8 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario proj#75-JV-28

SAMPLE NO.	GOLD PPB
71701	Nil
71851	20
71852	20
71853	40/50
71854	10
71855	20
71856	Nil
71857	Nil

Per G. Lebel

G. Lebel, Manager/dg

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KIRKLAND LAKE ASSAYS

Certificate of Analysis

Certificate No. 76438 Date Oct. 12, 1989

Received Oct. 4, 1989 33 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario

proj#75-JV-28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71651	20	71671	Nil
71652	20	71672	Nil
71653	20	71673	Nil
71654	Nil	71674	Nil
71655	30	71675	Nil
71656	770/760	71676	Nil
71657	Nil	71677	20/20
71658	70	71678	Nil
71659	10	71679	Nil
71660	10	71680	40
71661	30	71681	10
71662	10	71682	Nil
71663	Nil	71683 & 71684**	10
71664	20		
71665	20/20		
71666	Nil		
71667	Nil		
71668	Nil		
71669	Nil		
71670	Nil		

**indicates 2 tags in sample bag

Per G. Lebel

G. Lebel, Manager/dg

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OCT 16 1989

File Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76439 Date Oct. 12, 1989

Received Oct. 5, 1989 19 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario

proj#75-JV-28

SAMPLE NO.	GOLD PPB
8376	Nil
8377	10
8378	230
8379	80/130
8380	Nil
8381	380/290
8382	20
8383	170
8384	Nil
8385	20
8386	10
8387	20
8388	20
8389	170
8390	310/320
8391	190
8392	70
8393	Nil
8394	Nil

Per G. Lebel, Manager/dg

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File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76469 Date Oct. 16, 1989

Received Oct. 10, 1989 64 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71951	30	71975	Nil	71999	Nil
71952	Nil	71976	Nil	72000	Nil
71953	Nil	71977	30	72501	Nil
71954	Nil	71978	40	72502	Nil
71955	Nil	71979	50/90	72503	Nil
71956	Nil	71980	Nil	72504	Nil/Nil
71957	Nil	71981	Nil	72505	Nil
71958	400/380	71982	Nil	72506	Nil
71959	20	71983	Nil	72507	Nil
71960	40	71984	Nil	72508	Nil
71961	40	71985	Nil	72509	Nil
71962	Nil	71986	30/50	72510	Nil
71963	20	71987	Nil	72511	Nil
71964	Nil	71988	Nil	72512	Nil
71965	Nil	71989	10	72513	Nil
71966	Nil	71990	Nil	72514	Nil
71967	20	71991	Nil		
71968	80/70	71992	Nil		
71969	30	71993	Nil		
71970	Nil	71994	Nil		
71971	20	71995	Nil/Nil		
71972	Nil	71996	Nil		
71973	Nil	71997	Nil		
71974	20	71998	Nil		

Per G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 76526 Date Oct. 17, 1989

Received Oct. 15, 1989 5 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
8442	Nil
8443	60/70
8444	30
8445	30
8446	20

Per G. Lebel

G. Lebel - Manager /ns

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File: Redeland Lake Assay

Certificate of Analysis

Certificate No. 76530 Date Oct. 17, 1989

Received Oct. 16,1989 41 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
72601	Nil	72622	20/10
72602	Nil	72623	Nil
72603	20	72624	Nil
72604	Nil	72625	Nil
72605	20/20	72626	Nil
72606	10	72627	Nil
72607	Nil	72628	Nil
72608	Nil	72629	20
72609	Nil	72630	10
72610	Nil	72631	Nil
72611	Nil	72632	Nil
72612	10/Nil	72633	Nil
72613	20	72634	Nil
72614	Nil	72635	Nil
72615	Nil	72636	Nil
72616	Nil	72637	10
72617	20	72638	Nil
72618	Nil	72639	Nil
72619	Nil	72640	20
72620	10	72641	60/70
72621	10		

Per G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 76502 Date Oct. 18, 1989

Received Oct. 12, 1989 58 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
72515	Nil	72537	Nil	72559	Nil/Nil
72516	Nil	72538	Nil	72560	Nil
72517	Nil	72539	10	72561	Nil
72518	Nil	72540	20	72562	Nil
72519	Nil/Nil	72541	Nil	72563	Nil
72520	Nil	72542	Nil	72564	Nil
72521	10	72543	50	72565	Nil
72522	Nil	72544	350/200	72566	Nil
72523	Nil	72545	Nil	72567	Nil
72524	Nil	72546	Nil	72568	Nil
72525	10	72547	Nil	72569	Nil/Nil
72526	20	72548	20/10	72570	Nil
72527	Nil	72549	Nil	72571	Nil
72528	Nil	72550	Nil	72572	Nil
72529	20	72551	Nil		
72530	20	72552	Nil		
72531	20	72553	Nil		
72532	130/150	72554	Nil		
72533	Nil	72555	Nil		
72534	Nil	72556	Nil		
72535	Nil	72557	Nil		
72536	10	72558	Nil		

Per G. Lebel

G. Lebel - Manager /ns

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File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76544 Date Oct. 18, 1989

Received Oct. 16, 1989 18 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
72669	100/150
72670	70
72671	70
72672	20
72673	20
72674	20
72675	Nil
72676	20/30
72677	10
72678	Nil
72679	Nil
72680	Nil
72681	Nil
72682	30
72683	10
72684	10/Nil
72685	Nil
72686	Nil

Per G. Lebel

G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 76565 Date Oct. 18, 1989

Received Oct. 17, 1989 3 Grab Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
71692	110/100
71693	50
71694	90

Per G. Lebel

G. Lebel - Manager /ns

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OCT 23 1989

Certificate of Analysis

Certificate No. 76575 Date Oct. 19, 1989

Received Oct. 18, 1989 14 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
72707	110
72708	30
72709	60
72710	50/50
72711	40
72712	Nil
72713	110
72714	Nil
72715	30
72716	Nil
72717	Nil
72718	10/10
72719	Nil
72720	Nil

Per G. Lebel - Manager ms

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OCT 25 1989

Certificate of Analysis

Certificate No. 76337A Date oct. 20, 1989

Received Sept. 25, 1989 1 rock sample

Submitted by Battle Mountain Canada Inc., Toronto, Ontario

proj#75JV28

SAMPLE NO.	GOLD (SECOND PULP) PPB
8375	990/900

Per G. Lebel, Manager/dg

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OCT 26 1989

File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76552 Date Oct. 23, 1989

Received Oct. 16, 1989 26 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

Proj. #75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
71623	40	71636	Nil
71624	240/190	71637	20/20
71625	90	71638	20
71626	60	71639	Nil
71627	90	71640	30
71628	40	71641	Nil
71629	10	71642	Nil
71630	50	71643	Nil
71631	190/160	71644	Nil
71632	150	71645	20
71633	30	71646	410/410
71634	90	71647	30
71635	90	71648	Nil

Per G. Lebel - Manager /ns

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Assaying - Consulting - Representation

OCT 27 1989

Certificate of Analysis

Certificate No. 76594 Date Oct.24, 1989

Received Oct. 19, 1989 37 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	GOLD g/t
8395	20	---
8396	20	---
8397	80	---
8398	10	---
8399	20	---
8400	110/130	---
72721	Nil	---
72722	20	---
72723	40	---
72724	20	---
72725	500	---
72726	2370	2.47
72727	3630	3.12
Second Pulp	3330	2.88
72728	3430	3.26
72729	1640	1.58
72730	1360	1.47
72731	1200	1.30
72732	20	---
72733	20	---
72734	Nil	---
72735	20	---
72736	20	---
72737	Nil	---
72738	260/260	---
72739	210	---
72740	470/620	---
72741	250	---
72801	10	---
72802	200	---
72803	10	---
72804	Nil	---
72805	Nil	---
72806	20	---
72807	Nil	
72808	Nil	---
72809	20	---
72810	3500	3.39
Second Pulp	3630	3.77

Per G. Lebel

G. Lebel - Manager /ns

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O.E.L. OCT 27 1989

Certificate of Analysis

Certificate No. 76595 Date Oct. 25, 1989

Received Oct. 20,, 1989 64 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB		SAMPLE NO.	GOLD PPB		SAMPLE NO.	GOLD PPB
72901	40		72924	5560	5.62 g/t	72948	50
72902	10		72925	7270	7.20	72949	30
72903	Nil		72926	3620	3.22	72950	Nil
72904	Nil		72927	1000	1.20	72951	Nil
72905	Nil		72928	1360	1.51	72952	Nil
72906	30		72929	80		72953	10
72907	2060	1.78 g/t	72930	20		72954	Nil
72908	10		72931	Nil		72955	20
72909	Nil		72932	Nil		72956	20/70
72910	10		72933	Nil		72957	Nil
72911	20		72934	660		72958	Nil
72912	20		72935	2810	3.67	72959	Nil
72913	440		72936	22220	24.27	72960	Nil
72914	2610	2.66 g/t	Second Pulp	21360	19.20	72961	10
72915	11660	10.97 g/t	72937	5280	5.59	72962	10
Second Pulp	11420	11.11 g/t	72938	890		72963	Nil
72916	340					72964	Nil
72917	200		72941	20		72968	Nil
72918	30		72942	Nil		72971	10
72919	Nil		72943	Nil		Con't....	
72920	50		72944	10			
72921	40		72945	Nil			
72922	1250	0.99 g/t	72946	440/480			
72923	9390	10.63 g/t	72947	330			
Second Pulp	9360	9.43					

Per G. Lebel

G. Lebel - Manager /ns

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Certificate No. 76595

SAMPLE NO.	GOLD g/t
72907	1.78
72914	2.64
72915	10.97
Second Pulp	11.11
72922	0.99
72923	10.63
Second Pulp	9.43
72924	5.62
72925	7.20
72926	3.22
72927	1.20
72928	1.51
72935	3.67
72936	24.27
Second Pulp	19.20
72937	5.59

Per G. Lebel

G. Lebel - Manager

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OCT 27 1989

File
Kirkland Lake
Assays

Certificate of Analysis

Certificate No. 76637 Date Oct. 25, 1989

Received Oct. 24, 1989 7 Core Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
72939	40
72940	10
72965	Nil
72966	Nil
72967	Nil
72969	20/20
72970	Nil

Per G. Lebel

G. Lebel - Manager /ns

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OCT 30 1989

File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76654 Date Oct. 26, 1989

Received Oct. 25, 1989 9 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
71897	50
71898	140/140
71899	Nil
71900	160
72758	120/130
72759	170
72760	230/240
72761	180
72762	120

Per G. Lebel

G. Lebel - Manager /ns

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NOV 3 1989

Certificate of Analysis

Certificate No. 76660 Date Oct. 30, 1989

Received Oct. 26, 1989 111 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
201	10	222	Nil	244 *	1120
202	Nil	223	Nil	245	170
203	Nil	224	Nil	246	90
204	10	225	Nil	247	10
205	70/120	226	Nil	248	Nil
206	70	227	10	249	30
207	30	228	Nil	250	20
208	Nil	229	70	251	Nil
209	10	230	130/150	252	Nil
210	Nil	231	90	253	450
211	10	232	60	254	610/600
212	Nil	233	20	255	160
213	20	234	Nil	256	50
214	130/130	235	20	257	20
215	20	236	Nil	258	70
216	Nil	237	40	259	Nil
217	30	238	300/290	260	20
218	Nil	239	130	261	10
219	Nil	240	110	262	10
220	10	241	10	263	20
221	Nil	242	Nil	Con't...	
		243	170		

Per G. Lebel - Manager //ns

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Certificate No. 76660 Page -2-

SAMPLE NO.	GOLD PPB
264	190
265	340
266	10
267	30
268 *	1710
Second Pulp	1510
269	130
270	10
271	Nil
272	20
273	Nil
274	Nil
275	30
276	20
277	30
278	70
279	180/200
280	100
281	140
282	40
283	40
284	110
285	40

SAMPLE NO.	GOLD PPB
286	20
287	30
288	50
289	460/450
290	320
291	250
292	110
293	10
294	Nil
295	Nil
296	Nil
297	Nil
298	20
299	10
300	10/10
501	Nil
502	Nil
503	10
504	Nil
505	Nil
506	10

SAMPLE NO.	GOLD PPB
507	Nil
508	Nil
509	30
510	Nil
511	20

SAMPLE NO.	GOLD g/t
244	1.30
268	1.71
Second Pulp	1.65

Per _____
G. Lebel - Manager

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Certificate of Analysis

Certificate No. 76669 Date Oct. 30, 1989

Received Oct. 27, 1989 6 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
72811	10
72812	Nil
72813	Nil
72814	10/Nil
72815	Nil
72816	Nil

Per G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 76680 Date Oct. 31, 1989

Received Oct. 27, 1989 1 Rock Sample

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
533	130/130

Per G. Lebel

G. Lebel - Manager /ns

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File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76678 Date Oct. 31, 1989

Received Oct. 27, 1989 21 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	GOLD g/t
512	80	---
513	110	---
514	4700	4.73
Second Pulp	4050	4.08
515	30	---
516	40	---
517	140	---
518	80	---
519	320	---
520	130	---
521	130	---
522	170	---
523	1920	1.75
524	Nil	---
525	70	---
526	70	---
527	150	---
528	40	---
529	60/70	---
530	50	---
531	50	---
532	50	---

Per G. Lebel

G. Lebel - Manager /ns

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NOV 6 1989

Certificate of Analysis

Certificate No. 76699 Date Nov. 3, 1989

Received Oct. 29, 1989 43 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario proj#75JV28

SAMPLE NO.	GOLD PPB		SAMPLE NO.	GOLD PPB
71649	30		71922	10
71650	340		71923	10
71901	10		71924	Nil
71902	10		71925	Nil
71903	40		71926	Nil
71904	7840	7.54 g/t	71927	10
second pulp	6860	7.89 g/t	71928	10
71905	40		71929	10
71906	Nil		71930	10
71907	Nil		71931	10
71908	Nil		71932	Nil
71909	Nil		71933	30/20
71910	Nil		71934	Nil
71911	Nil		71935	Nil
71912	10		71936	Nil
71913	20/10		71937	Nil
71914	10		71938	10
71915	Nil		71939	10
71916	Nil		71940	Nil
71917	Nil		71941	Nil
71918	10			
71919	10			
71920	Nil			
71921	Nil			

Per G. Lebel

G.Lebel, Manager/dg

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Assaying - Consulting - Representation

NOV 6 1989

Certificate of Analysis

Certificate No. 76700 Date Nov. 3, 1989

Received Oct. 30, 1989 43 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario 75JV28

SAMPLE NO.	GOLD PPB		SAMPLE NO.	GOLD PPB	
71684	10		72764	40	
71685	300/330		72765	70	
71686	10		72766	30	
71687	Nil		72767	290/280	
71688	20		72817	70	
71689	20		72718	10	
71690	Nil		72819	40	
71691	Nil		72820	10	
71695	Nil		72821	150	
71696	Nil		72822	20	
71697	Nil		72823	20	
71698	Nil/Nil		72824	10	
71699	Nil		72825	Nil	
71700	Nil		72826	20	
72751	Nil		72827	Nil	
72752	Nil		72828	200	
72753	Nil		72829	3630	3.22 g/t
72754	Nil		second pulp	3430	3.43 g/t
72755	Nil		72830	70	
72756	Nil		72831	30	
72757	10		72832	2740	2.61 g/t
72763	4660	4.53 g/t	72833	70	
second pulp	4590	4.66 g/t			

Per G. Lebel

G. Lebel, Manager/dg

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NOV 9 1989

Certificate of Analysis

Certificate No. 76719 Date Nov. 6, 1989

Received Oct. 31, 1989 36 rock samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario 75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
901	20	921	Nil
902	10	922	Nil
903	10	923	Nil
904	40/50	924	Nil
905	Nil	925	20/20
906	20	926	10
907	Nil	927	Nil
908	Nil	71942	Nil
909	Nil	71943	10
910	Nil	71944	Nil
911	20	71945	Nil
912	10	71946	Nil
913	Nil	71947	Nil
914	170/150	71948	20
915	Nil	71949	Nil
916	Nil	71950	20
917	40		
918	30		
919	10		
920	Nil		

Per G. Lebel, Manager/dg

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NOV 15 1989

Certificate of Analysis

Certificate No. 76761 Date Nov. 8, 1989

Received Nov.3, 1989 58 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
801	Nil	823	Nil	845	Nil
802	Nil	824	80	846	Nil
803	Nil	825	130	847	180
804	10	826	150/170	848	200/120
805	30	827	20	849	130
806	180/220	828	Nil	850	80
807	110	829	120	851	Nil
808	140	830	Nil	852	10
809	200	831	Nil	853	Nil
810	200	832	Nil	854	50
811	200/200	833	Nil	855	40
812	170	834	Nil	856	10
813	130	835	60	857	10
814	90	836	Nil	858	20
815	50	837	20		
816	20	838	30		
817	30	839	70		
818	50	840	70/80		
819	Nil	841	40		
820	80	842	70		
821	20	843	80		
822	160/160	844	10		

Per G. Lebel - Manager /ns

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NOV 15 1989

Certificate of Analysis

Certificate No. 76760 Date Nov. 10, 1989

Received Nov. 3, 1989 65 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P. O. #75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
534	40	559	Nil	584	Nil
535	20	560	Nil	585	Nil
536	160/180	561	40	586	Nil
537	160	562	Nil	587	20
538	90	563	50	588	Nil/Nil
539	Nil	564	Nil	589	Nil
540	110	565	Nil	590	Nil
541	30	566	Nil	591	10
542	40	567	90/100	592	Nil
543	10	568	10	593	Nil
544	Nil	569	Nil	594	Nil
545	40	570	Nil	595	Nil
546	10	571	Nil	596	Nil
547	30	572	Nil	597	Nil
548	50	573	Nil	598	Nil/Nil
549	30	574	Nil	599	Nil
550	60	575	Nil	600	Nil
551	150/120	576	Nil		
552	60	577	Nil		
553	Sample not received	578	Nil		
554	Sample not received	579	10		
555	20	580	Nil		
556	310/330	581	20		
557	50	582	Nil		
558	50	583	Nil		

Per G. Lebel

G. Lebel - Manager /hs

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NOV 15 1989

Certificate of Analysis

Certificate No. 76777 Date Nov. 10, 1989

Received Nov. 6, 1989 33 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB	GOLD g/t
72834	60	72852	10	---
72835	40	72853	250	---
72836	30	72854	10	---
72837	60	72855	3770	4.01
72838	30/40	Second Pulp	3050	3.26
72839	90	72856	6510	5.66
72840	20	Second Pulp	6030	6.31
72841	70	72857	70	---
72842	200	72858	3430	3.43
72843	130	Second Pulp	2850	2.88
72844	50	72859	340	---
72845	310	72860	30	---
72846	30	72861	30	---
78847	200	72862	40	---
72848	190/150	72863	1950	1.91
72849	60	Second Pulp	1710	1.85
72850	380	72864	20	---
72851	30	72865	30	---
		72866	40	---

Per G. Lebel

G. Lebel - Manager /ns

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J.B. ? O.E.L.
File: Ireland Lake Assays

Certificate of Analysis

Certificate No. 76816 Date Nov. 13, 1989

Received Nov. 9, 1989 11 Channel Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. 75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t
8298	20	---
8299	10	---
8300	1300	0.96
72742	480	---
72743	1920	2.54
72744	8570	9.46
Second Pulp	10290	9.94
72745	5280	5.49
72746	940	---
72747	210	---
72748	6170	6.10
72749	5140	6.79

Per G. Lebel - Manager /ns

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NOV 17 1989

Certificate of Analysis

Certificate No. 76836 Date Nov. 14, 1989

Received Nov. 13, 1989 3 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
72768	10
72769	10
72770	290/290

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NOV 30 1989

File: Kirkland Lake Assays

Certificate of Analysis

Certificate No. 76942 Date Nov. 27, 1989

Received Nov. 23, 1989 18 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

SAMPLE NO.	GOLD PPB
72972	320
72973	110
72974	360
72975	230
72976	180
72977	460/500
72978	210
72979	320
72980	Nil
72981	690/650
72982	Nil
72983	540/640
72984	Nil
72985	310
72986	Nil
72987	20
72988	Nil
72989	Nil

Per G. Lebel - Manager /ns

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Kirkland Lake Rapid Assays

DEC 11 1989

Certificate of Analysis

Certificate No. 77062 Date Dec. 6, 1989

Received Dec. 5, 1989 33 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t
602	10	---
603	Nil	---
604	Nil	---
605	Nil	---
606	Nil/Nil	---
607	10	---
608	Nil	---
609	Nil	---
610	10	---
611	40	---
612	7610	7.75
Second Pulp	7410	7.82
613	3840	4.59
614	2740	2.61
615	750	---
616	620/720	---
617	290	---
618	320	---
619	660	---
620	3090	3.22
621	1850	2.19
Second Pulp	2060	1.85
622	2400	2.88
623	820	---
624	40	---
625	90	---
626	Nil	---
627	30	---
628	30	---
629	Nil	---
630	20	---
631	10/Nil	---
632	Nil	---
633	Nil	---
634	Nil	---

Per G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 77063 Date Dec. 7, 1989

Received Dec. 5, 1989 3 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O#75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t
635	2400	2.40
636	9260	9.33
637	70/80	---

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Kirkland Lake Assays

DEC 15 1989

(75-JV-28)

Certificate of Analysis

Certificate No. 77095 **Date** Dec. 11, 1989

Received Dec. 7, 1989 54 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t	SAMPLE NO.	GOLD ppb	GOLD g/t
638	10	---	655	500	---
639	Nil	---	656	1650	1.71
640	10	---	657	2730	2.64
641	60	---	658	1760	1.76
642	1410	1.44	659	2190	1.89
643	660	---	660	1430	1.23
644	340	---	661	1120	1.03
645	60	---	662	40	---
646	30	---	663	2400	2.13
647	10	---	664	80	---
648	10	---	665	40	---
649	80	---	666	20	---
650	920	---	667	50	---
651	50	---	668	40	---
652	3840	4.42	669	240	---
Second Pulp		3.26	Con't....		
653	290	---			
654	2060	2.06			

Per G. Lebel - Manager /ns

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Certificate No. 77095 Page -2-

SAMPLE NO.	GOLD PPB	GOLD g/t	SILVER PPM	COPPER PPM	LEAD PPM	ZINC PPM
670	27220	28.53	7.5	73	848	84
Second Pulp		29.83				
671	1480	1.30	1.9	69	1030	51
672	20	---	0.1	61	4	64
673	30	---	0.1	85	13	63
674	20	---	0.1	110	3	137
675	1280	1.23	0.6	93	184	69
676	40	---	0.2	55	51	79
677	720	---	0.7	49	205	108
678	30	---	0.3	89	494	89
679	1470	1.41	2.1	81	3030	364
680	3090	3.33	1.3	41	433	181
681	1000	0.96	0.7	73	677	60
682	990	---	0.7	89	760	85
683	2190	2.26	2.2	389	1270	35
684	870	---	7.0	151	2530	37
685	3980	4.15	1.6	72	1050	36
686	200	---	0.3	63	873	78
687	620	---	1.2	281	2140	71
688	50	---	0.2	53	8	144
689	330	---	0.3	81	28	71
690	20	---	0.2	42	73	119
691	590	---	0.9	55	1070	71

Per G. Lebel - Manager

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Certificate of Analysis

Certificate No. 77096 Date Dec. 11, 1989

Received Dec. 7, 1989 11 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB
301	Nil
302	30
303	20
304	10
305	20/10
306	Nil
307	Nil
308	Nil
309	Nil/Nil
310	Nil
311	Nil

Per G. Lebel

G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 77116 Date Dec. 15, 1989

Received Dec. 11, 1989 37 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75JV28

SAMPLE NO.	GOLD PPB	SAMPLE NO.	GOLD PPB
312	50/30	332	Nil
313	40	333	Nil
314	30	334	10
315	Nil	335	20/20
316	20	336	Nil
317	Nil	337	Nil
318	Nil	338	Nil
319	Nil	339	10
320	Nil	340	50/70
321	Nil	341	Nil
322	Nil	342	Nil
323	20/20	343	Nil
324	30	344	Nil
325	30	345	40/20
326	10	346	20
327	Nil	347	Nil
328	Nil	348	10
329	10		
330	20		
331	20		

Per _____

G. Lebel - Manager /ns

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DEC 18 1989

Certificate of Analysis

Certificate No. 77101 Date Dec. 13, 1989

Received Dec. 8, 1989 9 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t	SILVER PPM	COPPER PPM	LEAD PPM	ZINC PPM
692	10	---	0.2	58	68	116
693	50	---	1.4	124	2150	48
694	10	---	0.2	329	254	153
695	4110	3.63	4.2	53	4040	38
Second Pulp	3430	3.39				
696	210	---	0.6	36	166	95
697	410/440	---	0.8	33	189	81
698	80	---	0.5	56	150	197
699	40	---	0.5	51	71	88
700	130	---	0.7	42	27	84

Per G. Lebel - Manager /ns

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DEC 18 1989

Certificate of Analysis

Certificate No. 77102 Date Dec. 13, 1989

Received Dec. 8, 1989 9 Rock Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t	SILVER PPM	COPPER PPM	LEAD PPM	ZINC PPM
72867	70	---	0.8	54	48	131
72868	2270	2.09	4.9	63	339	70
72869	5760	5.97	2.3	63	67	85
72870	60	---	0.4	32	157	89
72871	10	---	0.1	70	181	190
72872	11180	10.90	2.5	31	87	83
Second Pulp	11070	12.00				
72873	830	---	1.1	36	748	75
72874	90	---	0.3	288	529	117
72875	2610	2.85	0.8	49	24	74

Per G. Lebel - Manager /ns

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JAN 11 1990

Certificate of Analysis

Certificate No. 77282 Date Jan. 9, 1990

Received Jan. 4, 1990 3 Grab Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	GOLD PPB	GOLD g/t	SILVER PPM	COPPER PPM	LEAD PPM	ZINC PPM	MOLYBDENUM PPM
8447	34560	34.90	11.6	79	798	50	319
Second Pulp	31130	30.58					
8448	2740	3.22	---	---	---	---	---
8449	1080	1.10	---	---	---	---	---

Suspect Pb Tailings

Requested total element analyses of all these samples.

① CHARACTER SAMPLE OF CENTRAL ZONE AT 83+50 TRENCH

② WHOLE-ROCKS OF ①

Per G. Lebel

G. Lebel - Manager /ns

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JAN 15 1990

Certificate of Analysis

Certificate No. 77282A Date Jan. 11, 1990

Received Jan. 4, 1990 2 grab samples

Submitted by Battle Mountain Canada Inc. , Toronto, Ontario

SAMPLE NO.	SILVER PPM	COPPER PPM	LEAD PPM	ZINC PPM	MOLYBDENUM PPM
8448	6.1	29	247	54	215
8449	0.7	52	97	81	9

Per G. Lebel, Manager/dg

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Certificate of Analysis

Certificate No. 77282 - B Date Jan. 22, 1990

Received Jan. 4, 1990 3 Core Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O.#75JV28

SAMPLE NO.	TELLURIUM PPM	ANTIMONY PPM
8447	8	<5
8448	5	<5
8449	1	<5

Per G. Lebel

G. Lebel - Manager /ns

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Certificate of Analysis

Certificate No. 77282 - C Date Jan. 23, 1990

Received Jan. 4, 1990 3 Grab Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O #75JV28

WHOLE ROCK ANALYSIS

SAMPLE NO:		8447	8448	8449
SiO_2	%	71.31	68.14	59.21
Al_2O_3	%	7.81	9.64	13.42
Fe_2O_3	%	6.58	8.50	6.71
CaO	%	2.79	1.08	4.31
MgO	%	1.67	0.93	2.05
Na_2O	%	0.72	0.56	1.94
K_2O	%	4.01	4.97	5.62
TiO_2	%	0.34	0.69	0.69
MnO	%	0.30	0.07	0.45
P_2O_5	%	0.31	0.51	0.43
LOI	%	4.08	4.82	5.06
Ba	PPM	106	1281	1908
Cr	PPM	1155	968	416
Nb	PPM	190	193	182
Sr	PPM	241	195	716
Y	PPM	<10	28	24
Zr	PPM	107	343	329

Per G. Lebel - Manager /ns

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JAN 26 1990

Certificate of Analysis

Certificate No. 77282 - C Date Jan. 23, 1990

Received Jan. 4, 1990 3 Grab Samples

Submitted by Battle Mountain Canada Inc., Toronto, Ontario.

P.O. #75JV28

"Semi-Quantitative Multi-Element Analysis"

SAMPLE NO:		8447	8448	8449
Silver	PPM	43	43	20
Arsenic	PPM	<10	<10	<10
Boron	%	0.2	0.1	0.05
Barium	PPM	1900	1848	3201
Berillium	PPM	<10	<10	<10
Bismuth	PPM	<10	<10	<10
Cadmium	PPM	19	19	16
Cerium	PPM	<10	20	18
Cobalt	PPM	35	49	32
Chromium	PPM	905	675	292
Copper	PPM	65	40	70
Lanthanum	PPM	<10	72	45
Molybdenum	PPM	<10	<10	<10
Niobium	PPM	<10	<10	<10
Nickel	PPM	57	44	32
Lead	PPM	947	354	285
Sulphur	%	0.2	0.4	0.06
Antimony	PPM	<10	<10	<10
Selenium	PPM	<10	<10	<10
Tin	PPM	<10	<10	<10
Strontium	PPM	223	152	663
Tellurium	PPM	<10	<10	<10

SAMPLE NO:		8447	8448	8449
Thorium	PPM	<10	<10	<10
Uranium	PPM	<10	<10	<10
Vanadium	PPM	144	222	171
Tungsten	PPM	<10	<10	<10
Yttrium	PPM	<10	21	28
Zinc	PPM	59	67	111
Zirconium	PPM	98	319	343
Al_2O_3	%	7.27	6.19	13.30
Fe_2O_3	%	5.86	7.15	5.86
CaO	%	2.66	1.04	4.76
MgO	%	1.35	0.51	1.54
Na_2O	%	0.26	0.04	1.87
K_2O	%	2.88	3.48	4.56
TiO_2	%	0.2	0.4	0.4
MnO	%	0.2	0.06	0.3
P_2O_5	%	0.1	0.7	0.7
LOI	%	4.08	4.82	5.06

NOTE: Slight chromium contamination due to use of hard chrome steel pulverizer plates.

Per G. Lebel

G. Lebel - Manager /ns

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MAR 12 1990

Geochemical Analysis Certificate

0W-0272-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn:

Date: MAR-06-90

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We hereby certify the following Geochemical Analysis of 8 ROCK samples submitted MAR-05-90 by .

Sample Number	Au ppb	Au-Check ppb
72876	41	
72877	90	
72878	341	343
72879	38	
72880	7	
72881	31	
72882	27	
72883	75	48

Certified by G. Lebel

G. Lebel / Manager

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Bondar-Clegg & Company Ltd.
Suite [illegible]
Ottawa, Ontario
K1B 9C[illegible]
(613) 74[illegible] Telex 053-3233

BONDAR-CLEGG

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

Certificate of Analysis

FEB 12 1990

BATTLE MOUNTAIN (CANADA) INC.
390 BAY ST. SUITE 2910
TORONTO, ONTARIO
M5H 2Y2

[illegible]
[illegible]
Ottawa, Ont.
K1J 9G2
(613) 749-[illegible] Tlx: 053-3233

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Certificate of Analysis

REPORT: 090-40641.4 (COMPLETE)

REFERENCE INFO:

CLIENT: BATTLE MOUNTAIN (CANADA) INC.
PROJECT: NONE

SUBMITTED BY: DONALD R. BOUCHER
DATE PRINTED: 6-FEB-90

ORDER	ELEMENT	NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Au Gold	69	0.07 G/T		

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ASSORTED	69	-200	69	Pulverize -200	45

REMARKS: SAMPLES 621 (PULP) AND 658 (PULP) WERE
ORIGINALLY LISTED AS REJECTS.

G/T X 1000 =PPB

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Ottawa, [redacted]
K1J 9G[redacted]
(613) [redacted]

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REPORT: 090-40641.4

DATE PRINTED: 6-FEB-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Au G/T	SAMPLE NUMBER	ELEMENT UNITS	Au G/T
244 (PULP)		1.17	72727		3.02
245 (PULP)		0.10	72728		2.81
268 (PULP)		1.78	72729		1.30
514		3.19	72730		1.44
523		1.27	72731		0.89
612		7.54	72743		2.47
613		3.94	72744		9.70
614		2.23	72745		5.83
620		3.05	72748		5.90
621 (PULP)		1.95	72749		6.48
622		2.47	72810		3.36
635		2.33	72829 (PULP)		2.85
636		8.54	72832		2.02
642 (PULP)		1.20	72855		3.53
652 (PULP)		3.77	72856		6.00
654		1.71	72858		2.61
656		1.51	72907		0.17
657		2.40	72914 (PULP)		2.02
658 (PULP)		1.51	72915 (PULP)		10.83
659 (PULP)		1.92	72922 (PULP)		0.62
660 (PULP)		1.10	72923 (PULP)		7.92
661		0.86	72924 (PULP)		5.01
663		3.02	72925 (PULP)		7.95
670		30.00	72926 (PULP)		3.46
671		1.34	72927 (PULP)		0.89
675		1.06	72928 (PULP)		1.17
679		1.20	72935 (PULP)		3.09
680		3.09	72936 (PULP)		20.71
683		2.02	72937 (PULP)		5.55
685		4.25			
695		3.63			
8300		0.99			
8430		7.82			
8431		6.24			
8432		3.46			
8433		9.67			
8438		1.61			
71554 (PULP)		8.13			
71904 (PULP)		7.68			
72726		2.13			

Joe German, Chief Assayer

Bondar-Clegg & Company Ltd
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A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

FEB 26 1991

Certificate of Analysis

BATTLE MOUNTAIN (CANADA) INC.
390 BAY ST. SUITE 2910
TORONTO, ONTARIO
M5H 2Y2
ATTN: T.J. BOTTRILL

Bondar-Clegg & Company Ltd.
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Ottawa, Ontario
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(613) 749-2220 Telex 053-3233

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A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

Certificate of Analysis

REPORT: 090-40641.5 (COMPLETE)

REFERENCE INFO:

CLIENT: BATTLE MOUNTAIN (CANADA) INC.
PROJECT: NONE

SUBMITTED BY: D. R. BOUCHER
DATE PRINTED: 21-FEB-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Au	Gold	1	69 PPB		

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
OTHER	1	-200	1	Pulverize -200	1

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REPORT: 090-40641.5

DATE PRINTED: 21 FEB 90
PROJECT: NONE PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Au PPB
72907		103

Joe German, Chief Assayer

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FEB 22 1988

BATTLE MOUNTAIN (CANADA) INC.
390 BAY ST. SUITE 2910
TORONTO, ONTARIO
M5H 2Y2

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A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

Certificate of Analysis

REPORT: 090-40738.4 (COMPLETE)

REFERENCE INFO:

CLIENT: BATTLE MOUNTAIN (CANADA) INC.
PROJECT: NONE

SUBMITTED BY: VERNON M. SHEIN
DATE PRINTED: 19-FEB-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Au	Gold	69	69 PPB		

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ASSORTED	69	-200	69	Pulverize -200	61

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Certificate of Analysis

REPORT: 090-40738.4

DATE PRINTED: 19-FEB-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Au PPB	SAMPLE NUMBER	ELEMENT UNITS	Au PPB
682 (PULP)		823	8437		377
71656 (PULP)		686	71646		377
72828 (PULP)		171	71648		<69
72975 (PULP)		206	71657		<69
72979 (PULP)		274	71667		<69
72981 (PULP)		583	71716		<69
72983 (PULP)		583	71782		549
72985 (PULP)		274	71788		69
214		137	71849		<69
238		309	71855		171
239		69	71868		<69
243		137	71882		<69
254		549	71898		137
265		206	71958		206
284		<69	72725		411
290		686	72738		137
600		<69	72740		377
615		754	72746		994
616		651	72761		137
623		960	72767		240
643		480	72802		206
650		651	72842		171
655		514	72853		206
677		994	72864		<69
678		<69	72873		651
684		754	72913		274
687		549	72934		720
691		549	72938		1303
697		343	72946		411
8002		<69			
8234		377			
8246		<69			
8299		<69			
8311		<69			
8353		514			
8359		69			
8365		<69			
8381		240			
8383		171			
8390		240			

Joe Ferron, Chief Assayer

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0W-0651-RG1

Company: **BATTLE MOUNTAIN CANADA INC** Date: MAY-18-90

Project:

Attn: WAYNE BENHAM

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We hereby certify the following Geochemical Analysis of 19 ROCK samples submitted MAY-17-90 by BRIAN LADOUCEUR.

Sample Number	Au ppb	Au check ppb	Au g/t	Au check g/t
D-8601	17	17		
D-8602	21			
D-8603	24			
D-8604	72			
D-8605	161			
D-8606	11863	12412	12.75	12.34
D-8607	5074		4.32	
D-8608	2331		2.19	
D-8609	2949		2.90	
D-8610	4457		4.94	
D-8611	1851		1.47	
D-8612	2537		2.95	
D-8613	2194		2.40	
D-8614	196			
D-8615	185			
D-8616	3086		2.85	
D-8617	1382		1.37	
D-8618	17			
D-8619	7			

Certified by G. Lebel

G. Lebel / Manager

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0W-0655-RG1

Company: **Battle Mountain Canada Inc.**
Project: 75-JV-28
Attn: Wayne Benham

Date: MAY-23-90
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We hereby certify the following Geochemical Analysis of 13 rock samples submitted MAY-18-90 by .

Sample Number	Au ppb	Au check ppb
401	17	
402	38	45
403	Nil	
404	7	
405	Nil	
406	Nil	
407	Nil	
408	10	
409	10	
410	10	
411	10	
412	34	34
413	10	

Certified by G. Lebel

G. Lebel / Manager

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0W-0660-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: MAY-23-90
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We hereby certify the following Geochemical Analysis of 14 Rock samples submitted MAY-22-90 by Keith Barron.

Sample Number	Au ppb	Au 2nd ppb	Au g/t	Au 2nd g/t
414	Nil			
415	Nil	Nil		
416	Nil			
417	Nil			
418	37			
419	Nil			
420	51			
421	Nil			
422	Nil			
951	57			
952	631			
953	120			
954	93			
955	4457	5006	4.53	4.87

Certified by G. Lebel

G. Lebel / Manager

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0W-0661-RG1

Company: BATTLE MOUNTAIN CANADA INC.

Project:

Attn: WAYNE BENHAM

Date: MAY-24-90

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We hereby certify the following Geochemical Analysis of 63 Rock samples submitted MAY-22-90 by Brian Ladouceur.

Sample Number	Au ppb	Au 2nd ppb	Au g/t	Au 2nd g/t
8620-D	14			
8621	93			
8622	Nil			
8623	Nil			
8624	258			
8625	459	429 444		
8626	233			
8627	14			
8628	Nil			
8629	Nil			
8630	Nil			
8631	24			
8632	10			
8633	106			
8634	17			
8635	Nil			
8636	Nil			
8637	55			
8638	1430		1.35	
8639	2523		2.60	
8640	2232		2.13	
8641	1611		1.47	
8642	2811	2263	2.81	2.61 2.71
8643	922			
8644	650			
8645	261			
8646	1046		0.97	
8647	1632		1.45	
8648	41			
8649	Nil			

Certified by G. Lebel

G. Lebel / Manager

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Company: BATTLE MOUNTAIN CANADA INC.

Project:

Attn: WAYNE BENHAM

Date: MAY-24-90

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We hereby certify the following Geochemical Analysis of 63 Rock samples submitted MAY-22-90 by Brian Ladouceur.

Sample Number	Au ppb	Au 2nd ppb	Au g/t	Au 2nd g/t	
8650	Nil				
8651	10				
8652	Nil				
8653	909	933			
8654	10				
8655	14				
8656	Nil				
8657	10				
8658	21				
8659	35				
8660	10				
8661	10				
8662	3				
8663	Nil				
8664	24				
8665	3634		3.43		
8666	2743		2.57		
8667	1618		1.54		
8668	215				
8669	14880	14400	15.09	14.74	14.92
8670	1005		1.17		
8671	1227		1.13		
8672	Nil				
8673	Nil				
8674	Nil				
8675	Nil				
8676	Nil				
8677	Nil				
8678	72	94	83		
8679	Nil				

Certified by G. Lebel

G. Lebel / Manager

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Company: BATTLE MOUNTAIN CANADA INC.

Project:

Attn: WAYNE BENHAM

Date: MAY-24-90

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We hereby certify the following Geochemical Analysis of 63 Rock samples submitted MAY-22-90 by Brian Ladouceur.

Sample Number	Au ppb	Au 2nd ppb	Au g/t	Au 2nd g/t
8680	Nil			
8681	Nil			
8682	Nil			

Certified by G. Lebel

G. Lebel / Manager

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0W-0668-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**

Project:

Attn: WAYNE BENHAM

Date: MAY-24-90

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We hereby certify the following Geochemical Analysis of 7 ROCK samples submitted MAY-23-90 by M. MASSON.

Sample Number	Au ppb	Au check ppb
701	10	
702	Nil	
703	10	14
704	Nil	
705	Nil	
706	Nil	
707	Nil	

Certified by G. Lebel

G. Lebel / Manager

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0W-0669-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**

Date: MAY-25-90

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Attn: MR. WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 58 ROCK samples submitted MAY-23-90 by Brian Ladouceur.

Sample Number	Au ppb	Au check ppb	Au g/t	Au check g/t
D8683	10			
D8684	Nil			
D8685	17	17		
D8686	7			
D8687	2			
D8688	3			
D8689	Nil			
D8690	Nil			
D8691	7			
D8692	24			
D8693	Nil			
D8694	Nil			
D8695	195			
D8696	336			
D8697	72			
D8698	885			
D8699	2743	2743	2.40	2.67
D8700	1577		1.78	
D8701	3			
D8702	3			
D8703	Nil			
D8704	Nil			
D8705	Nil			
D8706	24			
D8707	7			
D8708	10			
D8709	10			
D8710	14			
D8711	20			
D8712	9			

Certified by G. Lebel

G. Lebel / Manager

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0W-0669-RG1

Company: BATTLE MOUNTAIN CANADA INC.

Date: MAY-25-90

Project:

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Attn: MR. WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 58 ROCK samples submitted MAY-23-90 by Brian Ladouceur.

Sample Number	Au ppb	Au check ppb	Au g/t	Au check g/t
D8713	3			
D8714	10			
D8715	3			
D8716	Nil			
D8717	Nil			
D8718	27			
D8719	28			
D8720	10			
D8721	75			
D8722	48	31	40	
D8723	17			
D8724	346			
D8725	326			
D8726	1399		1.27	
D8727	1063		0.91	
D8728	110			
D8729	21			
D8730	24			
D8731	43			
D8732	Nil			
D8733	27			
D8734	6514	6514	6.24	6.35 6.45
D8735	41			
D8736	3			
D8737	Nil			
D8738	21			
D8739	Nil			
D8740	Nil			

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0686-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: MAY-31-90

Project: 75-JV-28 Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT.P2N 3K1

Attn: WAYNE BENHAM 2. HOLD COPY

We hereby certify the following Geochemical Analysis of 5 rock samples submitted MAY-28-90 by Keith Barron.

Sample Number	Au ppb	Au check ppb
423	7	
424	34	27
425	7	
426	7	
427	55	

Certified by G. Lebel

G. Lebel / Manager

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Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: MAY-30-90
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We hereby certify the following Geochemical Analysis of 71 Grab samples submitted MAY-25-90 by Brian Ladouceur.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne
C-956	129			
C-957	1351		1.34	
D-8741	17			
D-8742	7			
D-8743	17			
D-8744	10			
D-8745	7			
D-8746	10			
D-8747	3			
D-8748	Nil			
D-8749	7			
D-8750	Nil			
D-8751	Nil			
D-8752	Nil			
D-8753	Nil			
D-8754	Nil			
D-8755	3			
D-8756	10			
D-8757	Nil			
D-8758	Nil			
D-8759	7			
D-8760	305	350		
D-8761	31			
D-8762	21			
D-8763	28			
D-8764	14			
D-8765	75			
D-8766	3086		3.22	
D-8767	4320	4937	4.87	5.01
D-8768	86			

Certified by G. Lebel

G. Lebel / Manager

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0W-0687-RG1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: MAY-30-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT.P2N 3K1
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We hereby certify the following Geochemical Analysis of 71 Grab samples submitted MAY-25-90 by Brian Ladouceur.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne
D-8769	7			
D-8770	14			
D-8771	3			
D-8772	14			
D-8773	336	411		
D-8774	92			
D-8775	110			
D-8776	38			
D-8777	Nil			
D-8778	Nil			
D-8779	7			
D-8780	Nil			
D-8781	Nil			
D-8782	17			
D-8783	Nil			
D-8784	3			
D-8785	Nil			
D-8786	141			
D-8787	72	69		
D-8788	41			
D-8789	34			
D-8790	7			
D-8791	21			
D-8792	27			
D-8793	Nil			
D-8794	69			
D-8795	137	118		
D-8796	86			
D-8797	72			
D-8798	Nil			

Certified by G. Lebel

G. Lebel / Manager

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0W-0687-RG1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: MAY-30-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT.P2N 3K1
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We hereby certify the following Geochemical Analysis of 71 Grab samples submitted MAY-25-90 by Brian Ladouceur.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne
D-8799	130			
D-8800	144			
D-8801	6994		6.65	
D-8802	12137	12686	12.07	12.69
D-8803	1227		1.71	
D-8804	34			
D-8805	17			
D-8806	7			
D-8807	Nil			
D-8808	Nil			
D-8809	7			

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0685-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-01-90
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We hereby certify the following Geochemical Analysis of 25 Channel Rock samples submitted MAY-28-90 by Robert Peever.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne
8810	14			
8811	24			
8812	14			
8813	3			
8814	41			
8815	Nil			
8816	233			
8817	2743		2.47	
8818	2126		2.33	
8819	1125		1.13	
8820	2606		2.47	
8821	2469		2.33	
8822	1450		1.51	
8823	2331		2.33	
8824	1042		1.23	
8825	1059		1.20	
8826	1776		1.79	
8827	734			
8828	909			
8829	4800		4.66	
8830	24206	22149	23.52	22.80
8831	2263		2.40	
8832	69			
8833	27			
8834	31			

Certified by G. Lebel

G. Lebel / Manager

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0W-0696-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: MR. WAYNE BENHAM

Date: JUN-01-90
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We hereby certify the following Geochemical Analysis of 16 ROCK samples submitted MAY-29-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne
8835	17			
8836	3			
8837	14	7		
8838	38			
8839	7			
8840	3			
8841	3			
8842	Nil			
8843	Nil			
8844	2126		1.82	
8845	970		1.10	
8846	850			
8847	1577		1.23	
8848	4800		4.94	
8849	14057	13886	14.81	13.71
8850	14263		13.61	

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0W-0704-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-01-90
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We hereby certify the following Geochemical Analysis of 12 ROCK samples submitted MAY-30-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne
8851	17		
8852	Nil		
8853	24	21	
8854	10		
8855	Nil		
8856	21		
8857	3		
8858	31		
8859	699	669	
8860	847		
8861	706		
8862	3137		3.12

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G. Lebel / Manager

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0W-0718-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-05-90
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We hereby certify the following Geochemical Analysis of 27 ROCK samples submitted MAY-31-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne
428	27			
431	48			
432	34			
433	130			
708	31			
709	24			
710	17			
711	2071		2.06	
712	405			
8863	3			
8864	17			
8865	171			
8866	10			
8867	27			
8868	Nil			
8869	3			
8870	230			
8871	120			
8872	72			
8873	58			
8874	38			
8875	75			
8876	984			
8877	2602	2057	2.54	2.06
8878	144			
8879	117			
8880	14			

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0W-0721-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-05-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
2. HOLD COPY

We hereby certify the following Geochemical Analysis of 26 ROCK samples submitted JUN-01-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne
429	82		
430	Nil		
8881	322		
8882	329	322	
8883	75		
8884	69		
8885	1687		1.68
8886	62		
8887	34		
8888	48	45	
8889	110		
8890	17		
8891	58		
8892	17		
8893	55		
8894	45		
8895	12		
8896	27		
8897	51		
8898	Nil		
8899	7		
8900	522	576	
8901	45		
8902	17		
8903	Nil		
8904	58		

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0W-0733-RG1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-06-90

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We hereby certify the following Geochemical Analysis of 24 CHANNEL SAMPLES samples submitted JUN-04-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb
8905	55	34
8906	Nil	
8907	31	
8908	Nil	
8909	Nil	
8910	7	
8911	Nil	
8912	10	17
8913	Nil	
8914	Nil	
8915	24	
8916	Nil	
8917	17	
8918	Nil	
8919	Nil	
8920	Nil	
8921	3	
8922	Nil	
8923	Nil	
8924	Nil	
8925	Nil	
8926	Nil	
8927	Nil	
8928	Nil	Nil

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0W-0734-RG1

Date: June-7-1990 MMM-DD-YY

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
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We hereby certify the following Geochemical Analysis of 18 ROCK samples submitted JUN-04-90 by KEITH BARRON.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au check g/tonne	Ag ppm	Cu ppm	Mo ppm	Pb ppm
434	Nil							
435	21							
436	7							
437	Nil							
438	Nil							
439	3							
440	3							
441	Nil							
442	Nil							
443	Nil							
444	682	754			0.6	32	4	63
445	525				3.4	25	409	2810
446	370				1.9	58	373	1290
447	3							
448	130	106						
713	22217	21874	21.46	21.57				
714	106							
715	36343	38503	35.52	37.58				

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0W-0748-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-08-90
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We hereby certify the following Geochemical Analysis of 24 ROCK samples submitted JUN-05-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au check g/tonne	Au 2nd g/tonne	Au 2nd g/tonne
8929	34				
8930	24				
8931	785				
8932	2359		2.67		
8933	796				
8934	247				
8935	648				
8936	14				
8937	24				
8938	151	137			
8939	102				
8940	10				
8941	5				
8942	3				
8943	Nil				
8944	Nil				
8945	Nil				
8946	17				
8947	14				
8948	Nil				
716	7				
717	15634		15.84	15.45	16.39
449	34				
450	10				

Certified by G. Lebel

G. Lebel / Manager

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0W-0756-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-08-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
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We hereby certify the following Geochemical Analysis of 13 ROCK samples submitted JUN-07-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au check g/tonne
958	141		
959	247		
8949	603	624	
8950	Nil		
8951	Nil		
8952	28		
8953	7		
8954	10		
8955	511	463	
8956	24		
8957	14		
8958	1539		1.41
8959	65		

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0W-0762-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-12-90
Project: 75-JV-28 Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
Attn: WAYNE BENHAM 2. HOLD COPY

We hereby certify the following Geochemical Analysis of 26 ROCK samples submitted JUN-08-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au 2nd ppb	Au g/tonne	Au 2nd g/tonne
718	17			
719	3			
720	48			
721	10			
722	3			
723	31			
724	10			
725	51			
8960	10			
8961	30			
8962	422			
8963	8572	9806	8.37	9.39
8964	1968		1.54	
8965	569			
8966	100			
8967	141			
8968	Nil			
8969	Nil			
8970	Nil			
8971	3			
8972	Nil			
8973	Nil			
8974	Nil			
8975	Nil			
8976	Nil	Nil		
8977	Nil			

Results in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0772-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-14-90
Project: 75-JV-28 Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
Attn: WAYNE BENHAM 2. HOLD COPY

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUN-11-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check g/tonne	Au 2nd g/tonne
8978	4200	4.15	4.15
8979	Nil		
8980	24		
8981	Nil		
8982	27	34	
8983	10		
8984	10		
8985	27		
8986	Nil		
8987	Nil		
8988	3		
8989	Nil		
8990	Nil		
8991	10		
8992	3		
8993	3		
8994	Nil		
8995	7		
8996	7		
8997	Nil		
8998	Nil		
8999	41	41	
9000	31		
12001	21		
12002	7		
12003	21		
12004	10		
12005	34		
12006	101		
12007	1313	1.27	

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G. Lebel / Manager

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We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUN-11-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check g/tonne	Au 2nd g/tonne
12008	34		
12009	1169	1.30	
12010	14		
12011	Nil		
12012	10		
12013	10		
12014	17	12	
12015	14		
12016	Nil		
12017	Nil		
12018	Nil		
12019	Nil		
12020	Nil		
12021	Nil		
12022	Nil		
12023	3		
12024	Nil		
12025	3		
12026	Nil		
12027	59		
12028	79	77	
12029	17		
12030	7		
12031	31		
12032	24		
12033	3		
12034	27		
12035	29		
12036	Nil		
12037	Nil		

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We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUN-11-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check g/tonne	Au 2nd g/tonne
12038	Nil		
12039	31	36	
12040	10		
12041	Nil		
12042	Nil		
12043	Nil		
12044	Nil		
12045	7		
12046	10		
12047	17	17	
12048	17		
12049	7		
12050	7		
12051	3		

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0W-0789-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-14-90
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We hereby certify the following Geochemical Analysis of 35 ROCK samples submitted JUN-12-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb
451	72	65
452	41	
453	48	
454	Nil	
455	16	
456	21	
457	3	
458	Nil	
459	17	
460	7	
461	Nil	
462	Nil	
463	86	99
464	10	
12052	Nil	
12053	14	
12054	3	
12055	Nil	
12056	33	
12057	24	
12058	41	48
12059	31	
12060	10	
12061	Nil	
12062	Nil	
12063	3	
12064	Nil	
12065	Nil	
12066	Nil	
12067	Nil	

Certified by G. Lebel

G. Lebel / Manager

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Attn: WAYNE BENHAM

Date: JUN-14-90
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We hereby certify the following Geochemical Analysis of 35 ROCK samples submitted JUN-12-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb
12068	3	
12069	Nil	
12070	7	14
12071	Nil	
12072	Nil	

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0801-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-18-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
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We hereby certify the following Geochemical Analysis of 24 ROCK samples submitted JUN-13-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne
12073	18			
12074	1440	1.34		
12075	2606	2.33		
12076	2263	2.09		
12077	7749	7.78		
12078	4594	4.18		
12079	19612	20.57	19.92	20.09
12080	8229	8.40		
12081	7406	7.13		
12082	6857	6.48		
12083	3840	3.84		
12084	3429	3.84		
12085	10149	9.74		
12086	10492	9.87	11.07	10.73
12087	3127	2.61		
12088	490			
12089	597			
12090	27			
12091	10			
12092	10			
12093	3086	2.61		
12094	4937	5.01		
12095	5109	5.14		
12096	75			

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0805-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-19-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE, ONT. P2N 3K1
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We hereby certify the following Geochemical Analysis of 28 ROCK samples submitted JUN-14-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au 2nd g/tonne	Au check 2nd g/t
12097	14	10			
12098	18				
12099	3				
12100	10				
12101	7				
12102	3				
12103	Nil				
12104	Nil				
12105	10				
12106	7				
12107	Nil				
12108	14	15			
12109	3				
12110	14				
12111	10				
12112	7				
12113	38				
12114	3909		3.63		
12115	6857		6.62		
12116	6446		5.93		
12117	1179		1.27		
12118	7269		6.27	6.07	5.76
12119	3497		2.78		
12120	237				
12121	257				
12122	45				
12123	17				
12124	14				

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0813-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-19-90

Project: 75-JV-28 Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1

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We hereby certify the following Geochemical Analysis of 18 ROCK samples submitted JUN-15-90 by .

Sample Number	Au ppb	Au check ppb	Au check g/tonne	Au 2nd g/tonne
12125	1			
12126	1			
12127	21			
12128	7			
12129	36			
12130	5966		5.42	5.62
12131	278			
12132	161			
12133	17			
12134	10			
12135	18			
12136	3			
12137	7			
12138	1			
12139	1			
12140	3			
12141	17			
12142	14	10		

Values reported in g/tonne were obtained using one assay ton fusions

Certified by G. Lebel

G. Lebel / Manager

P.O. Box 10, Swastika, Ontario P0K 1T0

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Geochemical Analysis Certificate

0W-0825-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-21-90
Project: 75-JV-28 Copy 1. hold
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 27 ROCK samples submitted JUN-18-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne
8001	117		
8002	398		
8003	545	549	
8004	473		
8005	1214		1.03
8006	444		
8007	17		
8008	Nil		
8009	34		
8010	21		
8011	17		
8012	3		
8013	Nil		
8014	3		
8015	10		
8016	10		
8017	Nil		
8018	3		
8019	Nil		
12143	Nil		
12144	Nil		
12145	Nil		
12146	Nil		
12147	Nil		
12148	Nil		
12149	Nil	Nil	
12150	Nil		

Au results in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

P.O. Box 10, Swastika, Ontario P0K 1T0
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Geochemical Analysis Certificate

0W-0834-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUN-21-90

Copy 1. hold

We hereby certify the following Geochemical Analysis of 22 ROCK samples submitted JUN-19-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb	Au g/tonne	Au 2nd g/tonne
8020	34			
8021	3			
8022	31			
8023	2626		1.71	
8024	2815		2.87	
8025	2544		2.30	
8026	1337		1.51	
8027	1330		1.20	
8028	3086		2.68	2.88
8029	1872		1.99	
8030	1851		1.57	
8031	24			
8032	Nil			
8033	58			
8034	Nil			
8035	Nil			
8036	5			
8037	10			
8038	Nil			
8039	Nil			
8040	Nil			
8041	7	3		

Au results in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0837-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-22-90

Project: 75-JV-28 Copy 1. HOLD

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 21 ROCK samples submitted JUN-20-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb
465	3	
466	45	
467	7	
468	14	
8042	24	
8043	7	
8044	17	
8045	24	
8046	38	
8047	10	10
8048	10	
8049	Nil	
8050	Nil	
8051	Nil	
8052	21	
8053	Nil	
8054	17	
8055	31	34
8056	27	
8057	21	
8058	21	

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0849-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-22-90
Project: 75-JV-28 Copy 1. hold
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 1 ROCK samples submitted JUN-22-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au check ppb
960	38	41

Certified by G. Lebel

G. Lebel / Manager

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0W-0850-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-26-90

Project: 75-JV-28 Copy 1. hold

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 9 ROCK samples submitted JUN-22-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne	Au 2nd g/tonne
8059	3		
8060	14		
8061	24		
8062	86		
8063	2606	2.67	
8064	26		
8065	5		
8066	6102	6.03	5.86
8067	2743	2.54	

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0863-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-26-90
Project: 75-JV-28 Copy 1. Hold for pick up 567-4048
Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 4 ROCK samples submitted JUN-25-90 by .

Sample Number	Au ppb	Au check ppb
469	3	
470	11	
471	24	27
472	Nil	

Certified by G. Lebel

G. Lebel / Manager

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Assay Certificate

0W-0888-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-29-90

Project: 75-JV-28 Copy 1. hold 567-4840

Attn: W. BENHAM

We hereby certify the following Assay of 26 ROCK samples submitted JUN-27-90 by .

Sample Number	Au ppb	Au g/tonne	Au 2nd g/tonne	Au check 2nd g/t
8091	22			
8092	7			
8093	34			
8094	10			
8095	22			
8096	14			
8097	Nil			
8098	21			
8099	4389	4.15		
8100	4114	4.39		
8101	15909	15.77		
8102	11726	11.86		
8103	4183	3.74		
8104	51			
8105	5211	4.59		
8106	16114	16.05	14.91	14.98
8107	233			
8108	48			
8109	10			
8110	Nil			
8111	Nil			
8112	14			
8113	Nil			
8114	7			
8115	14			
8116	24/17			

Results reported in g/tonne are assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0893-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUN-29-90

Project: 75-JV-28 Copy 1. hold 567-4840

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 6 ROCK samples submitted JUN-28-90 by H. DILLON-LEITCH.

Sample Number	Au ppb	Au check ppb
C-961	14	
C-962	34	34
C-963	7	
C-964	22	
C-965	7	
C-966	41	34

Certified by G. Lebel / Manager

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0W-0892-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-03-90
Copy 1. P.O.BOX 635,KIRKLAND LAKE,ONT. P2N 3K1
2. HOLD COPY

We hereby certify the following Geochemical Analysis of 23 ROCK samples submitted JUN-28-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne	Au 2nd g/tonne
8068	10		
8069	21		
8070	21		
8071	14		
8072	82		
8073	2407	2.54	
8074	967		
8075	106		
8076	17		
8077	295		
8078	285		
8079	216		
8080	27		
8081	115		
8082	3230	2.95	
8083	65		
8084	1721	1.58	
8085	206		
8086	57326	55.54	57.12
8087	23314	23.11	
8088	3771	4.05	
8089	72		
8090	51		

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0896-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W.BENHAM

Date: JUL-04-90

Copy 1. hold 567-4840

We hereby certify the following Geochemical Analysis of 28 ROCK samples submitted JUN-28-90 by M. Masson.

Sample Number	Au ppb	Au g/tonne	Au 2nd g/tonne
8117	14		
8118	Nil		
8119	31		
8120	34		
8121	175		
8122	1234	1.27	
8123	6583	5.28	
8124	5074	4.80	
8125	693		
8126	38		
8127	21		
8128	17		
8129	69		
8130	391		
8131	24823	24.10	25.95
8132	51		
8133	55		
8134	17		
8135	14		
8136	Nil		
8137	17		
8138	Nil		
8139	10		
8140	10		
8141	17		
8142	Nil		
8143	Nil		
8144	10		

Au results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0912-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-05-90

Copy 1. hold 567-4840

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUL-03-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne
473	17	
474	14	
475	17	
476	Nil	
477	69	
478	189/137	
479	Nil	
480	27	
481	69	
482	24	
483	7	
484	3	
485	31	
486	Nil	
487	Nil	
488	Nil	
489	1313	1.20
490	14	
491	163	
492	223	
553	675/686	
554	449	
967	7	
968	14	
969	10	
970	21	
971	Nil	
972	17	
973	3	
974	10	

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

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0W-0912-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-05-90
Project: 75-JV-28 Copy 1. hold 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUL-03-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne
975	89/69	
976	7	
977	7	
978	3	
979	14	
980	Nil	
981	Nil	
982	Nil	
983	7	
984	10	
985	Nil	
986	3	
987	10	
988	Nil/Nil	
989	Nil	
990	Nil	
8145	Nil	
8146	3	
8147	10	
8148	Nil	
8149	Nil	
8150	Nil	
11001	7	
11002	Nil	
11003	Nil	
11004	10	
11005	3	
11006	213/274	
11007	41	
11008	27	

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

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Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-05-90
Project: 75-JV-28 Copy 1. hold 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUL-03-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne
11009	24	
11010	10	
11011	Nil	
11012	19	
11013	14	
11014	27	
11015	17	
11016	Nil	
11017	14	
11018	Nil	
11019	10/14	
11020	17	
11021	10	
11022	10	

Results reported in g/tonne were assayed using 1 AT fusions

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0W-0913-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-06-90
Project: 75-JV-28 Copy 1. Hold Copy 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 17 ROCK samples submitted JUL-03-90 by R. PEEVER.

Sample Number	Au ppb	Au g/tonne	Au 2nd Pulp
11023	8366	7.54	
11024	315		
11025	38		
11026	21		
11027	51		
11028	86		
11029	103		
11030	2160	2.26	
11031	5194	4.94	
11032	960		
11033	1563	1.47	
11034	117		
11035	31		
11036	17		
11037	75		
11038	158		
11039	42069	41.83	43.80

NOTE: Results reported in g/tonne were assayed using 1 A.T. fusions.

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0921-RG1

Company: **BATTLE MOUNTAIN CANADA INC**
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-06-90
Copy 1. HOLD FOR PICK UP 567-4840

We hereby certify the following Geochemical Analysis of 16 ROCK samples submitted JUL-04-90 by M. MASSON.

Sample Number	Au ppb
11040	21
11041	Nil
11042	Nil
11043	7
11044	21
11045	7
11046	31-24
11047	10
11048	14
11049	Nil
11050	3
11051	Nil
11052	10/10
11053	10
11054	10
11055	Nil

Certified by G. Lebel

G. Lebel / Manager

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0W-0936-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-10-90
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We hereby certify the following Geochemical Analysis of 20 ROCK samples submitted JUL-06-90 by M. MASSON.

Sample Number	Au ppb	Au check ppb
11056	Nil	
11057	Nil	
11058	Nil	
11059	Nil	
11060	7	
11061	Nil	
11062	Nil	
11063	17	10
11064	7	
11065	14	
11066	Nil	
11067	21	
11068	3	
11069	Nil	
11070	34	
11071	14	
11072	3	3
11073	12	
11074	Nil	
11075	Nil	

Certified by G. Lebel

G. Lebel / Manager

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0W-0947-RG1

Company: BATTLE MOUNTAIN
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-10-90
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We hereby certify the following Geochemical Analysis of 38 ROCK samples submitted JUL-09-90 by M. Masson.

Sample Number	Au ppb	Au g/tonne	Au 2nd g/tonne
11076	10		
11077	Nil		
11078	3		
11079	Nil		
11080	7		
11081	Nil		
11082	10		
11083	1766	1.85	1.44
11084	1310	1.34	
11085	58		
11086	271		
11087	55		
11088	Nil		
11089	202		
11090	1382	1.32	
11091	10		
11092	14		
11093	7		
11094	3		
11095	17		
11096	10		
11097	38		
11098	549/651		
11099	254		
11100	69		
11101	41		
11102	41		
11103	45		
11104	38		
11105	65		

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0947-RG1

Company: BATTLE MOUNTAIN
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-10-90

Copy 1. HOLD COPY 567-4840

We hereby certify the following Geochemical Analysis of 38 ROCK samples submitted JUL-09-90 by M. Masson.

Sample Number	Au ppb	Au g/tonne	Au 2nd g/tonne
11106	199/171		
11107	Nil		
11108	10		
11109	7		
11110	7		
11111	7		
11112	3		
11113	10		

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0912-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-11-90

Copy 1. hold 567-4840

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUL-03-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne	Ag ppm	Cu ppm	Zn ppm
473	17				
474	14				
475	17				
476	Nil				
477	69				
478	189/137				
479	Nil				
480	27				
481	69				
482	24				
483	7				
484	3				
485	31				
486	Nil				
487	Nil				
488	Nil				
489	1313	1.20			
490	14				
491	163		0.3	162	320
492	223		1.4	528	518
553	675/686		2.0	164	112
554	449				
967	7				
968	14				
969	10				
970	21				
971	Nil				
972	17				
973	3				
974	10				

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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Company: BATTLE MOUNTAIN CANADA INC. Date: JUL-11-90
Project: 75-JV-28 Copy 1. hold 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUL-03-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne	Ag ppm	Cu ppm	Zn ppm
975	89/69				
976	7				
977	7				
978	3				
979	14				
980	Nil				
981	Nil				
982	Nil				
983	7				
984	10				
985	Nil				
986	3				
987	10				
988	Nil/Nil				
989	Nil				
990	Nil				
8145	Nil				
8146	3				
8147	10				
8148	Nil				
8149	Nil				
8150	Nil				
11001	7				
11002	Nil				
11003	Nil				
11004	10				
11005	3				
11006	213/274				
11007	41				
11008	27				

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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Project: 75-JV-28 Copy 1. hold 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 74 ROCK samples submitted JUL-03-90 by ROBERT PEEVER.

Sample Number	Au ppb	Au g/tonne	Ag ppm	Cu ppm	Zn ppm
11009	24				
11010	10				
11011	Nil				
11012	19				
11013	14				
11014	27				
11015	17				
11016	Nil				
11017	14				
11018	Nil				
11019	10/14				
11020	17				
11021	10				
11022	10				

Results reported in g/tonne were assayed using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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0W-0954-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-12-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 20 ROCK samples submitted JUL-10-90 by M. Masson.

Sample Number	Au ppb
C-991	10
C-992	10
C-993	3
C-994	Nil
11114	Nil
11115	10
11116	31/17
11117	10
11118	Nil
11119	10
11120	10
11121	14
11122	Nil
11123	17
11124	Nil
11125	75/75
11126	17
11127	Nil
11128	Nil
11129	10/10

Certified by G. Lebel

G. Lebel / Manager

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0W-0955-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-12-90

Project: 75-JV-28 DDH VA 90-1 Copy 1. HOLD COPY 567-4840

Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 17 CORE samples submitted JUL-10-90 by Keith Barran.

Sample Number	Au ppb	Ag ppm	Zn ppm
6074	31		
6075	38/34		
6076	21		
6077	Nil		
6078	7		
6079	Nil		
6080	Nil		
6081	Nil		
6082	Nil		
6083	Nil		
6084	Nil	0.4	614
6085	21/14	0.4	1180
6086	10		
6087	7		
6088	3		
6089	Nil		
6090	10		

Certified by G. Lebel

G. Lebel / Manager

P.O. Box 10, Swastika, Ontario P0K 1T0

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Geochemical Analysis Certificate

0W-0962-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-13-90
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We hereby certify the following Geochemical Analysis of 20 ROCK samples submitted JUL-11-90 by ROBERT PEEVER.

Sample Number	Au ppb
11130	21/21
11131	Nil
11132	Nil
11133	Nil
11134	Nil
11135	Nil
11136	7
11137	10
11138	5
11139	Nil
11140	Nil
11141	17/27
11142	3
11143	10
11144	10
11145	10/10
11146	Nil
11147	Nil
11148	Nil
11149	Nil

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0964-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-13-90
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We hereby certify the following Geochemical Analysis of 34 SAWN CORE samples submitted JUL-11-90 by ROBERT PEEVER.

Sample Number	Au ppb
6001	Nil
6002	Nil
6003	Nil
6004	Nil
6005	Nil
6006	82/72
6007	10
6008	7
6009	7
6010	21/17
6011	Nil
6012	Nil
6013	Nil
6014	Nil
6015	Nil
6016	Nil
6017	Nil
6018	Nil
6019	Nil
6020	Nil
6021	Nil
6022	Nil
6023	7
6024	3
6025	Nil
6026	Nil
6027	Nil
6028	7
6029	Nil
6030	Nil

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Company: BATTLE MOUNTAIN CANADA INC.
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Attn: WAYNE BENHAM

Date: JUL-13-90

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We hereby certify the following Geochemical Analysis of 34 SAWN CORE samples submitted JUL-11-90 by ROBERT PEEVER.

Sample Number	Au ppb
6031	7/10
6096	Nil
6097	Nil
6098	3

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0W-0970-RG1

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Project: 75-JV-28
Attn: WAYNE BENHAM

Date: JUL-13-90
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We hereby certify the following Geochemical Analysis of 28 DRILL CORE samples submitted JUL-11-90 by KEITH BARRON.

Sample Number	Au ppb
6032	24
6033	10
6034	295/350
6035	Nil
6036	7
6037	7
6038	7
6039	Nil
6040	Nil
6041	Nil
6042	Nil
6043	Nil
6044	Nil
6045	21/17
6046	Nil
6047	Nil
6048	Nil
6049	Nil
6050	Nil
6051	7
6052	Nil
6053	Nil
6054	Nil
6095	Nil
6099	Nil/Nil
6100	Nil
6101	Nil
6102	Nil

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0W-0976-RG2

Company: BATTLE MOUNTAIN CANADA INC
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-16-90

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We hereby certify the following Geochemical Analysis of 4 DRILL CORE samples submitted JUL-12-90 by K. BARRON.

Sample Number	Au ppb
6103	Nil
6104	Nil
6105	Nil
6106	Nil

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G. Lebel / Manager

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Geochemical Analysis Certificate

0W-0976-RG1

Company: **BATTLE MOUNTAIN CANADA INC** Date: JUL-16-90
Project: 75-JV-28 Copy 1. HOLD 567-4840
Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 30 DRILL CORE samples submitted JUL-12-90 by K. BARRON.

Sample Number	Au ppb	Au check ppb	Ag ppm	Cu ppm	Zn ppm
6139	48				653
6140	58	62			1530
6141	10				7080
6142	7				385
6143	Nil				2720
6144	146	134	1.6	418	2110
6126	7				
6127	Nil				
6128	Nil				
6129	Nil				
6130	Nil				
6055	Nil				
6056	7				
6057	Nil				
6058	7				
6059	Nil				
6060	Nil				
6061	Nil				
6062	10				
6063	Nil				
6064	25				
6065	240	247			
6066	24				
6067	3				
6068	Nil				
6069	Nil				
6070	Nil				
6071	Nil				
6072	7				
6073	Nil				

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0W-0977-RG1

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Project: 75-JV-28 Copy 1. HOLD 567-4840
Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 15 ROCK samples submitted JUL-12-90 by M.MASSON.

Sample Number	Au ppb	Au check ppb
11150	27	14
11151	Nil	
11152	Nil	
11153	Nil	
11154	10	
11155	7	
11156	Nil	
11157	34	38
11158	10	
11159	13	
11160	Nil	
11161	Nil	
11162	5	
11163	3	2
11164	7	

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Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-17-90

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We hereby certify the following Geochemical Analysis of 44 SPLIT CORE samples submitted JUL-13-90 by Jeff St.Jean.

Sample Number	Au ppb
6091	Nil
6092	10
6093	3
6094	31/34
6131	Nil
6132	Nil
6133	7
6134	10
6135	24
6136	10
6137	38
6138	48
6145	Nil
6146	62
6147	79/120
6148	51
6149	45
6150	55/55
6151	38
6152	14
6153	10
6154	3
6155	3
6156	7
6157	Nil
6158	Nil
6159	Nil
6160	10
6161	Nil
6162	10

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0W-0985-RG1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-17-90

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We hereby certify the following Geochemical Analysis of 44 SPLIT CORE samples submitted JUL-13-90 by Jeff St.Jean.

Sample Number	Au ppb
6163	10
6164	14
6165	58/51
6166	31
6167	10
6168	Nil
6169	41
6170	10
6171	Nil
6172	Nil
6173	3
6174	3
6175	Nil
6176	Nil

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0W-0996-RG1

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Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-18-90
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We hereby certify the following Geochemical Analysis of 14 ROCK samples submitted JUL-16-90 by M.MASSON.

Sample Number	Au ppb	Au check g/tonne
11165	3	
11166	7	
11167	10/7	
11168	Nil	
11169	7	
11170	Nil	
11171	Nil	
11172	10	
11173	Nil	
11174	Nil	
11175	7	
11176	Nil	
11177	1059	0.99
11178	939/789	

Results reported in g/tonne were assayed using 1 AT fusions

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0W-0997-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-18-90
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We hereby certify the following Geochemical Analysis of 19 DRILL CORE samples submitted JUL-16-90 by JEFF ST.JEAN.

Sample Number	Au ppb
6107	3
6108	27
6109	Nil
6110	Nil
6111	7
6112	10
6113	3
6114	31/31
6115	14
6116	Nil
6117	Nil
6118	3/3
6119	Nil
6120	Nil
6121	17
6122	Nil
6123	Nil
6124	Nil
6125	51

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Geochemical Analysis Certificate

0W-1003-RG1

Company: **BATTLE MOUNTAIN CANADA INC**
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-19-90

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We hereby certify the following Geochemical Analysis of 26 ROCK samples submitted JUL-17-90 by .

Sample Number	Au ppb	Au check g/tonne	Au 2nd g/tonne
11179	Nil		
11180	Nil		
11181	Nil		
11182	Nil		
11183	Nil	Nil	
11184	Nil		
11185	Nil		
11186	3		
11187	Nil		
11188	Nil		
11189	Nil		
11190	Nil		
11191	Nil		
11192	31		
11193	39497	39.15	40.25
11194	216		
11195	21		
11196	31		
11197	Nil		
11198	Nil		
11199	Nil		
11200	Nil		
11201	Nil		
11202	17		
11203	38/27		
11204	14		
11205	27		
11206	24		
11207	27		

Au results reported in g/tonne were assayed using 1 AT fusions

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0W-1012-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W. BENHAM

Date: JUL-19-90
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We hereby certify the following Assay of 18 ROCK samples submitted JUL-18-90 by M.MASSON.

Sample Number	Au ppb
11208	Nil
11209	3
11210	10/7
11211	10
11212	Nil
11213	Nil
11214	Nil
11215	3
11216	Nil
11217	Nil
11218	Nil
11219	Nil
11220	Nil
11221	14/14
11222	Nil
11223	Nil
11224	Nil
11225	Nil

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Geochemical Analysis Certificate

0W-1021-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-23-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 17 ROCK samples submitted JUL-19-90 by M. MASSON.

Sample Number	Au ppb
726	117/99
11226	17
11227	31
11228	Nil
11229	10/17
11230	3
11231	Nil
11232	Nil
11233	10
11234	5
11235	7
11236	Nil
11237	Nil
11238	31
11239	7
11240	41/34
11241	27

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0W-1028-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn:

Date: JUL-25-90
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We hereby certify the following Geochemical Analysis of 17 ROCK samples submitted JUL-20-90 by .

Sample Number	Au ppb	Au check g/tonne	Au 2nd g/tonne
11242	151		
11243	27		
11244	17		
11245	987		
11246	740235	761.11	834.45
11247	1783	1.47	
11248	178		
11249	233		
11250	76		
11251	2043	2.19	
11252	878		
11253	38		
11254	216	185	
11255	27		
11256	7		
11257	Nil		
11258	17		

Results reported in g/tonne were assayed using 1 AT fusions

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Geochemical Analysis Certificate

0W-1042-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-25-90

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Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 22 ROCK samples submitted JUL-23-90 by M. MASSON.

Sample Number	Au ppb
11259	45
11260	14
11261	7
11262	Nil
11263	3/3
11264	3
11265	Nil
11266	10
11267	Nil
11268	17/17
11269	Nil
11270	Nil
11271	Nil
11272	7
11273	24/21
11274	Nil
11275	Nil
11276	Nil
11277	Nil
11278	Nil
11279	Nil
11280	Nil

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0W-1047-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: JV-75-28
Attn: W. BENHAM

Date: JUL-26-90
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We hereby certify the following Geochemical Analysis of 20 ROCK samples submitted JUL-24-90 by R. PEEVER.

Sample Number	Au ppb
11281	21
11282	24
11283	38/41
11284	Nil
11285	3
11286	3
11287	10
11288	7
11289	21/14
11290	Nil
11291	Nil
11292	Nil
11293	Nil
11294	7
11295	7
11296	Nil
11297	14
11298	24/34
11299	21
11300	Nil

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0W-1058-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: JUL-27-90
Project: 75-J28 Copy 1. HOLD COPY 567-4840
Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 20 ROCK samples submitted JUL-25-90 by .

Sample Number	Au ppb
11301	3
11302	55
11303	120/120
11304	Nil
11305	7
11306	10
11307	Nil
11308	10
11309	3
11310	10
11311	10
11312	230/213
11313	117
11314	48
11315	10
11316	Nil
11317	58
11318	76
11319	58
11320	120/123

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1069-RG1

Company: **BATTLE MOUNTAIN CANADA INC** Date: JUL-31-90
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Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 16 rock samples submitted JUL-27-90 by JEFF ST.JEAN.

Sample Number	Au ppb
11321	38
11322	14
11323	Nil
11324	58/62
11325	41
11326	41
11327	69
11328	120
11329	65
11330	106/93
11331	14
11332	Nil
11333	82
11334	27
11335	123/130
11336	79

Certified by G. Lebel

G. Lebel / Manager

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0W-1087-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-02-90
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Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 19 ROCK samples submitted JUL-31-90 by .

Sample Number	Au ppb
11337	10
11338	Nil
11339	Nil
11340	Nil
11341	7
11342	3
11343	24/24
11344	21
11345	Nil
11346	55
11347	27
11348	45/34
11349	3
11350	53
11351	3
11352	58
11353	120/93
11354	22
11355	Nil

Certified by G. Lebel

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0W-1082-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-02-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 6 ROCK samples submitted JUL-30-90 by KEITH BARRON.

Sample Number	Au ppb
493	14
494	127/123
495	7
727	Nil
728	Nil
729	10

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G. Lebel / Manager

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0W-1099-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-03-90
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Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 9 ROCK/M.M. GRAB samples submitted AUG-01-90 by Jeff St. Jean.

Sample Number	Au ppb
730	51/38
731	14
11356	10
11357	27
11358	34
11359	83
11360	264/243
11361	9
11362	31

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Geochemical Analysis Certificate

0W-1105-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-07-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 13 ROCK samples submitted AUG-02-90 by JEFF ST. JEAN.

Sample Number	Au ppb
11363	24
11364	21
11365	34
11366 MISSING	--
11367	24
11368	10
11369	38/38
11370	17
11371	38
11372	17
11373	24/21
11374	17
11375	14

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0W-1116-RG1

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Attn: W. BENHAM

Date: AUG-08-90
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We hereby certify the following Geochemical Analysis of 10 ROCK samples submitted AUG-03-90 by M. MASSON.

Sample Number	Au ppb
11366	Nil
11376	549/357
11377	27
11378	Nil
11379	Nil
11380	Nil
11381	38/55
11382	Nil
11383	Nil
11384	3

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G. Lebel / Manager

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0W-1120-RG1

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Attn: WAYNE BENHAM

Date: AUG-09-90
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We hereby certify the following Geochemical Analysis of 4 ROCK samples submitted AUG-07-90 by M. MASSON.

Sample Number	Au ppb
11385	Nil
11386	3
11387	Nil
11388	Nil

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1130-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-13-90

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Attn: W. BENHAM

We hereby certify the following Geochemical Analysis of 12 ROCK samples submitted AUG-09-90 by .

Sample Number	Au ppb
11389	Nil
11390	17/17
11391	Nil
11392	Nil
11393	Nil
11394	Nil
11395	Nil
11396	Nil
11397	Nil
11398	Nil
11399	7
11400	10/14

Certified by _____

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1137-RG1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: AUG-14-90
Copy 1. HOLD COPY 567-4840

We hereby certify the following Geochemical Analysis of 31 ROCK samples submitted AUG-10-90 by JEFF ST.JEAN.

Sample Number	Au ppb
11401	Nil
11402	Nil
11403	Nil
11404	3
11405	Nil/Nil
11406	Nil
11407	Nil
11408	Nil
11409	3
11410	21
11411	Nil
11412	Nil
11413	Nil
11414	Nil
11415	24
11416	7/7
11417	Nil
11418	Nil
11419	Nil
11420	Nil
11421	Nil
11422	Nil
11423	Nil
11424	Nil
11425	Nil
11426	3
11427	Nil/Nil
11428	Nil
11429	Nil
11430	Nil
11431	Nil

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1150-RG1

Company: BATTLE MOUNTAIN CANADA INC. Date: AUG-16-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 33 ROCK samples submitted AUG-13-90 by JEFF ST. JEAN.

Sample Number	Au ppb
11432	Nil/Nil
11433	3
11434	Nil
11435	Nil
11436	Nil
11437	Nil
11438	Nil
11439	Nil
11440	Nil
11441	31
11442	250/274
11443	842/857
11444	168
11445	16
11446	120
11447	Nil
11448	Nil
11449	7
11450	3
11451	Nil
11452	7
11453	3
11454	Nil
11455	9
11456	48/41
11457	3
11458	31/31
11459	7
11460	Nil
11461	14

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0W-1150-RG1

Company: BATTLE MOUNTAIN CANADA INC. Date: AUG-16-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 33 ROCK samples submitted AUG-13-90 by JEFF ST. JEAN.

Sample Number	Au ppb
11462	Nil
11463	Nil
11464	7

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Geochemical Analysis Certificate

0W-1156-RG1

Company: BATTLE MOUNTAIN CANADA INC. Date: AUG-16-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 17 ROCK samples submitted AUG-14-90 by KEITH BARRON.

Sample Number	Au ppb
496	Nil
497	7
498	10
499	110/86
500	14
995	99/127
996	62
997	Nil
8138	14
8139	3
8140	Nil
8141	3
8142	Nil/Nil
8143	Nil
8144	Nil
8145	Nil
8146	Nil

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Geochemical Analysis Certificate

0W-1183-RG1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: AUG-21-90

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We hereby certify the following Geochemical Analysis of 33 ROCK samples submitted AUG-16-90 by WAYNE BENHAM.

Sample Number	Au ppb
11465	7
11466	14/7
11467	10
11468	Nil
11469	Nil
11470	10
11471	Nil
11472	Nil
11473	Nil
11474	Nil
11475	Nil
11476	Nil
11477	3
11478	Nil
11479	Nil
11480	Nil
11481	10/17
11482	Nil
11483	Nil
11484	Nil
11485	3
11486	10/3
11487	3
11488	Nil
11489	Nil
11490	Nil
11491	3
11492	Nil
11493	Nil
11494	Nil

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0W-1183-RG1

Company: BATTLE MOUNTAIN CANADA INC. Date: AUG-21-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 33 ROCK samples submitted AUG-16-90 by WAYNE BENHAM.

Sample Number	Au ppb
11495	3
11496	10
11497	7

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0W-1214-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-23-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 12 ROCK samples submitted AUG-21-90 by M. MASSON.

Sample Number	Au ppb	Au check ppb
732	7	
733	Nil	
998	1221	1440
999	1113	
1000	415	
125001	Nil	
125002	Nil	
125003	17	
125004	3	Nil
125005	Nil	
125006	Nil	
125007	Nil	

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0W-1190-RG1

Company: BATTLE MOUNTAIN CANADA INC
Project: 75-JV-28
Attn: W. BENHAM

Date: AUG-22-90

Copy 1. PHONE 567-4840

We hereby certify the following Geochemical Analysis of 26 ROCK samples submitted AUG-17-90 by R. PEEVER.

Sample Number	Au ppb
11498	3
11499	Nil/Nil
11500	Nil
11501	Nil
11502	7
11503	Nil
11504	Nil
11505	Nil
11506	3
11507	Nil
11508	14
11509	Nil
11510	Nil
11511	3
11512	Nil
11513	Nil
11514	Nil/Nil
11515	7
11516	Nil
11517	Nil
11518	Nil
11519	3/Nil
11520	14
11521	7
11522	Nil
11523	Nil

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1258-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: AUG-30-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 9 ROCK samples submitted AUG-27-90 by M. MASSON.

Sample Number	Au ppb
734	Nil
735	17
125008	3
125009	Nil
125010	27/27
125011	10
125012	14
125013	26
125014	24/21

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0W-1261-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: SEP-04-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 8 ROCK samples submitted AUG-28-90 by M. MASSON.

Sample Number	Au ppb
736	29
737	22
738	7
739	58/69
740	14
741	127
742	26
743	171/213

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1554-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: OCT-17-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 6 ROCK samples submitted OCT-15-90 by M. MASSON.

Sample Number	Au ppb
744	10
745	31/17
746	Nil
747	Nil
748	Nil
749	Nil

Label Stock

Certified by G. Lebel

G. Lebel / Manager

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Geochemical Analysis Certificate

0W-1554-RG1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: OCT-17-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Geochemical Analysis of 6 ROCK samples submitted OCT-15-90 by M. MASSON.

Sample Number	Au ppb
744	10
745	31/17
746	Nil
747	Nil
748	Nil
749	Nil

Certified by Donna Gardner

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0W-1611-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**

Date: NOV-09-90

Project:

Attn: WAYNE BENHAM

Copy 1. P.O.BOX 635,KIRKLAND LAKE, ONT.
2. HOLD PHONE 567-4840

We hereby certify the following Assay of 20 DRILL CORE samples submitted OCT-22-90 by WAYNE BENHAM.

Sample Number	Au g/tonne	Au check g/tonne	Au ppb
6230	Nil		
6231	Nil		Nil
6232	0.02	0.05	21
6233	Nil		Nil
6234	0.05		10
6235	0.01		10
6236	0.04		51
6237	0.01		17
6238	Nil		7
6239	0.02		31
6240	0.07		17
6241	0.02		21
6242	0.07		31
6243	0.09		72
6244	0.88	0.84	895
6245	0.36		346
6246	0.08		96
6247	0.04		34
6248	0.01		10
6249	0.04		27

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1618-RA1

Assay Certificate

Company: **BATTLE MOUNTAIN CANADA INC.**

Project:

Attn: WAYNE BENHAM

Date: OCT-24-90

Copy 1. P.O.BOX 635,KIRKLAND LAKE, ONT P2N 3K1
2. HOLD PHONE 567-4840

We hereby certify the following Assay of 50 DRILL CORE samples submitted OCT-22-90 by WAYNE BENHAM.

Sample Number	Au g/tonne	Au check g/tonne
6177	0.02	
6178	0.02	
6179	0.03	
6180	0.03	
6181	0.02	
6182	0.04	
6183	0.02	
6184	0.04	0.01
6185	0.02	
6186	0.02	
6187	0.03	
6188	0.01	
6189	0.01	
6190	0.01	
6191	0.03	
6192	0.02	0.01
6193	0.03	
6194	0.02	
6195	0.02	
6196	0.02	
6197	0.02	
6198	0.01	
6199	0.01	
6200	Nil	
6201	0.01	
6202	0.01	
6203	0.01	
6204	0.01	
6205	0.01	
6206	0.01	

Au was determined using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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Assay Certificate

0W-1618-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**

Date: OCT-24-90

Project:

Copy 1. P.O.BOX 635,KIRKLAND LAKE, ONT P2N 3K1

Attn: WAYNE BENHAM

2. HOLD PHONE 567-4840

We hereby certify the following Assay of 50 DRILL CORE samples submitted OCT-22-90 by WAYNE BENHAM.

Sample Number	Au g/tonne	Au check g/tonne
6207	0.01	
6208	0.01	
6209	0.01	
6210	0.01	
6211	0.01	0.01
6212	0.01	
6213	0.01	
6214	0.01	
6215	Nil	
6216	Nil	
6217	Nil	
6218	0.01	
6219	Nil	
6220	0.01	
6221	0.01	
6222	0.01	
6223	0.01	
6224	0.01	
6225	0.02	
6226	0.01	

Au was determined using 1 AT fusions

Certified by G. Lebel

G. Lebel / Manager

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Assay Certificate

0W-1619-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**

Date: OCT-25-90

Project:

Attn: WAYNE BENHAM

Copy 1. P.O.BOX 635, KIRKLAND LAKE,ONT. P2N 3K1
2. HOLD COPY
3. fax to 567-6448

We hereby certify the following Assay of 54 DRILL CORE samples submitted OCT-22-90 by WAYNE BENHAM.

Sample Number	Au g/tonne	Au check g/tonne
6227	Nil	
6228	Nil	
6229	0.02	
6250	Nil	
6251	0.01	
6252	0.01	
6253	0.01	
6254	0.01	0.01
6255	0.01	
6256	0.01	
6257	0.02	
6258	0.05	
6259	0.01	
6260	Nil	
6261	Nil	
6262	0.02	0.01
6263	Nil	
6264	0.01	
6265	Nil	
6266	Nil	
6267	0.01	
6268	0.01	
6269	0.02	
6270	Nil	
6271	0.01	0.01
6272	0.01	
6273	0.01	
6274	0.01	
6275	0.03	
6276	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1619-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**

Date: OCT-25-90

Project:

Attn: WAYNE BENHAM

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2. HOLD COPY
3. fax to 567-6448

We hereby certify the following Assay of 54 DRILL CORE samples submitted OCT-22-90 by WAYNE BENHAM.

Sample Number	Au g/tonne	Au check g/tonne
6277	0.02	
6278	Nil	
6279	0.01	
6280	Nil	
6281	0.01	
6282	0.02	
6283	0.01	0.01
6284	Nil	
6285	Nil	
6286	0.01	
6287	0.01	
6288	0.02	
6289	0.01	
6290	0.01	
6291	0.01	
6292	0.01	
6293	0.02	0.01
6294	0.01	
6295	0.01	
6296	0.01	
6297	Nil	
6298	Nil	
6299	Nil	
6300	Nil	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1632-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-09-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Assay of 54 SPLIT CORE samples submitted OCT-23-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au ppb
6301	Nil		
6302	Nil		
6303	0.01	0.03	
6304	Nil		
6305	0.03		
6306	0.01		
6307	0.01		
6308	0.01		
6309	0.03		
6310	Nil		
6311	0.01		
6312	0.01		10
6313	0.01		21
6314	Nil		3
6315	0.01	0.01	14
6316	0.01		10
6317	Nil		Nil
6318	Nil		Nil
6319	Nil		3
6320	0.01		10
6321	0.01		10
6322	0.16	0.17	182
6323	0.01		21
6324	0.02		31
6325	0.01		
6326	0.01		
6327	0.01		
6328	0.02	0.02	
6329	0.01		
6330	0.01		

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1632-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-09-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM

We hereby certify the following Assay of 54 SPLIT CORE samples submitted OCT-23-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au ppb
6331	0.01		
6332	Nil		
6333	0.01		
6334	0.01		
6335	0.02		
6336	0.04	0.05	
6337	0.01		
6338	Nil		
6339	Nil		
6340	0.01		
6341	0.01		
6342	0.01		
6343	Nil		
6344	Nil		
6345	0.02		
6346	Nil		
6347	0.02		
6348	0.02		
6349	0.03	0.02	
6350	0.01		
6351	Nil		
6352	Nil		
6353	Nil		
6354	0.01		

Au was determined using 1 AT fusions

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0W-1637-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: OCT-29-90
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2. FAX TO 567-6448

We hereby certify the following Assay of 18 SPLIT CORE samples submitted OCT-24-90 by M. Masson.

Sample Number	Au g/tonne	Au check g/tonne
6355	0.01	
6356	0.11	0.13
6357	0.02	
6358	0.02	
6359	0.01	
6360	0.01	
6361	0.05	
6362	0.01	
6363	0.02	
6364	0.01	
6365	Nil	
6366	Nil	
6367	Nil	
6368	Nil	
6369	Nil	
6370	Nil	
6371	0.02	0.01
6372	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1654-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: OCT-31-90

Project: 75-JV-28

Attn: W. BENHAM

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We hereby certify the following Assay of 30 SPLIT CORE samples submitted OCT-26-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne
6433	0.02	
6434	0.02	
6435	0.01	
6436	0.03	0.02
6437	0.01	
6438	0.01	
6439	0.01	
6440	0.01	
6441	Nil	
6442	Nil	
6443	Nil	
6444	0.03	
6445	0.01	0.01
6446	0.01	
6447	Nil	
6448	Nil	
6449	0.01	
6450	Nil	
6451	0.01	
6452	0.01	
6453	0.01	
6454	0.01	
6455	Nil	
6456	Nil	
6457	0.01	
6458	0.01	Nil
6459	Nil	
6460	Nil	
6461	Nil	
6462	Nil	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1648-RA1

Company: **Battle Mountain**
Project: 75-JV-28
Attn: W. Benham

Date: NOV-09-90

Copy 1. HOLD 567-4840
2. FAX TO 567-6448

We hereby certify the following Assay of 60 CORE samples submitted OCT-25-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t	Au ppb
6373	Nil				
6374	0.01				
6375	0.01				
6376	0.02	0.02			
6377	0.02				
6378	0.01				
6379	0.03				
6380	0.03				
6381	0.01				
6382	0.01				
6383	0.02				
6384	0.03				
6385	0.02				
6386	0.02				
6387	0.03				
6388	0.02				
6389	0.03				
6390	0.05	0.07			
6391	0.02				
6392	0.02				
6393	0.02				
6394	0.01				
6395	0.02				
6396	0.02				
6397	0.02				
6398	0.01				
6399	0.03	0.03			
6400	0.02				
6401	0.01				
6402	0.01				

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
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Assay Certificate

0W-1648-RA1

Company: **Battle Mountain**
Project: 75-JV-28
Attn: W. Benham

Date: NOV-09-90

Copy 1. HOLD 567-4840
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We hereby certify the following Assay of 60 CORE samples submitted OCT-25-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t	Au ppb
6403	0.01				
6404	0.02				
6405	0.01				
6406	0.02				
6407	0.02				
6408	0.02				
6409	0.03				
6410	0.01				Nil
6411	0.01	0.01			21
6412	0.02				17
6413	0.01				Nil
6414	0.02				Nil
6415	0.01				Nil
6416	0.70	0.96			627
6417	0.03				17
6418	0.02				10
6419	0.01				7
6420	0.02				14
6421	0.01				21
6422	0.02				17
6423	2.15	2.11	2.09	2.19	1992
6424	0.31				326
6425	0.31				326
6426	0.53				624
6427	0.10				72
6428	0.02				14
6429	0.90	1.03			833
6430	0.05				27
6431	0.03				24
6432	0.02				27

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1654-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W. BENHAM

Date: NOV-09-90

Copy 1. HOLD COPY
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We hereby certify the following Assay of 30 SPLIT CORE samples submitted OCT-26-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au ppb
6433	0.02		Nil
6434	0.02		45
6435	0.01		Nil
6436	0.03	0.02	24
6437	0.01		
6438	0.01		
6439	0.01		
6440	0.01		
6441	Nil		
6442	Nil		
6443	Nil		
6444	0.03		
6445	0.01	0.01	
6446	0.01		
6447	Nil		
6448	Nil		
6449	0.01		
6450	Nil		
6451	0.01		
6452	0.01		
6453	0.01		
6454	0.01		
6455	Nil		
6456	Nil		
6457	0.01		
6458	0.01	Nil	
6459	Nil		
6460	Nil		
6461	Nil		
6462	Nil		

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1664-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-09-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 49 SPLIT CORE samples submitted OCT-29-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t	Au ppb
6462 not rec'd					
6463	0.01				
6464	0.02				
6465	Nil				
6466	0.01				
6467	0.01	0.02			
6468	0.01				
6469	0.01				
6470	0.03				
6471	0.01				
6472	0.01				
6473	0.01				
6474	0.02				
6475	0.01	0.02			
6476	0.02				
6477	0.02				
6478	0.01				
6479	0.02				
6480	0.02				
6481	0.02				
6482	0.02	0.01			
6483	0.01				
6484	0.01				
6485	0.02				
6486	0.03				
6487	0.03				
6488	0.01				
6489	0.01				
6490	0.01				
6491	0.01				

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1664-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-09-90
Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 49 SPLIT CORE samples submitted OCT-29-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t	Au ppb
6492	0.01				
6493	0.01				
6494	0.01				10
6495	0.02				14
6496	0.05				10
6497	0.03				38
6498	0.02				10
6499	0.02				17
6500	0.09				93
6501	5.07	5.01	4.32	4.42	
6502	0.04				31
6503	0.04				34
6504	0.02				3
6505	0.02				17
6506	0.03				24
6507	0.01				
6508	0.02				
6509	0.03				
6510	0.02				
6511	0.02				

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1674-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-09-90

Project: 75-JV-28 Copy 1. FAX TO 567-6448

Attn: W. BENHAM

We hereby certify the following Assay of 45 SPLIT CORE samples submitted OCT-29-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne	Au ppb
6512	0.02				
6513	0.01				
6514	Nil				
6515	0.01				
6516	0.01				
6517	0.02				41
6518	0.10				113
6519	0.13				185
6520	0.16	0.19			182
6521	0.12				120
6522	0.25		0.25	0.25	285
6523	0.07				134/141
6524	0.28	0.28	0.23	0.28	387/477
6525	0.11				134
6526	0.02				45
6527	0.02				21
6528	0.07				65
6529	0.03				10
6530	0.01				
6531	0.01				
6532	0.01				
6533	0.01				
6534	0.01				
6535	0.04				31
6536	0.05				55
6537	0.04				62
6538	0.15				154
6539	0.03				48
6540	0.12				144
6541	0.15	0.19	0.16	0.14	158/230

Au was determined using 1 AT fusions

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Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W. BENHAM

Date: NOV-09-90

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We hereby certify the following Assay of 45 SPLIT CORE samples submitted OCT-29-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne	Au ppb
6542	0.01				10
6543	0.06				72
6544	0.08	0.07			79
6545	0.02				21
6546	0.01				
6547	0.02				
6548	0.01				
6549	0.02				
6550	Nil				
6551	0.02				
6552	0.02				
6553	0.02	0.03			
6554	0.03				
6555	0.03				
6556	0.02				

Au was determined using 1 AT fusions

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Attn: WAYNE BENHAM

Date: NOV-09-90
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We hereby certify the following Assay of 54 SPLIT CORE samples submitted OCT-30-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t	Au ppb
6557	Nil				
6558	0.02				
6559	0.01				
6560	Nil				
6561	Nil				
6562	Nil				
6563	Nil				
6564	0.03				
6565	0.08	0.07			
6566	Nil				
6567	Nil				
6568	Nil				
6569	0.02				
6570	0.01				
6571	Nil				
6572	0.01				
6573	0.01				
6574	Nil				
6575	0.01	0.01			
6576	0.01				
6577	0.01				
6578	Nil				
6579	Nil				
6580	Nil				
6581	0.01				10
6582	0.06				72
6583	0.23				247
6584	25.27	25.65	27.39	27.87	
6585	3.91	3.94			
6586	7.17	7.17			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Attn: WAYNE BENHAM

Date: NOV-09-90

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We hereby certify the following Assay of 54 SPLIT CORE samples submitted OCT-30-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t	Au ppb
6587	8.54	7.89	9.29	9.19	
6588	4.97	4.87			
6589	2.09	1.61			
6590	0.03				31
6591	0.08				65
6592	0.02				27
6593	0.02				21
6594	0.01				24
6595	0.01				
6596	Nil				
6597	Nil				
6598	0.02				
6599	Nil				
6600	Nil				
6601	0.01				
6602	Nil				
6603	Nil				
6604	Nil				
6605	Nil				
6606	Nil				
6607	Nil				
6608	0.01				
6609	Nil	Nil			
6610	Nil				

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Attn: W. BENHAM 2. hold

We hereby certify the following Assay of 53 SPLIT CORE samples submitted NOV-01-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
6611	0.01	0.01		
6612	0.01			
6613	Nil			
6614	Nil			
6615	0.01			
6616	0.01			
6617	Nil			
6618	Nil			
6619	0.01			
6620	0.01			
6621	0.01			
6622	0.01			
6623	0.02			
6624	0.04			
6625	0.02	0.02		
6626	0.01			
6627	0.04			
6628	0.01			
6629	0.01			
6630	0.01			
6631	0.02			
6632	0.03			
6633	0.02			
6634	0.03			
6635	0.01			
6636	0.03			
6637	0.02			
6638	0.02			
6639	0.02	0.02		
6640	Nil			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1702-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-07-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM 2. hold

We hereby certify the following Assay of 53 SPLIT CORE samples submitted NOV-01-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
6641	0.04			
6642	0.01			
6643	0.01			
6644	Nil			
6645	0.02			
6646	2.23	2.21		
6647	0.03			
6648	0.33			
6649	5.79	5.11	5.76	5.55
6650	0.11			
6651	0.18			
6652	0.03			
6653	Nil			
6654	0.01			
6655	0.01			
6656	0.01			
6657	0.01			
6658	0.01			
6659	0.01			
6660	0.01	0.01		
6661	0.02			
6662	0.02			
6663	0.01			

Au was determined using 1 AT fusions

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Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 43 SPLIT CORE samples submitted NOV-02-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne
6664	0.01	0.01		
6665	0.01			
6666	Nil			
6667	0.01			
6668	0.01			
6669	Nil			
6670	0.01			
6671	0.01			
6672	0.01			
6673	1.14	1.23		
6674	0.02			
6675	0.02			
6676	0.02			
6677	Nil			
6678	0.03			
6679	0.01			
6680	0.01			
6681	Nil			
6682	0.01			
6683	0.02			
6684	0.01			
6685	0.01			
6686	0.02			
6687	2.06	2.09		
6688	0.03			
6689	9.70	10.22	10.29	9.94
6690	0.03			
6691	Nil			
6692	0.02			
6693	0.01			

Au was determined using 1 AT fusions

Certified by Ruth Landin

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0W-1709-RA1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-08-90

Copy 1. HOLD COPY 567-4840
2. FAX TO 567-6448

We hereby certify the following Assay of 43 SPLIT CORE samples submitted NOV-02-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne
6694	Nil			
6695	Nil			
6696	Nil			
6697	0.01			
6698	0.02			
6699	0.01			
6700	Nil			
6701	Nil			
6702	Nil			
6703	0.01			
6704	0.07	0.07		
6705	0.01			
6706	Nil			

Au was determined using 1 AT fusions

Certified by Ruth Landin

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0W-1710-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-08-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 5 REJECTS samples submitted NOV-02-90 by M. MASSON.

Sample Number	Original Number	Cert No.	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne	Initial Au g/t	ppb	Date
11524	11247	1028	1.05	1.07	1.99	2.16	1.47		July 25/90
11525	11251	"	2.50	2.26			2.19		"
11526	11254	"	0.21					200	"
11527	11257	"	0.02					Nil	"
11528	72915	76595	11.11	10.49	11.25	10.87	11.04		Oct 25/89

Au was determined using 1 AT fusions

Certified by Ruth Landini

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Assay Certificate

0W-1718-RA1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-08-90
Copy 1. HOLD COPY 567-4840
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We hereby certify the following Assay of 39 SPLIT CORE samples submitted NOV-05-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne
6707	0.01	0.05		
6708	Nil			
6709	Nil			
6710	0.01			
6711	0.02			
6712	0.01			
6713	Nil			
6714	Nil			
6715	0.01			
6716	0.01			
6717	0.01	0.03		
6718	Nil			
6719	Nil			
6720	Nil			
6721	0.01			
6722	0.01			
6723	0.01			
6724	0.01			
6725	0.01			
6726	Nil			
6727	Nil			
6728	0.01			
6729	0.01	0.02		
6730	Nil			
6731	Nil			
6732	Nil			
6733	Nil			
6734	Nil			
6735	Nil			
6736	0.01			

Au was determined using 1 AT fusions

Certified by Ruth Landin

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Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-08-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 39 SPLIT CORE samples submitted NOV-05-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne
6737	Nil			
6738	0.01			
6739	0.02			
6740	0.01			
6741	11.25	11.59	11.45	10.70
6742	0.05			
6743	0.02			
6744	0.02			
6745	0.01			

Au was determined using 1 AT fusions

Certified by Ruth Landin

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Assay Certificate

0W-1724-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W. BENHAM

Date: NOV-08-90
Copy 1. HOLD COPY 567-4840
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We hereby certify the following Assay of 31 SPLIT CORE samples submitted NOV-06-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne
6746	0.01	0.01
6747	Nil	
6748	0.03	
6749	0.02	
6750	0.01	
6751	0.01	
6752	0.02	
6753	0.01	
6754	Nil	
6755	0.01	
6756	0.01	
6757	0.01	
6758	Nil	
6759	Nil	
6760	0.01	
6761	Nil	
6762	Nil	
6763	Nil	
6764	Nil	
6765	Nil	
6766	0.01	0.01
6767	0.01	
6768	Nil	
6769	Nil	
6770	Nil	
6771	Nil	
6772	Nil	
6773	0.01	
6774	Nil	
6775	Nil	
6776	Nil	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1732-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-12-90
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We hereby certify the following Assay of 15 SPLIT CORE samples submitted NOV-07-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6777	0.01	
6778	Nil	
6779	Nil	
6780	0.01	
6781	Nil	
6782	Nil	
6783	Nil	
6784	Nil	
6785	Nil	Nil
6786	Nil	
6787	0.01	
6788	Nil	
6789	Nil	
6790	0.67	0.63
6791	Nil	
6792 not rec'd		

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1745-RA1

Company: BATTLE MOUNTAIN
Project: 75-JV-28
Attn: W. BENHAM

Date: NOV-14-90
Copy 1. HOLD COPY 567-4840
2. FAX # 567-6448

We hereby certify the following Assay of 27 SPLIT CORE samples submitted NOV-08-90 by M. MASSON.

Sample Number	Au g/tonne	Au check g/tonne
6792	0.01	
6793	0.01	
6794	0.01	
6795	0.02	0.03
6796	Nil	
6797	0.01	
6798	0.02	
6799	0.01	
6800	0.02	
6801	0.01	
6802	0.02	
6803	0.01	
6804	0.01	
6805	Nil	
6806	0.04	
6807	0.03	
6808	0.01	
6809	0.05	0.07
6810	Nil	
6811	0.02	
6812	Nil	
6813	0.01	
6814	0.01	
6815	Nil	
6816	0.02	
6817	0.04	0.05
6818	0.02	
6819 NOT REC'D		

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1753-RA1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-14-90
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We hereby certify the following Assay of 15 SPLIT CORE samples submitted NOV-09-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6819	0.03	
6820	0.02	
6821	0.09	0.10
6822	Nil	
6823	0.01	
6824	0.02	
6825	0.01	
6826	0.01	
6827	0.02	
6828	0.02	0.03
6829	0.01	
6830	0.03	
6831	0.01	
6832	0.01	
6833	0.03	

Au was determined using 1 AT Fusions

Certified by Donna Gardner

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0W-1754-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-14-90

Project: 75-JV-28 Copy 1. 567-4840

Attn: W.BENHAM 2. FAX # 567-6448

We hereby certify the following Assay of 28 SPLIT CORE samples submitted NOV-09-90 by .

Sample Number	Au g/tonne	Au check g/tonne
6834	Nil	
6835	0.01	
6836	0.01	
6837	0.01	
6838	0.01	
6839	0.01	
6840	0.02	0.01
11551	0.02	
11552	0.01	
11553	0.01	
11554	0.01	
11555	0.01	
11556	0.01	
11557	0.02	
11558	0.01	
11559	0.01	
11560	0.01	
11561	0.01	
11562	0.01	0.01
11563	0.01	
11564	Nil	
11565	0.01	
11566	0.02	
11567	0.03	
11568	0.02	0.02
11569	0.02	
11570	0.02	
11571	0.01	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1767-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-15-90

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Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 48 SPLIT CORE samples submitted NOV-12-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6841	0.03	
6842	0.03	
6843	0.01	
6844	0.01	Nil
6845	0.01	
6846	0.01	
6847	0.01	
6848	0.02	
6849	0.01	
6850	Nil	
6851	Nil	
6852	0.02	
6853	0.01	
6854	0.01	
6855	0.01	0.01
6856	Nil	
6857	0.03	
6858	0.01	
6859	0.01	
6860	Nil	
6861	0.01	
6862	0.02	
6863	0.03	
6864	0.01	
6865	0.01	0.02
6866	0.01	
6867	0.01	
6868	0.01	
6869	0.01	
6870	0.01	0.03

Au was determined using 1 AT fusions

Certified by Donna Gardner

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We hereby certify the following Assay of 48 SPLIT CORE samples submitted NOV-12-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6871	0.03	
6872	0.01	
6873	0.01	
6874	0.01	0.01
6875	0.02	
6876	0.03	
6877	0.01	
6878	0.02	
6879	0.04	
6880	0.03	
6881	0.02	
6882	0.02	
6883	0.02	
6884	0.02	
6885	0.02	
6886	0.01	
6887	0.01	
6888	0.01	

Au was determined using 1 AT fusions

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Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 62 SPLIT CORE samples submitted NOV-14-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6889	0.01	
6890	Nil	
6891	0.01	
6892	0.01	
6893	Nil	
6894	0.06	
6895	0.03	
6896	0.01	
6897	0.01	
6898	0.01	0.01
6899	Nil	
6900	0.02	
6901	Nil	
6902	0.01	
6903	0.01	
6904	Nil	
6905	0.02	
6906	0.01	
6907	0.01	0.01
6908	0.01	
6909	Nil	
6910	0.01	0.01
6911	Nil	
6912	Nil	
6913	Nil	
6914	0.01	
6915	0.02	
6916	0.02	
6917	0.01	
6918	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 62 SPLIT CORE samples submitted NOV-14-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6919	0.01	
6920	Nil	
6921	0.01	
6922	0.01	0.01
6923	0.01	
6924	Nil	
6925	Nil	
6926	Nil	
6927	Nil	
6928	0.02	
6929	Nil	
6930	0.02	
6931	0.06	
6932	0.02	
6933	0.01	
6934	0.01	
6935	0.01	
6936	0.01	0.01
6937	0.02	
6938	Nil	
6939	0.01	
6940	0.01	
6941	0.01	
6942	0.01	
6943	0.01	
6944	0.01	
6945	0.03	
6946	Nil	
6947	Nil	
6948	Nil	

Au was determined using 1 AT fusions

Certified by Donna Yardley

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Date: NOV-16-90
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We hereby certify the following Assay of 62 SPLIT CORE samples submitted NOV-14-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6949	Nil	
6950	Nil	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-16-90
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We hereby certify the following Assay of 22 SPLIT CORE samples submitted NOV-14-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
6992	0.01			
6993	0.02			
6994	0.01			
6995	1.13			
6996	2.54	2.64		
6997	0.38			
6998	0.25			
6999	0.24			
7000	0.04			
7001	1.99	1.92	1.85	1.92
7002	0.47			
7003	0.55			
7004	1.21			
7005	1.30	1.30		
7006	1.04			
7007	0.96			
7008	0.07			
7009	0.02			
7010	0.01			
7011	Nil			
7012	0.02			
7013	Nil			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1789-RA1

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Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-20-90
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We hereby certify the following Assay of 41 SPLIT CORE samples submitted NOV-15-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6951	0.01	
6952	Nil	
6953	Nil	
6954	0.01	
6955	0.01	0.03
6956	0.01	
6957	Nil	
6958	Nil	
6959	Nil	
6960	Nil	
6961	0.02	
6962	0.01	
6963	Nil	
6964	0.01	0.02
6965	0.01	
6966	0.01	
6967	0.02	
6968	Nil	
6969	0.01	
6970	0.02	
6971	0.01	
6972	0.01	
6973	Nil	
6974	0.01	
6975	0.02	
6976	0.01	
6977	0.01	
6978	Nil	
6979	0.01	0.01
6980	0.01	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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We hereby certify the following Assay of 41 SPLIT CORE samples submitted NOV-15-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
6981	0.01	
6982	0.02	
6983	0.01	
6984	0.01	0.03
6985	0.02	
6986	0.02	
6987	0.02	
6988	0.02	
6989	0.01	
6990	0.01	
6991	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Attn: WAYNE BENHAM

Date: NOV-20-90

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We hereby certify the following Assay of 70 SPLIT CORE samples submitted NOV-16-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
11572	Nil	
11573	0.02	
11574	Nil	
11575	Nil	
11576	0.01	
11577	0.01	
11578	Nil	
11579	Nil	Nil
11580	0.01	
11581	Nil	
11582	0.01	
11583	Nil	
11584	Nil	0.01
11585	Nil	
11586	0.01	
11587	Nil	
11588	Nil	
11589	Nil	
11590	Nil	
11591	Nil	
11592	0.01	
11593	Nil	
11594	Nil	
11595	Nil	
11596	Nil	
11597	0.01	
11598	Nil	
11599	0.01	
11600	Nil	
11601	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-20-90

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We hereby certify the following Assay of 70 SPLIT CORE samples submitted NOV-16-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
11602	0.02	
11603	0.02	
11604	0.02	0.01
11605	0.01	
11606	0.01	
11607	0.01	
11608	0.01	
11609	0.01	
11610	0.01	
11611	0.01	
11612	0.01	
11613	0.01	
11614	0.01	
11615	0.01	
11616	0.02	0.01
11617	0.01	
11618	0.02	
11619	0.02	
11620	0.02	
11621	0.02	
11622	0.02	
11623	0.03	
11624	0.03	
11625	0.02	
11626	0.02	
11627	Nil	
11628	0.01	
11629	0.01	
11630	0.02	
11631	0.01	0.01

Au was determined using 1 AT fusions

Certified by Donna Yardley

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Date: NOV-20-90

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We hereby certify the following Assay of 70 SPLIT CORE samples submitted NOV-16-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
11632	0.01	
11633	0.01	
11634	0.01	0.01
11635	0.02	
11636	0.01	
11637	0.01	
11638	0.01	
11639	Nil	
11640	0.01	
11641	0.01	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1800-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: W. BENHAM

Date: NOV-20-90

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We hereby certify the following Assay of 27 SPLIT CORE samples submitted NOV-19-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7014	0.02			
7015	0.01			
7016	0.02	0.02		
7017	0.01			
7018	0.01			
7019	0.03			
7020	0.02			
7021	0.02			
7022	0.02			
7023	0.02			
7024	0.02			
7025	0.03			
7026	0.03			
7027	0.01			
7028	0.04			
7029	0.18			
7030	2.26	1.92		
7031	0.10			
7032	0.05			
7033	0.07			
7034	0.49			
7035	0.27			
7036	0.12			
7037	16.08	16.46	16.18	16.87
7038	0.03			
7039	0.02			
7040	0.04			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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0W-1805-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-20-90

Project: 75-JV-28 Copy 1. FAX TO 567-6448

Attn: W. BENHAM

We hereby certify the following Assay of 34 SPLIT CORE samples submitted NOV-19-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7041	0.06			
7042	0.10	0.10		
7043	0.15			
7044	0.08			
7045	0.24			
7046	0.11			
7047	0.02			
7048	0.02			
7049	0.02			
7050	0.33	0.27		
7051	0.16			
7052	0.04			
7053	0.04			
7054	0.08			
7055	0.10			
7056	0.04			
7057	0.01			
7058	0.04			
7059	0.03			
7060	0.01			
7061	0.01			
7062	0.01			
7063	0.01			
7064	0.01			
7065	0.18	0.21		
7066	0.04			
7067	0.02			
7068	0.01			
7069	0.02			
7070	0.06			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Date: NOV-20-90

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: W. BENHAM

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We hereby certify the following Assay of 34 SPLIT CORE samples submitted NOV-19-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7071	6.10	6.31	6.45	6.31
7072	0.03			
7073	0.01			
7074	0.02			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-22-90
Project: 75-JV-28 Copy 1. FAX # 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 33 SPLIT CORE samples submitted NOV-20-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
~~7074 NOT REC~~'D				
7075	Nil			
7076	0.01			
7077	Nil			
7078	0.02			
7079	0.01			
7080	0.01	0.01		
7081	0.01			
7082	0.01			
7083	0.05			
7084	0.01			
7085	0.03			
7086	0.01			
7087	0.02			
7088	0.01			
7089	0.01			
7090	0.03			
7091	1.11	1.00		
7092	2.85	2.50		
7093	2.75	2.78	3.09	3.12
7094	1.37	1.41		
7095	0.12			
7096	0.08			
7097	0.06			
7098	0.07	0.06		
7099	0.02			
7100	0.02			
7101	0.01			
7102	0.01			
7103	0.01			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Project: 75-JV-28
Attn: W. BENHAM

Date: NOV-22-90

Copy 1. FAX # 567-6448

We hereby certify the following Assay of 33 SPLIT CORE samples submitted NOV-20-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7104	0.01			
7105	0.01			
7106	0.06			
7107	0.06			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-23-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 38 SPLIT CORE samples submitted NOV-21-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7108	0.01			
7109	Nil			
7110	Nil			
7111	Nil			
7112	0.18			
7113	1.54	1.44		
7114	1.49			
7115	0.01			
7116	0.11			
7117	0.08			
7118	0.04			
7119	0.88			
7120	2.19	2.37		
7121	0.58			
7122	0.02			
7123	0.13			
7124	0.01			
7125	0.04			
7126	0.02			
7127	0.04			
7128	0.41			
7129	0.05			
7130	0.02			
7131	0.25			
7132	0.02			
7133	7.06	7.03		
7134	0.05			
7135	0.04			
7136	7.10	7.13		
7137	0.07			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1823-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-23-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 38 SPLIT CORE samples submitted NOV-21-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7138	0.04			
7139	13.06	12.72	12.58	13.10
7140	1.02			
7141	0.89			
7142	0.89			
7143	0.13			
7144	11.04	10.53	8.91	8.85
7145	0.36			

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705)642-3300

Swastika Laboratories

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Assaying - Consulting - Representation

Assay Certificate

RECEIVED DEC - 6 1990

0W-1828-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-23-90

Project: 75-JV-28

Attn: WAYNE BENHAM

Copy 1. HOLD COPY 567-4840

2. FAX TO 567-6448

We hereby certify the following Assay of 28 SPLIT CORE samples submitted NOV-22-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7146	0.05			
7147	0.25			
7148	0.02			
7149	2.39	2.54	2.13	1.92
7150	0.02			
7501	0.03			
7502	0.02			
7503	Nil			
7504	0.17			
7505	0.04			
7506	0.01			
7507	0.03			
7508	0.04	0.07		
7509	0.02			
7510	0.01			
7511	0.01			
7512	0.04			
7513	0.01			
7514	0.01			
7515	0.02			
7516	0.02			
7517	0.02			
7518	0.03	0.03		
7519	0.01			
7520	0.02			
7521	0.01			
7522	0.02			
7523	0.01			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1839-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-28-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 112 SAWN CORE samples submitted NOV-23-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7524	0.01	
7525	Nil	
7526	0.01	
7527	Nil	
7528	0.01	
7529	Nil	
7530	0.04	0.09
7531	Nil	
7532	Nil	
7533	0.02	
7534	0.01	
7535	0.01	
7536	0.02	
7537	Nil	
7538	Nil	
7539	Nil	Nil
7540	0.01	
7541	Nil	
7542	Nil	
7543	Nil	
7544	0.01	
7545	0.01	
7546	0.01	
7547	0.01	
7548	0.01	
7549	0.02	
7550	0.05	
7551	0.03	
7552	0.35	0.48
7553	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
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Assay Certificate

0W-1839-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-28-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 112 SAWN CORE samples submitted NOV-23-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7554	0.01	
7555	0.01	
7556	Nil	
7557	0.01	0.01
7558	0.01	
7559	Nil	
7560	Nil	
7561	Nil	
7562	0.01	
7563	Nil	
7564	Nil	
7565	0.01	
7566	0.01	
7567	0.37	0.35
7568	0.09	
7569	0.01	
7570	0.01	
7571	0.01	
7572	0.01	
7573	0.01	
7574	0.02	
7575	0.02	
7576	0.01	
7577	0.01	
7578	0.01	
7579	0.01	
7580	0.01	
7581	0.01	0.01
7582	0.01	
7583	0.01	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1839-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-28-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 112 SAWN CORE samples submitted NOV-23-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7584	0.01	
7585	0.01	
7586	0.01	
7587	0.01	
7588	0.06	0.04
7589	0.01	
7590	0.01	
7591	0.01	
7592	0.01	
7593	0.01	
7594	0.01	
7595	0.01	
7596	0.01	
7597	0.01	0.01
7598	0.01	
7599	0.01	
7600	0.01	
7601	0.01	
7602	0.01	
7603	0.01	
7604	0.02	
7605	0.01	
7606	0.01	
7607	Nil	
7608	0.01	
7609	0.02	0.02
7610	0.01	
7611	0.01	
7612	0.01	
7613	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1839-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-28-90
Project: 75-JV-28 Copy 1. FAX TO 567-6448
Attn: W. BENHAM

We hereby certify the following Assay of 112 SAWN CORE samples submitted NOV-23-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7614	0.01	
7615	0.01	
7616	0.02	
7617	0.01	
7618	0.02	0.02
7619	0.02	
7620	0.01	
7621	0.01	
7622	0.01	
7623	0.02	
7624	0.01	
7625	0.01	
7626	Nil	
7627	Nil	
7628	Nil	
7629	Nil	
7630	Nil	
7631	Nil	
7632	Nil	
7633	Nil	
7634	0.01	
7635	0.01	0.01

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244 FAX (705) 642-3300

FILE: KIRKLAND LAKE ASSAYS

& Company Ltd.
Road

Telex 053-3233

BONDAR-CLEGG

Certificate of Analysis

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

BATTLE MOUNTAIN (CANADA) INC.
MR. WAYNE BENHAM
BOX 635
KIRKLAND LAKE, ONTARIO
P2N 3K1

Bondar-Clegg & Company Ltd.
5420 Canotek Road
Ottawa, Ontario
K1J 9G2
(613) 749-[redacted] Telex 053-3233

BONDAR-CLEGG

Certificate of Analysis

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

REPORT: 090-43373.4 (COMPLETE)

REFERENCE INFO:

CLIENT: BATTLE MOUNTAIN (CANADA) INC.
PROJECT: NONE

SUBMITTED BY: W. BENHAM
DATE PRINTED: 28-NOV-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Au	Gold	42	0.07 G/T		

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
OTHER	42	-200	42	Pulverize -200	42

REPORT COPIES TO: MR. WAYNE BENHAM
FAX: 705-567-4840

INVOICE TO: MR. WAYNE BENHAM

Bondar-Clegg & Company Ltd.
5420 Canotek Road
Ottawa, Ontario
K1J 9G2
(613) 749-2220 Telex 053-3233

BONDAR-CLEGG

Certificate of Analysis

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

REPORT: 090-43373.4

DATE PRINTED: 28-NOV-90
PROJECT: NONE PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Au G/T	SAMPLE NUMBER	ELEMENT UNITS	Au G/T
125015		0.87	11533		11.53
125016		0.70	11534		10.93
125017		0.73			
125018		2.02			
125019		0.60			
125020		0.33			
125021		0.57			
125022		0.17			
125023		0.10			
125024		0.93			
125025		0.20			
125026		0.13			
125027		0.23			
125028		0.13			
125029		0.27			
125030		0.10			
125031		0.20			
125032		0.10			
125033		0.10			
125034		0.10			
125035		0.17			
125036		0.17			
125037		0.20			
125038		0.07			
125039		0.10			
125040		0.33			
125041		24.20			
125042		3.67			
125043		5.73			
125044		8.53			
125045		4.33			
125046		1.80			
125047		2.03			
125048		<0.07			
125049		<0.07			
125050		5.43			
11529		0.10			
11530		0.20			
11531		2.43			
11532		0.13			

Joe German, Chief Assayer

Bondar-Clegg & Company Ltd.
5420 Canotek Road
Ottawa, Ontario
K1J 9G2
(613) 749-2220 Telex 053-3233

BC BONDAR-CLEGG

Certificate of Analysis

A DIVISION OF INCHCAPE INSPECTION & TESTING SERVICES

REPORT: 590-43373.4

DATE PRINTED: 28-NOV-90
PROJECT: NONE PAGE 1

New SAMPLE NUMBER	Original Sample Number	ELEMENT UNITS	Au G/T	S. Lab Au g/t	±dif	% dif	SAMPLE NUMBER	ELEMENT UNITS	Au G/T			
125015	6244	0.87	0.86	+0.01	1.012	11533	6689		11.53	10.04	+1.49	1.148 *
125016	6245	0.70	0.36	+0.34	1.944	11534	6741		10.93	11.25	-0.32	0.972 *
125017	6416	0.73	0.84	-0.11	0.869							
125018	6423	2.02	2.14	-0.12	1.318 *							
125019	6424	0.60	0.31	+0.29	1.935							
125020	6425	0.33	0.31	+0.02	1.065							
125021	6426	0.57	0.53	+0.04	1.075							
125022	6427	0.17	0.10	+0.07	1.700							
125023	6428	0.10	0.02	+0.08	5.00 ←							
125024	6429	0.93	0.97	-0.04	0.959							
125025	6518	0.20	0.10	+0.10	2.00 ←							
125026	6519	0.13	0.13	0.00	1.00							
125027	6520	0.23	0.17	+0.06	1.353							
125028	6521	0.13	0.12	+0.01	1.083							
125029	6522	0.27	0.25	+0.02	1.08							
125030	6523	0.10	0.07	+0.03	1.429							
125031	6524	0.20	0.27	-0.07	0.741							
125032	6525	0.10	0.11	-0.01	0.909							
125033	6538	0.10	0.15	-0.05	0.667							
125034	6539	0.10	0.03	-0.07	3.333							
125035	6540	0.17	0.12	+0.05	1.417							
125036	6541	0.17	0.16	+0.01	1.063							
125037	6542	0.20	0.01	+0.19	20.00 ←							
125038	6543	0.07	0.06	+0.01	1.167							
125039	6544	0.10	0.08	+0.02	1.250							
125040	6583	0.33	0.23	+0.10	1.435							
125041	6584	24.20	26.55	-1.35	0.911 *							
125042	6585	3.67	3.93	-0.26	0.934 *							
125043	6586	5.73	7.17	-2.56	0.799 *							
125044	6587	8.53	8.73	-0.20	0.977 *							
125045	6588	4.33	4.92	-0.59	0.880 *							
125046	6589	1.80	1.85	-0.05	0.973 *							
125047	6646	2.03	2.22	-0.19	0.914							
125048	6647	<0.07	0.03	0	2.333							
125049	6648	<0.07	0.33	-0.26	0.212							
125050	6649	5.43	5.55	-0.12	0.978 *							
11529	6650	0.10	0.11	-0.01	0.909							
11530	6651	0.20	0.18	-0.02	1.111							
11531	6687	2.43	2.08	+0.35	1.168 *							
11532	6688	0.13	0.03	+0.10	4.333							

(1) Actual
n = 40
x̄ = -0.075
s = 0.543

(2) %
n = 42
x̄ = 1.818 = 181.8%
s = 3.014 = 301.4%

n = 40 (less 5, 20)
x̄ = 1.284 = 128.4%
s =

(3) ± 1.0 g/t (*)
n = 12
x̄ = 0.998 = 99.8%
s = 0.144 = 14.4%

x̄ = -0.327 g/t
s = 0.956 g/t

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Assay Certificate

0W-1842-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: NOV-29-90

Project: 75-JV-28 Copy 1. FAX # 567-6448

Attn: W.BENHAM

We hereby certify the following Assay of 20 SPLIT CORE samples submitted NOV-26-90 by R. PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
11642	0.01			
11643	0.01			
11644	0.01			
11645	0.01			
11646	0.01	0.01		
11647	0.01			
11648	Nil			
11649	0.02			
11650	Nil			
11651	0.01			
11652	0.01			
11653	0.02			
11654	Nil			
11655	0.01			
11656	0.02			
11657	1.12	1.18	1.03	0.96
11658	0.02			
11659	0.02			
11660	0.07			
11661	0.01			

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0

Telephone (705) 642-3244 FAX (705) 642-3300

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Assay Certificate

0W-1854-RA1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-30-90

Copy 1. HOLD COPY 567-4840
2. FAX TO 567-6448

We hereby certify the following Assay of 93 SPLIT CORE samples submitted NOV-27-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7636	0.01	
7637	0.03	
7638	0.04	
7639	0.03	
7640	0.01	
7641	0.03	
7642	0.05	0.03
7643	0.02	
7644	0.03	
7645	0.02	
7646	0.01	
7647	0.01	
7648	0.01	
7649	0.01	
7650	0.02	
7651	0.01	
7652	0.01	
7653	0.04	0.02
7654	0.01	
7655	0.01	
7656	0.02	
7657	0.01	
7658	0.02	0.03
7659	0.01	
7660	0.01	
7661	0.02	
7662	0.01	
7663	0.02	
7664	0.01	
7665	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Assay Certificate

0W-1854-RA1

Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-30-90
Copy 1. HOLD COPY 567-4840
2. FAX TO 567-6448

We hereby certify the following Assay of 93 SPLIT CORE samples submitted NOV-27-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7666	0.02	
7667	0.01	
7668	0.01	
7669	0.01	
7670	0.02	
7671	0.20	0.18
7672	0.01	
7673	0.01	
7674	0.02	
7675	0.02	
7676	0.03	
7677	0.02	
7678	0.02	
7679	0.02	
7680	0.04	
7681	0.02	0.01
7682	0.02	
7683	0.03	
7684	0.02	
7685	0.02	
7686	0.02	
7687	0.02	
7688	0.04	
7689	Nil	
7690	0.02	
7691	0.03	
7692	0.02	
7693	0.03	0.03
7694	0.02	
7695	0.02	

Au was determined using 1 AT fusions

Certified by Ilona Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

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Assay Certificate

0W-1854-RA1

Company: BATTLE MOUNTAIN CANADA INC. Date: NOV-30-90
Project: 75-JV-28
Attn: WAYNE BENHAM

Copy 1. HOLD COPY 567-4840
2. FAX TO 567-6448

We hereby certify the following Assay of 93 SPLIT CORE samples submitted NOV-27-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7696	0.02	
7697	0.07	0.04
7698	0.02	
7699	0.02	
7700	0.02	
7701	0.02	
7702	0.02	
7703	0.02	
7704	0.03	
7705	0.04	
7706	0.02	
7707	0.03	0.02
7708	0.02	
7709	Nil	
7710	0.02	
7711	0.02	
7712	0.03	
7713	0.03	
7714	Nil	
7715	0.02	
7716	0.02	
7717	0.02	0.03
7718	0.02	
7719	0.01	
7720	0.01	
7721	0.02	
7722	0.01	
7723	0.02	
7724	0.03	
7725	0.02	0.05

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705)642-3244. FAX (705)642-3300

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Assay Certificate

0W-1854-RA1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: NOV-30-90

Copy 1. HOLD COPY 567-4840
2. FAX TO 567-6448

We hereby certify the following Assay of 93 SPLIT CORE samples submitted NOV-27-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7726	0.02	
7727	0.02	
7728	0.02	

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244 FAX (705)642-3300

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Assay Certificate

0W-1866-RA1

Company: **BATTLE MOUNTAIN CANADA INC.** Date: DEC-05-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: W.BENHAM 2. FAX# 567-6448

We hereby certify the following Assay of 62 SPLIT CORE samples submitted NOV-29-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7729	0.01			
7730	Nil			
7731	Nil			
7732	Nil			
7733	Nil			
7734	0.01			
7735	Nil			
7736	Nil			
7737	Nil			
7738	Nil			
7739	Nil	0.01		
7740	0.01			
7741	Nil			
7742	Nil			
7743	Nil			
7744	Nil			
7745	Nil			
7746	Nil			
7747	0.01			
7748	0.03			
7749	0.01			
7750	0.02	0.03		
7751	0.01			
7752	0.01			
7753	0.01			
7754	0.01			
7755	Nil			
7756	Nil			
7757	Nil			
7758	Nil			

Au was determined using 1 AT fusions

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0

Telephone (705) 642-3244 FAX (705) 642-3300

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Assay Certificate

0W-1866-RA1

Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: W.BENHAM

Date: DEC-05-90

Copy 1. HOLD COPY 567-4840
2. FAX# 567-6448

We hereby certify the following Assay of 62 SPLIT CORE samples submitted NOV-29-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7759	Nil			
7760	Nil			
7761	Nil			
7762	0.01			
7763	Nil	Nil		
7764	0.01			
7765	0.01			
7766	0.05			
7767	0.02			
7768	0.01			
7769	0.59	0.41		
7770	0.20			
7771	0.61			
7772	0.24			
7773	7.71	7.17	5.76	5.49
7774	6.31	6.31	5.90	6.48
7775	0.05			
7776	0.03			
7777	0.02			
7778	Nil			
7779	Nil			
7780	0.01			
7781	0.02			
7782	0.02	0.04		
7783	0.01			
7784	0.02			
7785	0.01			
7786	0.05			
11662	0.01			
11663	0.01	0.01		

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Attn: W.BENHAM

Date: DEC-05-90
Copy 1. HOLD COPY 567-4840
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We hereby certify the following Assay of 62 SPLIT CORE samples submitted NOV-29-90 by .

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
11664	Nil			
11665	Nil			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 55 SPLIT CORE samples submitted DEC-03-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7787	0.01			
7788	0.02			
7789	0.01			
7790	0.02	0.01		
7791	0.02			
7792	0.01			
7793	0.01			
7794	0.01			
7795	0.01			
7796	0.02			
7797	0.01			
7798	0.01			
7799	0.02			
7800	0.02			
7801	0.02	0.01		
7802	0.01			
7803	Nil			
7804	0.01			
7805	0.01			
7806	0.04			
7807	Nil			
7808	0.01			
7809	0.01			
7810	Nil			
7811	0.02			
7812	Nil			
7813	Nil			
7814	Nil	Nil		
7815	0.01			
7816	Nil			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 55 SPLIT CORE samples submitted DEC-03-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7817	0.25			
7818	0.04			
7819	7.65	7.75	8.13	8.50
7820	0.12			
7821	0.02			
7822	0.15			
7823	0.02			
7824	0.01			
7825	0.02			
7826	0.02			
7827	0.01			
7828	Nil			
7829	Nil			
7830	0.01	0.01		
7831	0.02			
7832	Nil			
7833	0.01			
7834	Nil			
7835	0.01			
7836	0.01			
7837	0.01			
7838	0.01			
7839	Nil			
7840	Nil			
7841	Nil			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Project: 75-JV-28
Attn: WAYNE BENHAM

Date: DEC-06-90
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We hereby certify the following Assay of 6 SPLIT CORE samples submitted DEC-04-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7842	0.01	0.01
7843	0.01	
7844	Nil	
7845	0.01	
7846	Nil	
7847	Nil	

Au was determined using 1 AT fusions

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Company: BATTLE MOUNTAIN CANADA INC. Date: DEC-07-90

Project: 75-JV-28 Copy 1. HOLD COPY 567-4840

Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 35 SPLIT CORE samples submitted DEC-04-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7848	not rec'd			
7849	0.01			
7850	0.01			
7851	0.03			
7852	0.01			
7853	0.01			
7854	0.02			
7855	0.02			
7856	0.02			
7857	0.01			
7858	0.31			
7859	7.61	7.65	6.55	6.65
7860	1.00			
7861	2.40	2.19		
7862	0.42			
7863	0.02			
7864	0.02			
7865	0.01			
7866	Nil			
7867	0.01			
7868	0.02			
7869	0.01			
7870	0.02			
7871	0.01			
7872	0.01			
7873	0.01			
7874	0.02			
7875	0.02	0.02		
7876	0.04			
7877	0.02			

Au was determined using 1 AT fusions

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Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 35 SPLIT CORE samples submitted DEC-04-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7878	0.02			
7879	0.02			
7880	0.02			
7881	0.02			
7882	0.02			
7883	0.02			

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Company: **BATTLE MOUNTAIN CANADA INC.**
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: DEC-10-90
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We hereby certify the following Assay of 27 SPLIT CORE samples submitted DEC-05-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7884	0.12	0.22
7885	0.03	
7886	0.09	
7887	0.02	
7888	Nil	
7889	0.01	
7890	0.01	
7891	0.02	
7892	0.01	
7893	0.02	
7894	0.02	
7895	0.20	
7896	0.28	
7897	0.44	0.43
7898	0.06	
7899	Nil	
7900	Nil	
7901	0.02	
7902	0.01	
7903	0.01	
7904	Nil	
7905	0.01	
7906	0.04	
7907	0.01	
7908	0.01	
7909	0.02	
7910	0.01	0.01

Au was determined using 1 AT fusions

Certified by R Landin

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Attn: WAYNE BENHAM

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We hereby certify the following Assay of 50 SPLIT CORE samples submitted DEC-06-90 by ROBERT PEEVER.

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Sample Number	Au g/tonne	Au check g/tonne
7911	0.01	
7912	Nil	
7913	0.01	
7914	Nil	
7915	Nil	
7916	0.01	
7917	Nil	0.01
7918	0.01	
7919	0.01	
7920	0.01	
7921	0.01	
7922	0.04	0.02
7923	0.01	
7924	0.01	
7925	0.01	
7926	0.01	
7927	0.01	
7928	0.01	
7929	Nil	
7930	0.01	
7931	0.02	
7932	0.04	
7933	0.03	0.03
7934	0.02	
7935	0.04	
7936	0.01	
7937	Nil	
7938	0.01	
7939	0.02	
7940	0.01	

Certified by Donna Gardner

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Project: 75-JV-28 Copy 1. HOLD COPY 567-4840
Attn: WAYNE BENHAM 2. FAX TO 567-6448

We hereby certify the following Assay of 50 SPLIT CORE samples submitted DEC-06-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
7941	0.01	
7942	0.01	
7943	0.08	0.03
7944	0.01	
7945	0.01	
7946	0.01	
7947	0.01	
7948	0.01	
7949	0.01	
7950	0.01	
7951	0.01	
7952	0.01	
7953	0.01	
7954	0.01	
7955	0.01	
7956	0.01	
7957	0.01	
7958	0.01	
7959	0.01	
7960	0.01	0.04

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Company: BATTLE MOUNTAIN CANADA INC.
Project: 75-JV-28
Attn: WAYNE BENHAM

Date: DEC-12-90
Copy 1. HOLD COPY 567-4840
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We hereby certify the following Assay of 100 SPLIT CORE samples submitted DEC-07-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7961	0.01			
7962	0.01			
7963	0.01			
7964	0.01			
7965	0.02			
7966	0.02			
7967	0.02			
7968	0.02			
7969	0.01	0.01		
7970	0.02			
7971	0.01			
7972	0.01			
7973	0.01			
7974	0.02			
7975	0.01			
7976	0.01			
7977	0.02			
7978	0.02			
7979	0.02			
7980	0.03			
7981	0.02	0.01		
7982	0.02			
7983	0.02			
7984	0.01			
7985	0.01			
7986	0.01			
7987	Nil			
7988	Nil	Nil		
7989	Nil			
7990	0.01			

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Project: 75-JV-28
Attn: WAYNE BENHAM

Copy 1. HOLD COPY 567-4840
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We hereby certify the following Assay of 100 SPLIT CORE samples submitted DEC-07-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
7991	Nil			
7992	Nil			
7993	0.01			
7994	0.01			
7995	Nil			
7996	0.01			
7997	0.02			
7998	0.02			
7999	0.01	0.01		
8000	0.01			
11701	0.02			
11702	0.02			
11703	0.02			
11704	0.02			
11705	0.02			
11706	0.75			
11707	4.39	4.22	3.81	3.70
11708	1.54			
11709	0.03			
11710	0.02			
11711	0.01			
11712	0.03			
11713	0.01			
11714	0.01			
11715	0.01			
11716	0.01			
11717	0.02	0.02		
11718	0.01			
11719	0.01			
11720	0.01			

Certified by Donna Gardner

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We hereby certify the following Assay of 100 SPLIT CORE samples submitted DEC-07-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
11721	0.01			
11722	0.01			
11723	0.01			
11724	0.01			
11725	0.01	0.02		
11726	0.01			
11727	0.01			
11728	0.01			
11729	0.01			
11730	0.02			
11731	0.01			
11732	Nil			
11733	0.01			
11734	0.02			
11735	0.01			
11736	0.02			
11737	0.02			
11738	0.01			
11739	0.01			
11740	0.02			
11741	0.01			
11742	0.02			
11743	0.02			
11744	0.01	0.01		
11745	0.01			
11746	0.01			
11747	0.01			
11748	0.02			
11749	0.01			
11750	0.03			

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We hereby certify the following Assay of 100 SPLIT CORE samples submitted DEC-07-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check 2nd g/t
11751	0.02			
11752	0.01			
11753	0.01			
11754	0.01			
11755	0.01			
11756	0.01			
11757	0.01			
11758	0.01			
11759	Nil			
11760	0.01	0.01		

Certified by Donna Gardner

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Project: 75-JV-28
Attn: WAYNE BENHAM

Date: DEC-13-90

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2. FAX TO 267-6448

We hereby certify the following Assay of 82 SPLIT CORE samples submitted DEC-10-90 by ROBERT PEEVER.

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Sample Number	Au g/tonne	Au check g/tonne
11761	0.01	
11762	0.01	
11763	0.02	0.02
11764	0.01	
11765	0.01	
11766	0.01	
11767	0.04	
11768	0.01	
11769	0.01	
11770	0.02	
11771	0.01	
11772	0.01	
11773	0.02	
11774	Nil	
11775	Nil	
11776	Nil	
11777	Nil	
11778	Nil	0.01
11779	0.01	
11780	Nil	
11781	Nil	
11782	Nil	
11783	Nil	
11784	0.01	
11785	Nil	
11786	0.01	
11787	0.01	
11788	0.02	
11789	0.01	
11790	Nil	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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We hereby certify the following Assay of 82 SPLIT CORE samples submitted DEC-10-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
11791	Nil	
11792	Nil	
11793	0.01	0.02
11794	Nil	
11795	Nil	
11796	0.01	
11797	0.02	
11798	0.01	
11799	0.01	
11800	0.01	
11801	Nil	
11802	0.01	0.01
11803	0.01	
11804	0.01	
11805	0.01	
11806	0.01	
11807	0.01	
11808	0.01	
11809	0.01	
11810	0.02	
11811	0.01	
11812	0.01	
11813	0.02	
11814	0.02	0.01
11815	0.01	
11816	0.01	
11817	0.01	
11818	0.01	
11819	0.01	
11820	0.01	

Au was determined using 1 AT fusions

Certified by Donna Gardner

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Attn: WAYNE BENHAM 2. FAX TO 267-6448

We hereby certify the following Assay of 82 SPLIT CORE samples submitted DEC-10-90 by ROBERT PEEVER.

Sample Number	Au g/tonne	Au check g/tonne
11821	0.01	
11822	0.01	
11823	0.02	
11824	0.02	
11825	0.01	
11826	0.03	
11827	0.01	0.01
11828	0.01	
11829	0.02	
11830	0.01	
11831	0.01	
11832	0.01	
11833	0.01	
11834	0.01	
11835	0.01	
11836	0.01	
11837	Nil	
11838	0.01	
11839	0.01	
11840	0.01	
11841	Nil	
11842	0.01	0.01

Au was determined using 1 AT fusions

Certified by Donna Gardner

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STRATAGEX

42A01NE0100 63.6025 EBY

090

REPORT

on

MAGNETIC AND HLEM SURVEYS

VIGRASS LAKE PROPERTY

KIRKLAND LAKE

ONTARIO

for

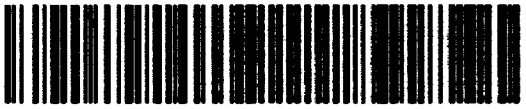
BATTLE MOUNTAIN (CANADA) INC

Toronto, Ont.

J. Roth

STRATAGEX LTD

September, 1990 **Toronto, Ont**



090C

REPORT on MAGNETIC & HLEM SURVEYS VIGRASS LAKE PROPERTY KIRKLAND LAKE, ONTARIO

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STRATAGEX

REPORT ON
MAGNETIC AND HLEM SURVEYS
VIGRASS LAKE PROPERTY

SUMMARY

Magnetometer and horizontal loop EM surveys were executed by Val d'or Geophysique during the period March-April, 1990, over claims comprising the Vigrass Lake property located southwest of Kirkland Lake, Ontario. These surveys form part of an integrated exploration program for gold deposits being conducted by Battle Mountain (Canada) Inc. within portions of this prolific gold district.

The Vigrass Lake property is known from past geological mapping and substantial prior exploration to be underlain by Timiskaming Group sediments and volcanics to the north and Larder Lake Group volcanics and subordinate sediments to the south, along with syenitic intrusives, all of which exhibit a general east-west to east-northeast fabric. Several persistent ENE strike faults (Larder Lake and Blanche River) extend across the property. A number of geochemically interesting gold occurrences occur associated with ENE to E-W shear zones, although none have achieved producer status.

The magnetic survey, totalling 55.1 km, was carried out in very detailed fashion reading both total field and vertical gradient. The results are interpreted to define eight lithomagnetic domains which likely define subunits of the Timiskaming and Larder Lake Groups. A series of dominantly east-west strike faults are inferred; while several correspond to known faults, a number are new and hence of interest as favourable loci for gold mineralization. Comparison and correlation of the detailed ground survey data with district-wide aeromagnetic surveys has enabled identification of the more persistent structural and lithologic features, while the ground data enables

recognition of subtle structural elements and lithologic units beyond the resolving power of the airborne survey.

The MaxMin horizontal loop EM survey, comprising 22 km in the south-central sector of the property, was conducted with a 50m coil separation at three frequencies. The results, after correction for local topographic effects, define 16 conductive zones of possible, probable or definite bedrock origin. Most of the conductors are judged to be graphitic beds within a sedimentary subunit of the Larder Lake Group, consistent with the results of past and recent drilling; however, undrilled conductors, particularly associated with interpreted faults, retain interest for further investigation.

Based on the geophysical results, taken in the context of pertinent geological information, it is recommended that:

1) Additional mapping, sampling and trenching be directed at interpreted strike faults, particularly where geological and/or geochemical encouragement is discerned.

2) Undrilled EM conductors be similarly checked as to geological environment;

3) The present interpretation be reviewed and revised as new information is obtained and/or new gold occurrences identified;

4) Detailed IP/resistivity surveys be considered if encouraging gold mineralization associated with disseminated sulphides is encountered.

1.0 INTRODUCTION

This report treats the results of a combined magnetometer and MaxMin horizontal loop EM survey completed over most of the Vigrass Lake property currently being explored by Battle Mountain (Canada) Inc. under an agreement with HSK Minerals Ltd. (now Queenston Mining Inc.)

The property, located in the southwest sector of the Kirkland Lake gold camp, is centered on Vigrass Lake immediately south and west of the town of Swastika, straddling the east-west boundary between Otto and Teck Townships.

This property is one of several under intensive exploration by Battle Mountain for new gold deposits similar to those already discovered in this prolific district. The present geophysical surveys comprise one component of an integrated exploration effort which has included regional geophysical surveys and geological studies as well as detailed mapping, trenching and sampling programs and limited drilling on specific properties.

2.0 GEOLOGY & PRIOR EXPLORATION

The Vigrass Lake property is underlain by portions of the Timiskaming and Larder Lake Groups, two assemblage of Precambrian lithologies typical of the Kirkland Lake sector of the Archean Abitibi greenstone belt.

The distinctive lithologies of the Timiskaming Group comprise clastic sediments and subordinate volcanics (including trachytes), which have been intruded by syenites and syenodiorites, all with a dominant orientation of east-northeast. Major deformation zones oriented subparallel to stratigraphy host most of the known significant gold deposits.

On the present property units of the Timiskaming Group are found north of Vigrass Lake. The Larder Lake Break and the Blanche River Fault pass through this sector of the property.

Rocks of the Larder Lake Group are found in the southern part of the Vigrass lake property, south of Vigrass Lake. These are principally mafic and ultramafic volcanics with interbedded sediments.

Exploration for and exploitation of gold deposits commenced in the vicinity of Swastika in the early 1900s preceding the discoveries in Kirkland Lake camp by ten years.

In the post-war period, when gold prices were low, exploration throughout the Kirkland Lake camp was quite limited. Renewed exploration commenced with the advent of increased gold prices, with many exploration companies known to have been active in the Kirkland Lake district since 1974.

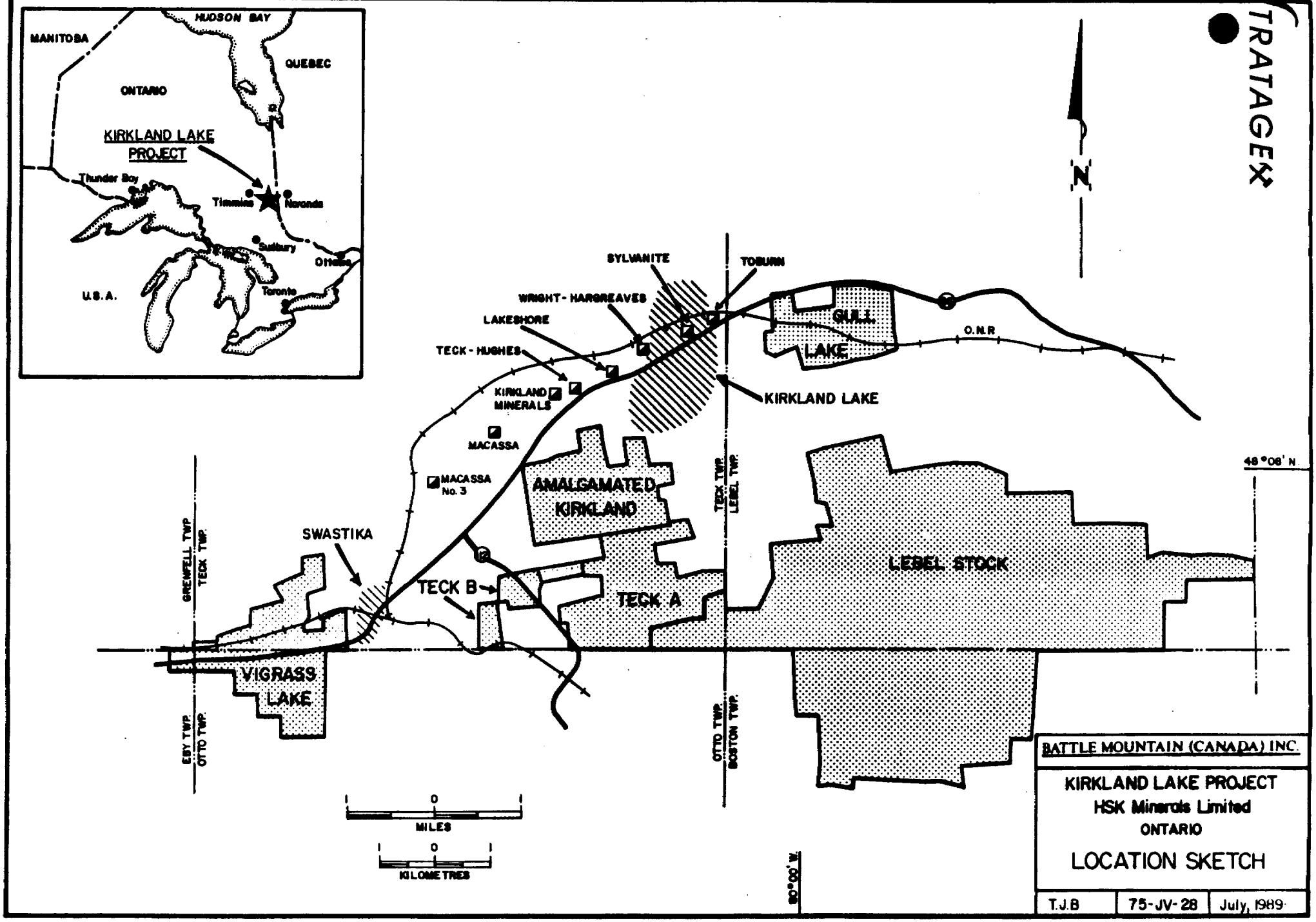

HUDSON BAY
MANITOBA
QUEBEC
ONTARIO
KIRKLAND LAKE PROJECT
Thunder Bay
Timmins
Noranda
Sudbury
Ottawa
U.S.A.
Toronto
N
SYLVANITE
TOBURN
WRIGHT-HARGREAVES
LAKESHORE
TECK-HUGHES
KIRKLAND MINERALS
KIRKLAND LAKE
GULL LAKE
O.N.R.
MACASSA
MACASSA No. 3
AMALGAMATED KIRKLAND
SWASTIKA
TECK B
TECK A
LEBEL STOCK
VIGRASS LAKE
GREENFELL TWP.
TECK TWP.
EBY TWP.
OTTO TWP.
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48°08' N
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KILOMETRES
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO
LOCATION SKETCH
T.J.B
75-JV-28
July, 1989

FIGURE 1

Among the recent exploration activities on and near the Vigrass lake property, Rio Algom drilled at least one hole at the northern edge of Vigrass Lake on a weak, graphitic shear zone in 1985, while HSK Minerals conducted drilling in 1988, including one hole (88-8) which encountered geochemically anomalous gold values in sheared and altered Larder Lake lithologies immediately south of Vigrass Lake.

No significant gold deposits are known on the Vigrass property, although a number of showings with anomalous gold values (e.g., Highway and 88-8) have been discovered by past and present exploration. Adjacent to the property, gold production was achieved in the past from several modest gold deposits, including the Golden Crescent/Gateford deposits immediately to the east.

Full details of the lithologic units, alteration and gold occurrences as well as the past exploration on and around the present claims may be found in various reports by Battle Mountain (Canada) and HSK Minerals.

3.0 SURVEY DESCRIPTION

Prior to commencing the geophysical surveys a cut line grid was established over the property during September and October, 1989 by F. Kiernicki of Kirkland Lake, using base and tie lines established by Northland Positioning. The grid has north-south cross lines spaced at 100m intervals and tie lines at 800m intervals, for a total of 55.1 km of survey lines. The survey grid has only a few minor departures and distortions from the intended ideal grid; these are shown on the appended geophysical maps.

Both the magnetic and HLEM surveys were conducted by Val d'or Geophysique during the period March 26-April 13, 1990.

3.1 Magnetic Survey

The magnetic survey employed an EDA OMNI 4 proton magnetometer reading both total field and vertical magnetic gradient, with a sensitivity of 1.0nT and 0.1 nT/m, respectively. A digital EDA base station magnetometer was used to record diurnal variations for subsequent removal.

Because magnetic sources were anticipated to be complex and shallow, the survey was conducted in a very detailed fashion, with readings taken on cross lines and tie lines at 12.5m intervals, for a total of 55.1 km of survey. Fill-in readings to 6.25m were taken in areas of significant magnetic relief.

The total field magnetic data was processed to remove the diurnal variations, posted along the grid lines, and gridded and contoured at 25 nT intervals where appropriate. The resulting maps for the total field data (Maps V-1 and V-1N) display good coherency and good ties at tie line intersections.

The vertical gradient magnetic data, on the other hand, display a degree of incoherency and only fair ties, due to the multiple, shallow magnetic sources. Consequently the data are most advantageously viewed in profile form (together with the profiled total field data), as seen in Maps V-2 and V-2N. The vertical gradient data are useful for analyzing individual anomalies in the total field data.

The magnetic data for the Vigrass property were originally compiled by Val d'or Geophysique on six separate 1:2500 map sheets designated A thru F, corresponding to geologic map sheets. However, for the present report, the data has been composited to form one principal map sheet, with Sheet A to the north retained as a separate map.

The magnetic features indicated by the survey have been interpreted in terms of simplified sources, distinguished in terms of generalized susceptibility (low, moderate, high and very high) as seen in the attached maps. Regions with similar magnetic characteristics have been designated as magnetic domains I through VIII.

Faults and shear zones identifiable from the magnetic data have also been indicated on the attached maps. These zones are of particular importance in view of the structurally controlled nature of most gold mineralization in the Kirkland Lake camp.

3.2 MaxMin HLEM Survey

The horizontal loop EM survey employed an Apex MaxMin II instrument. A coil separation of 50m was utilized in view of the generally shallow overburden, with readings at 25m intervals at 444, 1777 and 3555 Hz. The MaxMin survey was restricted to the central portion of the grid between 8200N and 10,000N, where a series of weak to moderate INPUT responses were detected in the OGS KLIP airborne survey. A total of 22.7 km of survey was completed.

The measured in-phase and quadrature values have been plotted in standard profile format at a scale of 1 cm = 10% for 444 and 1777 Hz, and 1 cm = 20% for 3555 Hz, as seen in Maps V-3 through V-5, respectively. In addition, corrections for topography to the 3555Hz in-phase values have been computed by subtracting the 444 Hz value from the 3555 Hz reading; the resulting corrected profiles comprise Map V-6.

Apart from the significant variations caused by topography, the recorded data generally display low noise (less than 2%), so that weak, poorly conductive features are readily recognizable.

Those HLEM anomalies judged to be geologically valid have been interpreted as definite, probable or possible bedrock or as probable overburden sources, as shown in Map V-6. Continuity of individual anomalies is indicated as possible, probable or definite. As seen in Map V-6 and in the other MaxMin maps, relatively few responses of possible to definite bedrock origin are present in the area surveyed, primarily within a restricted band in the south-central portion of the grid.

4.0 SURVEY RESULTS

The magnetic survey results will be discussed first, followed by the MaxMin results. The combined interpretation is portrayed superimposed on the contoured total field magnetic data (Maps V-1 and V-1N), while the MaxMin interpretation is portrayed independently on Map V-6.

4.1 Magnetic Results

The magnetic survey on the Vigrass property revealed alternating bands of low and moderate-to-high susceptibilities, with an general alignment of east-west to east-northeast.

Virtually all the magnetic sources lie within ten metres of the surface, with the exception of several magnetic features beneath Vigrass Lake, where source depths are on the order of 25 metres. Most of the sources are inferred to be quasi-vertical in orientation; however, several of the highly magnetic features that likely reflect syenitic intrusives, such as beneath Vigrass Lake, appear to have moderately dipping contacts.

The regions of differing magnetic characteristics have been designated as magnetic domains I through VIII, described in greater detail below.

Magnetic domain I, which is only partially disclosed in the northernmost portion of the survey, is composed of strongly magnetic lithologies trending generally east-northeast. This unit, revealed by aeromagnetic data to be several kilometers in strike length, reportedly corresponds to a mafic trachyte flow.

Domain I is inferred to be bounded to the south by a fault or deformation zone of sub-regional extent (part of the Larder Lake fault zone) which here trends northeast. A splay off that fault system is interpreted to extend into domain I near 10,800N, occasioning an offset in the magnetic lithologies, although these features are only partially defined due to limited survey coverage in this sector.

An additional fault internal to domain I is suggested by an interval of lower susceptibility trending east-northeast near 11500N, as seen in Map V-1N.

Domain II, located immediately to the south of domain I, is a narrow, largely non-magnetic region containing a few weak, isolated magnetic sources of variable orientation. This character is consistent with non-magnetic (Timiskaming) sediments or volcanics. At least one major fault system, trending east-northeast, is interpreted to extend through domain II near its southern contact with domain III.

Domain III, in the north-central sector of the survey, consists of narrow, moderate to strong magnetic sources occupying a belt which extends east-northeast across most of the survey area and which widens considerably to the east. Lithologies are interpreted to be mixed volcanics with syenitic intrusives belonging to the Timiskaming Group. This belt is inferred to contain a number of east-northeast to east-west strike faults, as well as to be bounded by similar faults.

A compact area to the southwest of the main portion of domain III containing moderately magnetic sources may be a continuation of this domain and accordingly is designated as subdomain III_A.

Domain IV extends east-northeast across the central portion of the area surveyed near baseline 10000N. This domain is characterized by a general absence of magnetic sources, consistent with a dominantly sedimentary composition. Major faults are interpreted to bound this domain, separating it from adjacent domains III and V to the north and south, respectively.

Domain V, located immediately south of domain IV, is a similarly narrow band aligned east-west, but differentiated from domain IV by the comparatively abundant weak to moderately strong magnetic sources embedded within it.

Domain VI, located to the south of domain V, is a 300m wide irregular band which extends east-west across the grid in the vicinity of Vigrass Lake. This domain is characterized by a rather variegated magnetic terrain containing numerous discrete, strong magnetic sources as well as a large, ovoid, strong magnetic source. A mixed assemblage of volcanics and intrusives is inferred for this domain which lies along the transition from Timiskaming to Larder Lake Groups.

The prominent ovoid anomaly, which lies beneath Vigrass Lake, is designated subdomain VI_A, and may reflect a syenodioritic or gabbroic intrusive. A series of moderate magnetic sources aligned along the southern boundary of domain VI is designated subdomain VI_B; volcanic flows are a plausible geologic source for these anomalies.

Domain VI is inferred to be bounded to the north and south by faults which separate it from domain V to the north and VII to the south. Transverse faults, offsetting local magnetic anomalies, are also interpreted in this domain. An obliquely trending west-northwest fault may separate subdomain VI_A from the main portion of domain VI to the south. Several of the persistent faults interpreted from the magnetic data are seen to have correlating MaxMin responses; in particular, MaxMin zones 1 and 2 within Vigrass Lake correlate with fault zones identified from the magnetic data, thereby increasing confidence in the validity of this interpretation. These conductors are discussed further in the following section on the MaxMin results.

Imparting additional interest to domain VI are the sheared and altered rocks encountered in DH 88-8 on the south shore of Vigrass Lake.

An essentially non-magnetic region indicated in the extreme western portion of the survey, centered on baseline 10000N may be a western extension of domain VI, or possibly a re-appearance of Timiskaming lithologies similar to those in non-magnetic domain IV to the east-northeast, or, less likely, a western continuation of domain V. Accordingly, this partially defined sector has been designated separately as domain IV/VI to indicate its uncertain correlation.

Domain VII designates an irregular, very weakly magnetic band trending generally east-west across the survey area and centered on tieline 9200N. The domain contains a few, scattered, minor magnetic sources, suggesting dominantly sedimentary lithologies belonging to the Larder Lake Group. Persistent strike faults are inferred to bound domain VII, separating it from domains VI to the north and VIII to the south.

Domain VII has been divided into a northern subdomain VII_A and a southern subdomain VII_B on the basis of the concentration of EM conductors in the northern subdomain. This distribution of EM conductors supports a predominantly sedimentary environment, particularly for subdomain VII_A. An additional persistent strike fault is inferred to separate these two subdomains.

Domain VIII, located in the southernmost portion of the area surveyed, contains numerous moderate to strong magnetic sources. These sources display no strongly defined trend, but have an average northwest alignment. A mixed assemblage of volcanics and mafic intrusives is suggested for this domain. An small inclusion of sediments is indicated to the east by a restricted non-magnetic region which also contains parallel EM conductors (zone 16).

Comparison of the ground magnetic features with those displayed by public and proprietary aeromagnetic surveys provokes a number of useful insights. In particular, it is noted that:

1) Domain I is part of a major magnetic feature which can be traced across most of the Kirkland Lake camp;

2) On a district basis east-northeast trending faults are more persistent and important, although within this sector SW of Swastika east-west faults predominate;

3) The interpreted fault bounding domain I to the south parallels the major Larder Lake Fault to the north;

4) The important SW-trending Amicougami Fault passes just to the east of the property;

5) Ground magnetic surveys are required for full resolution of the complex, multiple, shallow sources and structural regime.

4.1 MaxMin Results

The results of the MaxMin HLEM survey over portions of the Vigrass Lake property revealed a cluster of conductive responses concentrated in the southern sector between 9200N and 10000N, largely within the Larder Lake Group. This distributions corresponds reasonably well with the INPUT anomalies recorded by the OGS survey.

Most of the MaxMin conductors detected are classified as possible, probable or definite bedrock sources. Weak, predominantly quadrature responses are also present though less numerous, and display no particular concentration.

All EM conductive sources are shallow (in view of the 50m coil spacing employed), with depths less than 15m, and are sub-vertical to steeply dipping.

The significant conductive features have been designated zones 1 through 15, and are discussed briefly below.

Zone 1, located along the northern shore of Vigrass Lake, consists primarily of weak, dominantly quadrature anomalies interpreted to reflect conductive overburden. A persistent fault or shear zone is inferred from the magnetic data; consequently zone 1 may indirectly define the locus of this fault, which may represent a favourable environment for structurally controlled gold deposition. Rio reportedly drilled one hole on or near this feature.

Zone 2, located south of zone 1, extends east-southeast through Vigrass Lake from 10400E to 11000E. Judged a possible bedrock source, it is defined by dominantly quadrature anomalies at the higher frequencies. The conductor corresponds closely to a prominent fault or shear zone identified from the magnetic data. No prior drilling is reported for this interesting target.

Zone 3 consists of a weak but possible bedrock feature detected on line 10400E near 9500N, with a possible extension to the west. The conductor lies just to the north of a weak magnetic source within domain VI_B, implying a pyritic or graphitic source.

Zone 4, located to the southeast of zone 3, also consists of a weak, suspect response, in this case on line 10600E near 9450N. Its location on the north flank of a strong magnetic anomaly within subdomain VI_B suggests a geologic source similar to zone 3 to the west.

Zone 5 consists of a moderate EM response of probable bedrock origin detected on line 10900E near 9400N. It is located beyond the northern edge of a constituent magnetic anomaly within domain VI_B.

Zone 6 consists of isolated, weak but possible bedrock sources detected on lines 10600E and 10800E near 9350N,

located approximately 70m south of zone 5. Discrete pyritic lenses are a possible geologic source. The proximity of an interpreted strike fault imparts additional interest in these weak features.

Zone 7 is defined by anomalies of probable to definite bedrock origin detected on line 9800E to 10000E near 9350N in the southwestern sector of the area surveyed. A moderately steep dip to the south is indicated on several lines. Zone 7 lies within subdomain VII_A and has no local magnetic association, pointing to graphite as the likely source.

Zones 8 and 9, located immediately south of zone 7, are discrete conductors indicated by weak responses of possible bedrock origin detected on lines 9900E and 10000E. Neither zone has any magnetic association, suggesting graphite as the probable geologic source.

Zone 10, located several hundred metres to the west of zones 7,8 and 9, is a definite bedrock conductor detected on lines 9600E and 9700E, with a likely extension further to the west beyond the sector presently surveyed with MaxMin. The conductor is narrow and shows evidence for a dip to the south. Located with subdomain VII_A, it has no appreciable magnetic association, again suggesting a graphitic source.

Zone 11 consists of strong responses of probable to definite bedrock origin. Detected on lines 10100E through 10400E near 9400N, the non-magnetic zone 11 is located in the northern portion of subdomain VII_A and hence is probably a graphitic horizon.

Zone 12, located to the southeast of zone 11, is a strong conductor of probable to definite bedrock origin detected on lines 10300E through 10600E near 9250N.

In detail, the continuity of the zone 12 is subject to some uncertainty. The conductor apparently strikes east-west on lines 10300E and 10400E, changing to southeast further to the east, reflecting either folding or displacement by transverse faulting. An initial drill hole (VA90-1) drilled in March intersected altered, carbonated and silicified basalts and graphitic sediments, containing disseminated pyrite and (locally) fuchsite, sericite and quartz veining, with low gold values and minor sphalerite.

Zone 13 consists of weak anomalies of possible bedrock origin on lines 10600E and 10700E, immediately to the east-northeast of zone 12. Although a possible weak extension of zone 12, zone 13 is judged a separate source, probably graphitic if valid.

Zone 14 is a definite, narrow bedrock source detected solely on line 10700E near 9240N. Its non-magnetic character (within subdomain VII_A) suggests a probable graphitic origin.

Zone 15 is a definite bedrock source detected solely on line 11000E near 9250N. It appears to be spatially coincident with a distinct negative magnetic anomaly located within subdomain VII_A, and hence may be a restricted lens of pyrrhotite with reverse magnetization.

Zone 16 consists of two parallel conductors detected in the extreme southeastern portion of the area surveyed with MaxMin on lines 11100E and 11200E near 8500N. Both conductors are judged to be of probable bedrock origin, and occur within a limited non-magnetic subarea within domain VIII. Hence a band of sediments containing several graphitic horizons is inferred as the likely source. This band and its enclosed conductors are indicated by airborne data to extend considerably further to the east beyond the present ground survey limits.

An additional very weak, suspect conductor occurs near 8770N, 10900E. A drill hole (VA90-2), sited only partially on geophysical considerations, intersected sheared and weakly altered komatiites and basalts, indicating that the conductor is caused by overburden.

The above conductors, particularly those not previously drilled or with anomalous gold values indicated by prior drilling, hold obvious interest as targets for gold mineralization associated with graphitic sediments (e.g., Hoyle Pond, Golden Pond) or with sulphides (e.g., Detour River, Golden Knight), whether of syngenetic origin or introduced post-lthification due to subsequent shearing or deformation.

5.0 CONCLUSIONS

Based on the preceding results and interpretation, it is concluded that the magnetic and HLEM surveys on the Vigrass Lake property have provided significant information pertinent to the exploration of this property for gold deposits in that:

1) Eight specific lithomagnetic units have been identified, providing a means of extrapolating from scattered outcrop; in particular, six subunits within the Timiskaming Group are defined;

2) The structural regime is dominated by a network of faults and/or shear zones trending east-west to east-northeast, comparable to those recognized as important in controlling known gold mineralization;

3) Potentially interesting faults additional to those previously known are inferred within the Timiskaming Group in the northern portion of the property;

3) Undrilled conductive horizons fully resolved by the detailed MaxMin survey offer potential for graphite- or sulphide-hosted gold mineralization within the Larder Lake Group in the southern part of the claims;

4) Detailed lithologic and structural features have been resolved by the ground surveys beyond that achievable by detailed airborne surveys alone; conversely, trends and features of district-wide significance are discernible in the broader perspective provided by airborne data.

6.0 RECOMMENDATIONS

Based on the above discussion and conclusions, it is recommended that additional exploration be undertaken on the Vigrass Lake property and environs to establish the geological validity of the presently interpreted features. and their potential significance in terms of gold mineralization and its attendant alteration.

In particular, it is recommended that:

1) The inferred faults within the Timiskaming be carefully evaluated in terms of past geological information, and, in the absence of negative data, mapping and trenching undertaken as appropriate;

2) Undrilled conductors be scrutinized as to favourability, and pursued with trenching or drilling as appropriate;

3) IP/resistivity surveys be considered if disseminated sulphide zones with encouraging gold values are encountered;

4) The present interpretation be reviewed and updated in the light of new information or prospects.

Respectfully submitted,

J. Roth

Senior Geophysical Consultant

STRATAGEX

REFERENCES

Grant, F. and West, G., 1965, Interpretation Theory in Applied Geophysics, McGraw-Hill, 584p

Lowrie W. and West, G., 1965, The effect of conductive overburden on electromagnetic prospecting measurements, Geophysics v30, p624-632

MacNae, J.C., 1984, Survey design for multicomponent elctromagnetic systems, Geophysics, v 49, p 265-273

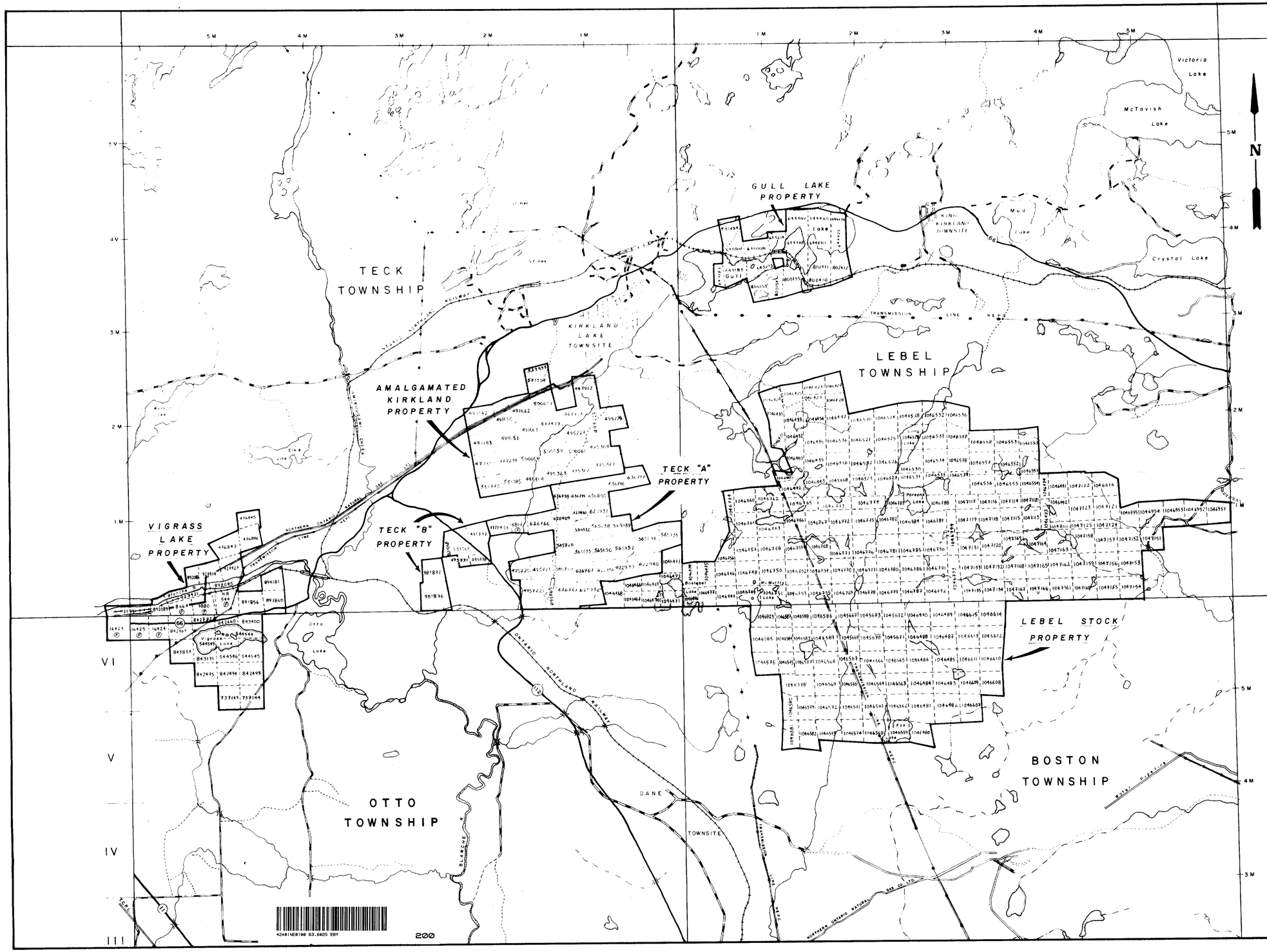
OMNDM/OGS, 1979, EM and Magnetic Survey, Kirkland Lake Area (KLIP), Questor Surveys

Palacky, G.J., 1972, Computer Assisted Interpretation of Multichannel Airborne Electromagnetic Measurements, PhD Thesis (unpub), Univ. of Toronto, 152p

Roth, J., 1989, Interpretive Report on Terraquest Aeromagnetic/VLF Surveys, Kirkland Lake, Ont. *for* Battle Mountain (Canada) Inc.

Terraquest, 1989, Logistics Report on Aeromagnetic and VLF Surveys, Kirkland Lake, Ont., *for* Battle Mountain (Canada) Inc.

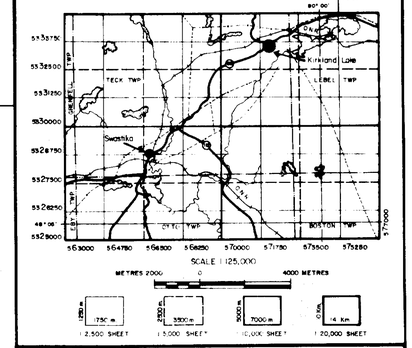
Ward, S.H., 1967, The Electomagnetic Method: in *Mining Geophysics v.2,* Tulsa, SEG, p 274-306



LEGEND

- HIGHWAY and ROUTE No. (66)
- OTHER ROADS
- TRAILS
- SURVEYED LINES
  - TOWNSHIP BASE LINE, etc.
- UNSURVEYED LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS

NOTE: The information that appears on this map has been compiled from various sources, therefore accuracy cannot be guaranteed.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

CLAIM MAP

PROJECT No. 75 - JV - 28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. PL-001	DATE 07/11/90

SCALE: 1 inch = 1/2 mile
FEET 0 1000 2000 4000 6000 8000
METRES 0 200 1000 2000

42A1NE0100 63.6025 EBY
200
63.6025

568250 E.

570000 E

5332500 N.

5331250 N.

SHEET ALIGNMENT POINT

CHAPUT HUGHES

HWY 66

Dam

Dam

Dam

Dam

330

336

340

343

347

+331

+ 335

+ 332

+ 327

+ 319

+ 325

201

333

330

332

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S2a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

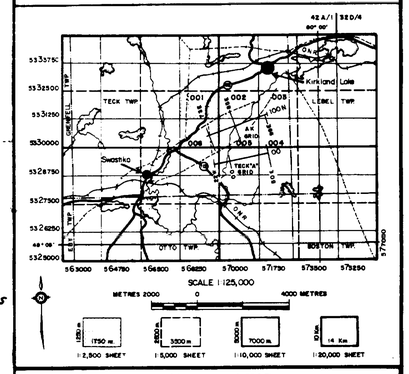
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g/t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp. - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
cc. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
f.c. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)

SHEET No: 568250 E / 5331250 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
N.T.S. 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. G L-001	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

63.6025

42A01NE0100 63.6025 EBY

570000 E.

571750 E.

5332500 N.

SHEET ALGONQUIN POINT

SHEET ALGONQUIN POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 15 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sse), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- c - cobble
- b - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

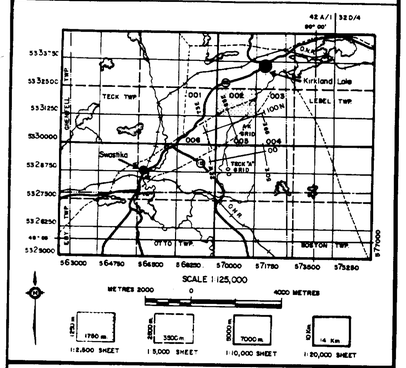
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 ← PPB AU; 1.6 ← g./t. AU; LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fractoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



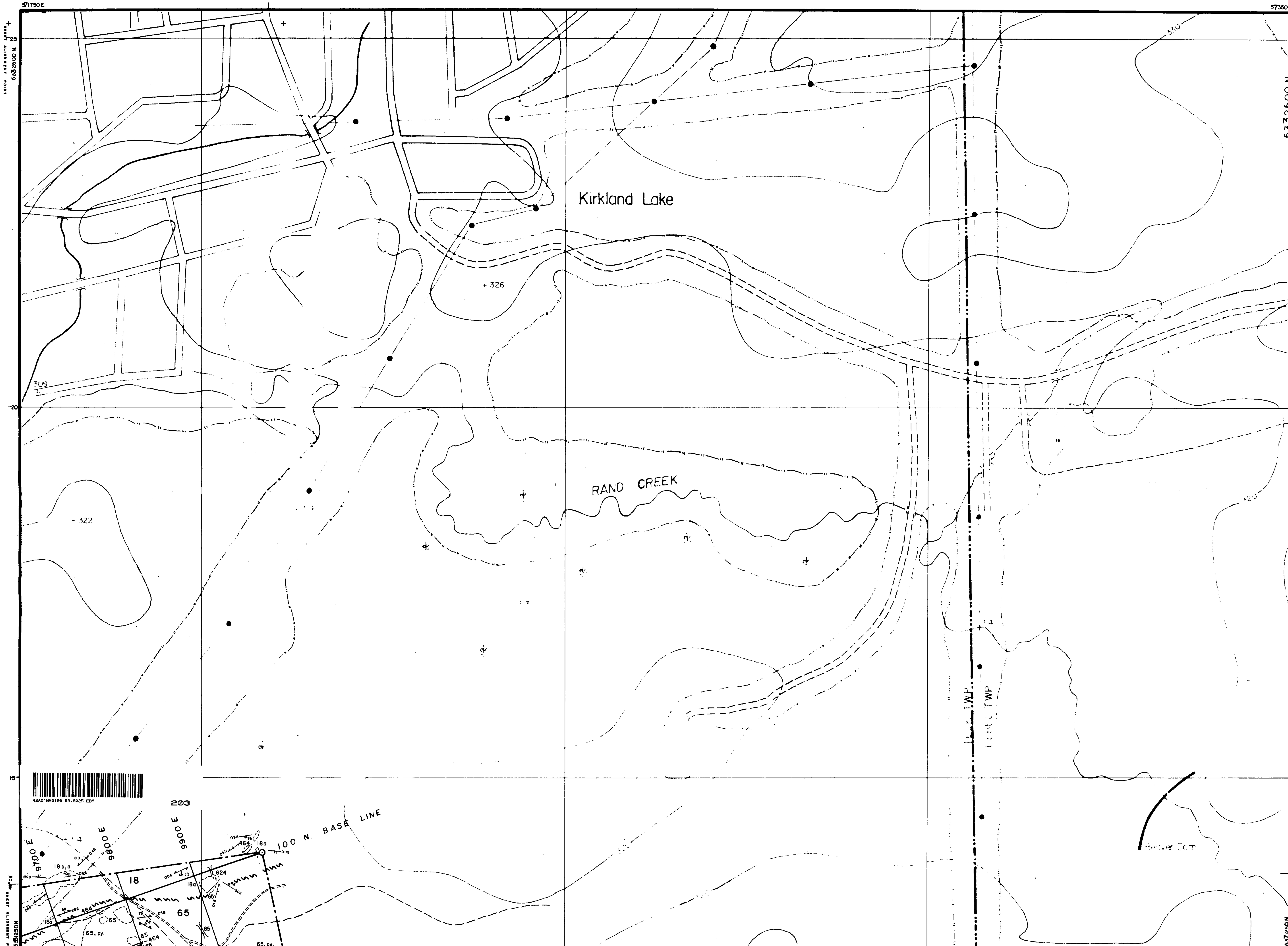
BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)

SHEET No: 570000E/5331250N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
N.T.S. 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: G L – 002	DATE: October 1990
SCALE: 1:2,500	50 0 50 100 METRES

42A01NE0100 63.6825 EDT

(3 of 3)



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a -fine grained
b -medium grained
c -coarse grained
p -pebble
d -cobble
e -boulder
g -grit

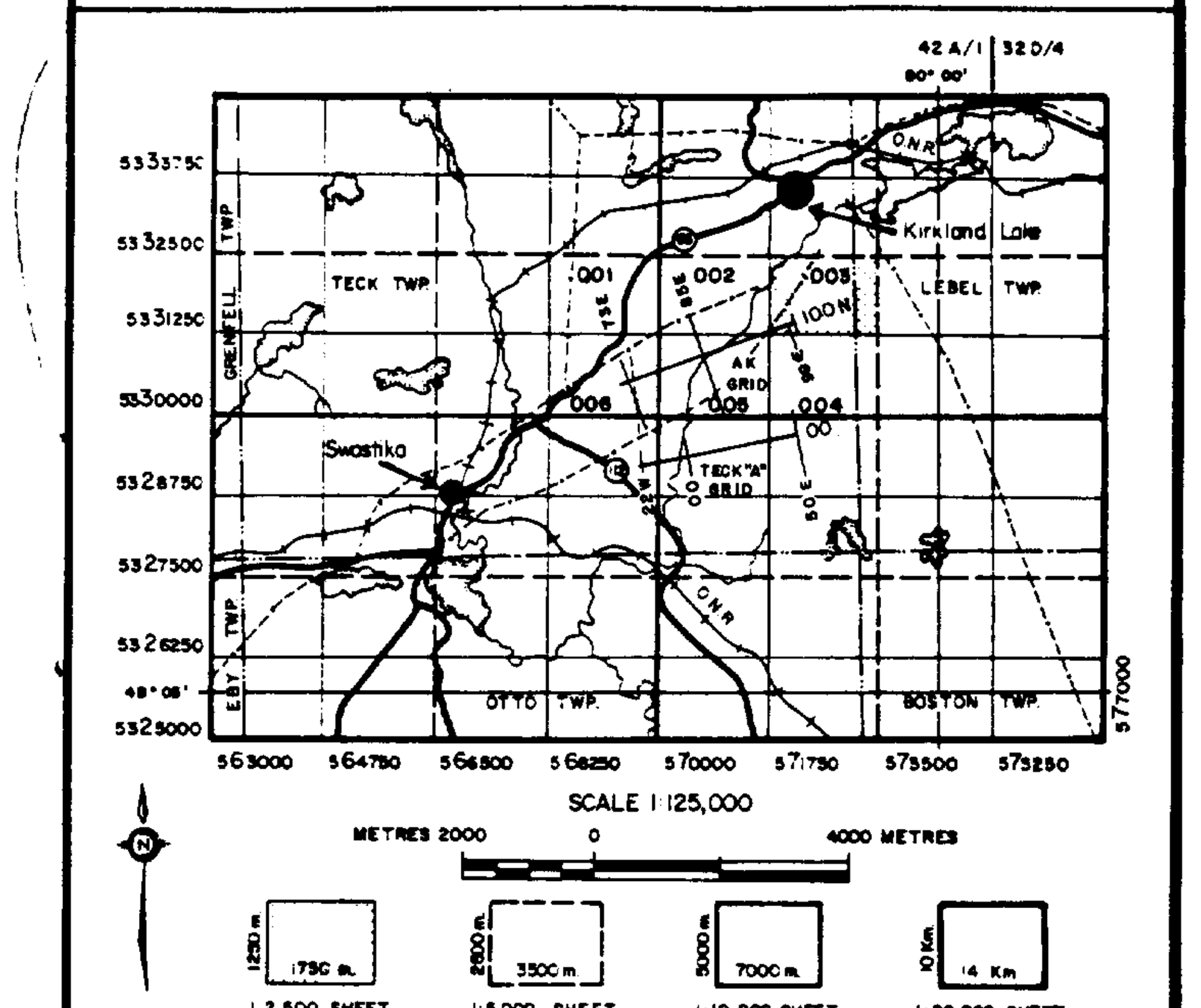
VOLCANIC ROCKS
a -ash tuff
b -lapilli tuff
c -block tuff
f -flow
fbx -flow breccia

IGNEOUS ROCKS
a -fine grained
b -medium grained
c -coarse grained
p -pegmatitic

SAMPLE NO. → 8501 △ 1600 ← PPB AU
LOCATION 1.6 ← g./t. AU

ABBREVIATIONS

agp.	augite porphyritic	fp.	feldspar porphyritic	q.v.	quartz vein
amg.	amygdaloidal	fsp	feldspathic	ser.	sericitic
amp.	amphibolite	gf.	graphitic	sil.	silicic
ank.	ankerite	hem.	hematite	sp.	sphalerite
bx.	breccia	lam.	laminated	spx.	spinifex
ca.	calcite	m.	massive	sh.	sheared
cb.	carbonate	mag.	magnetite	trc.	trachoidal
ch.	chlorite	p.	pillowed	var.	variolitic
cp.	chalcopyrite	pb.	galena	ves.	vesicular
fc.	fractured	py.	pyrite		



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)

SHEET No: 571750 E / 5331250 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GL-003	DATE: October 1990
SCALE: 1:2,500 (50 0 50 100 METRES)	

42A01NE0100 63.6025 EBY

63.6025

571750 E.

573500 E.

5333250 N.

5330000 N.

SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow, facing direction, dipping, vertical, overturned
- Foliation (S_1), dipping, vertical dip unknown
- Foliation (S_2 or S_3), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 4850 — 1600 ← PPB AU — 1.6 oz/t AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - gryophitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spharite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	

42A/1 | 32D/4

SCALE : 25,000

METRES 2000 0 4000 METRES

1:2,500 SHEET — 1:5,000 SHEET — 10,000 SHEET — 1:20,000 SHEET

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)

SHEET No.: 571750 E / 5330000 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
N.T.S.: 42A/1-8 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GL-004	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

63 6025

570000 E

571750 E

5932850 N

8350 E

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
- 461 Augite Syenite
- 462 Melo Syenite
- 463 Meso Syenite
- 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (sfol), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
c - cobble
b - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
l - lapilli tuff
b - block tuff
f - flow
fbx - flow breccia

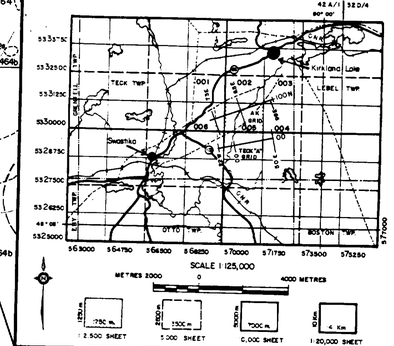
IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU
LOCATION — 1.6 g/t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)

SHEET No.: 570000E / 8380000 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: G L — 005	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.0025 EBY

570000E.

205

SHEET ALIGNMENT POINT

568250 E.

5330250 N.

570000 E.

5330000 N.

SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

BASE LINE 100 N

N.G.P.L.

Beaver Dam

HWY 66

7290E TRENCH

7400 E TRENCH

7625E TRENCH

7435E TRENCH

7545 E TRENCH

206

42A01NE0100 63.6025 EBY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Lauco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 15 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical, dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

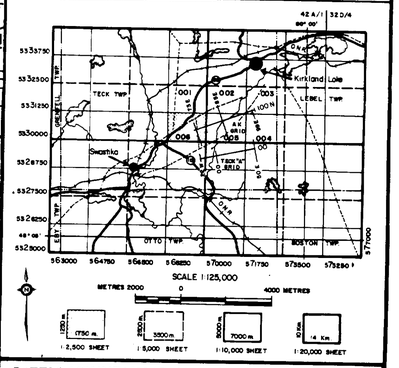
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 ← PPB AU
LOCATION — 1.6 ← g/t. AU

ABBREVIATIONS

- agp. - augite porphyritic
- amg. - amygdaloidal
- amp. - amphibolite
- ank. - ankerite
- bx. - breccia
- ca. - calcite
- cb. - carbonate
- ch. - chlorite
- cp. - chalcopyrite
- fc. - fractured
- fp. - feldspar porphyritic
- fsp. - feldspathic
- gf. - graphitic
- hem. - hematite
- lam. - laminated
- m. - massive
- mag. - magnetite
- p. - pillowed
- pb. - galena
- py. - pyrite
- qv. - quartz vein
- ser. - sericitic
- sil. - siliceic
- sp. - sphalerite
- spx. - spinifex
- sh. - sheared
- trc. - trachoidal
- var. - variolitic
- ves. - vesicular



BATTLE MOUNTAIN (CANADA) INC.

BEN MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

AMALGAMATED KIRKLAND PROPERTY

(GEOLOGY PLAN)

SHEET No.: 568280 E / 5330000 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: G L-006	DATE: October 1990

SCALE: 1:2,500

50 0 50 100 METRES

569000 E

572500 E

5332000 N

5330000 N

CHAPUT HUGHES

Tailings

KIRKLAND LAKE

KIRKLAND GOLD RAND

CANADIAN KIRKLAND

KIRKLAND LAKE INDUSTRIAL COMPLEX

LAC MINERALS LTD MACASSA DIV 3000' Level x-cut

AMALGAMATED KIRKLAND FAULT

LAKESHORE FAULT

TAUL

NSP

TUNTON SHAFT

CO-GENERATION PLANT

ABANDONED

100 N. BASE LINE

BASE LINE

LARDER LAKE FAULT ZONE

MUDDOCK CREEK

L524843 L571358 L500057 L491650 L491182 L491662 L491663 L491651 L491183 L477819 L447912 L447913 L495229 L495223 L495227 L495364 L500061 L500059 L500058 L477299 L477300 L495362 L495361 L495358 L531085 L531770

DT8-1 DT8-2 DT8-3 DT8-4 DT8-5 DT8-6 HK-1

62 Au

"TECK A" PROPERTY

207

42A81NE0180 63.6025 EBY

63.6025

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 465 Meso Syenite
  - 466 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sfol), dipping, vertical dip unknown
- Folletion (Sfl or Sfl), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep suboop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- c - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

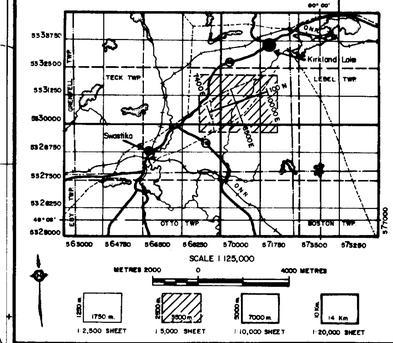
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 6501 1600 FPB AU
LOCATION 1.6 oz./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracheloid
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

AMALGAMATED KIRKLAND PROPERTY

(GEOLOGY PLAN)

PROJECT No.: 75 - JV - 28	DATA BY: W. Benham
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GL - 010	DATE: November 1990
SCALE: 1:5000	NOTE: Revised location - Lakeshore Fault (11/25/90)

100 0 100 200 METRES

568250 E

570000 E

5332500 N

CHAPUT HUGHES

HWY 66

Dam

+331

+325

+332

+319

+327

+325

330

336

340

343

347

333

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Mesc Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- pebble
- d - cobble
- e - boulder
- g - grit

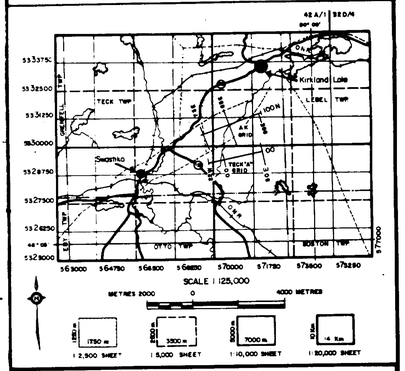
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g/t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 568250 E / 5331250 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GA-001	DATE: October 1990

SCALE 1:2,500
50 0 50 100
METRES

63.6025

42A01NE0100 63.6025 EBY

208

SHEET ALIGNMENT POINT

570000 E

571750 E

5332500 N

5330250 N

SHEET ALIGNMENT POINT

Kirkland Lake

AMALGAMATED KIRKLAND FAULT

LAKESHORE FAULT

HUNTON SHAFT

8850 TRENCH

8350 TRENCH

MURDOCK CREEK FAULT

105 N

110 N

8100 E

8200 E

8300 E

8400 E

8500 E

8600 E

8700 E

8800 E

8900 E

9000 E

9100 E

9200 E

9300 E

9400 E

9500 E

9600 E

9700 E

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
- 461 Augite Syenite
- 462 Melo Syenite
- 463 Meso Syenite
- 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
- 18f Flows
- 18o Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

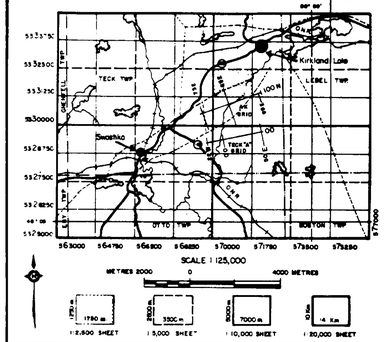
IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatite

SAMPLE NO. 8501 LOCATION — 1600 PPB AU — 1.6 g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fractured
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
f.c. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 570000E/5331250N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., S.A.D.
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GA-002	DATE: October 1990
SCALE 1:2,500	50 0 50 100 METRES

63.6025

571750 E

573500 E

5332500 N

Kirkland Lake

RAND CREEK

TWP

326

522

210

100 N. BASE LINE

300 E

900 E

18

65

8322 qzs 40ppb 164 18a qzs

8323 150ppb

8324 18a qzs 624 65

8351 90ppb 8330 Nil 65

8325 Nil

8331 10ppb 18b

8334 30ppb 65

8337 10ppb

8335 10ppb

8336 Nil

8329 90ppb 65 464

65, py.

80°00'

42A/NE0100 63.6025 EBY

LEGEND

60 ALTERATION

61 Chlorite ± Talc ± Carbonate ± Quartz
- 612 Weak
- 613 Moderate
- 614 Strong

62 Sericite ± Carbonate ± Chlorite ± Quartz
- 622 Weak
- 623 Moderate
- 624 Strong

65 Carbonate ± Chlorite Fuschite ± Quartz
- 652 Weak
- 653 Moderate
- 654 Strong

69 Carbonatized Syenite

40 INTRUSIVES

41 Diabase
- 412 Lamprophyre

42 Peridotite

43 Pyroxenite

44 Gabbro

45 Diorite

46 Syenite
- 461 Augite Syenite
- 462 Melc Syenite
- 463 Mesc Syenite
- 464 Leuco Syenite

20 SEDIMENTS

21 Conglomerate

22 Graywacke

23 Arenite

25 Siltstone

26 Mudstone

27 Iron Formation

10 VOLCANICS

11 Komatiites

13 Basalts

16 Trachytes
- 16f Flows
- 16a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sis), dipping, vertical dip unknown
- Foliation (Sis or Slt), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbr - flow breccia

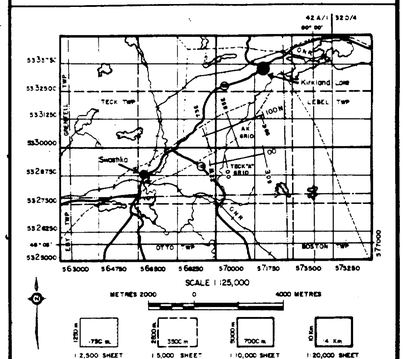
IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 6501 — 1600 ← PPB AU; 1.6 ← g/t AU

LOCATION

ABBREVIATIONS

agp. - augite porphyritic	f.p. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - granophyric	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb - carbonate	mag - magnetite	frc. - fracheidal
ch - chlorite	p - pillowed	var. - variolitic
cp - chalcopyrite	pb. - galena	ves. - vesicular
f.c. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: s71750 E / s5331250 N	CHECKED BY: W. Benham
PROJECT No: 75-JV-28	DATA BY H.D-L., V.S., S.A.D.
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. GA-003	DATE October 1990
SCALE 1:2,500	

50 0 50 100 METRES

63.6025

SHEET ALIGNMENT POINT

571750 E

573500 E

5533750 N

5530000 N

SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Mela Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S3b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a -fine grained
b -medium grained
c -coarse grained
p -pebble
d -cobble
e -boulder
g -grit

VOLCANIC ROCKS

a -ash tuff
b -lapilli tuff
c -block tuff
f -flow
fbx -flow breccia

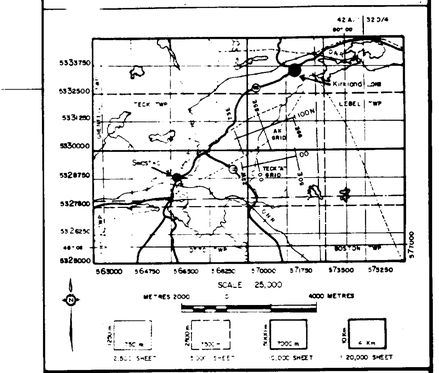
IGNEOUS ROCKS

a -fine grained
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p -pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	f.p. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachaidal
ch. - chlorite	p. - pillowed	var - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No. 571750 E / 530000 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., S.A.D.
N.T.S. 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No GA-004	DATE October 1990

SCALE 1:2,500

50 0 50 100 METRES

63.6025

570000 E

571750 E

5332650 N

SHEET ALIGNMENT POINT

NOTE: See Dwg No. 70437 31069 Sec. 89 / 1:100 for 8350 Zone grab samples.

100+75 N EASE LINE

MURDOCK

LAKE FAULT ZONE

LARDER

8350 E TRENCH

7950 E TRENCH

8030 E TRENCH

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Mesо Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 16 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow, facing direction, dipping, vertical, overturned
- Foliation (Sch.), dipping, vertical dip unknown
- Foliation (S2 or S3b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE.

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- b - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
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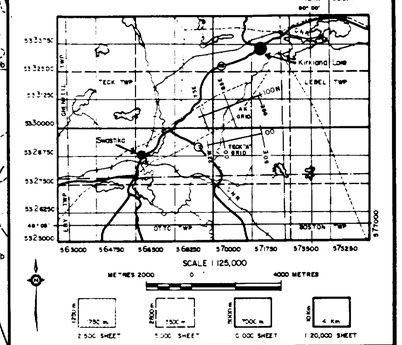
IGNEOUS ROCKS

- a - fine grained
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- p - pegmatitic

SAMPLE NO. 8501 — LOCATION — 1600 PPB AU — 1.6 g/t AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein	
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic	
amp. - amphibolite	gf. - graphitic	sil. - siliceous	
ank. - ankerite	hem. - hematite	sp. - spherulite	
bx. - breccia	lam. - laminated	spx. - spinifex	
ca. - calcite	m. - massive	sh. - sheared	
cb - carbonate	mag. - magnetite	trc. - trachoidal	
ch. - chlorite	p. - pillowed	var. - variolitic	
cp - chalcopyrite	pb. - galena	ves. - vesicular	
f.c. - fractured	py. - pyrite		



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 570000E / 5330000 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., S.A.D.
N.T.S 42A/1 & 32D/4	DRAWN BY B.H. Modill, Tech.
DRAWING No GA-005	DATE October 1990
SCALE 1:2,500	

50 0 50 100 METRES

42A01NE0108 63.6025 EBY

63.6025

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
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  - 461 Augite Syenite
  - 462 Melo Syenite
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SYMBOLS

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- Foliation (S2 or S1b), dipping, vertical, dip unknown
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GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
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- g - grit

VOLCANIC ROCKS

- a - ash tuff
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- c - block tuff
- f - flow
- fbr - flow breccia

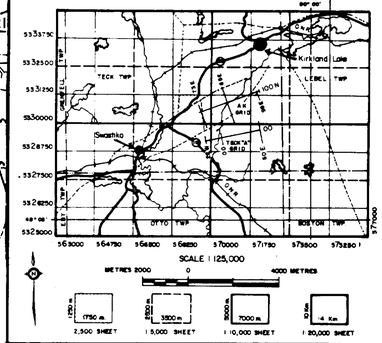
IGNEOUS ROCKS

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SAMPLE NO. 8501 — 1600 PPB AU — 1.6 oz./t. AU
LOCATION

ABBREVIATIONS

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cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

AMALGAMATED KIRKLAND PROPERTY

(GEOLOGY PLAN)

showing

GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No.: 856250 E / 5330000 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., S.A.D.
N.T.S. 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. GA-006	DATE October 1990
SCALE: 1:2,500	50 0 50 100 METRES

63.6025

569000 E

572500 E

5332000 N

5330000 N

KIRKLAND GOLD RAND

KIRKLAND LAKE

CHAPUT HUGHES

Tailings

AMALGAMATED KIRKLAND FAULT

LAKESHORE FAULT

HUNTON SHAFT

TCUL N&P

ABANDONED

CO-GENERATION PLANT

ICON BASE LINE

LAC MINERALS LTD MACASSA DIV 3000' Level x-cut

KIRKLAND LAKE INDUSTRIAL COMPLEX

CANADIAN KIRKLAND

BASE LINE 100 N.

MURDOCK CREEK FAULT ZONE

LARDER LAKE FAULT ZONE

TECK "A" PROPERTY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

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- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
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  - 462 Melc Syenite
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- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
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- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sx), dipping, vertical dip unknown
- Foliation (S2 or S3), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- c - cobble
- b - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

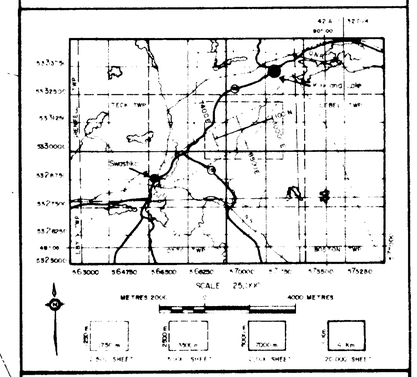
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB Au / 1.6 g/t Au — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp - amphibolite	gf. - graphitic	sil. - silicic
ank - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb - carbonate	mag. - magnetite	trc - trachoidal
ch. - chlorite	p. - pillowed	var - variolitic
cp - chalcopyrite	pb. - galena	ves - vesicular
fc - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
AMALGAMATED KIRKLAND PROPERTY
(GEOLOGY PLAN)
showing
ANOMALOUS (≥100 ppb) GRAB SAMPLE LOCATIONS and ASSAYS

PROJECT No 75 JV 28	DATA BY W Benham
N.T.S. 42A/1 & 32D/4	DRAWN BY B.H. Modill, Tech.
DRAWING No GA-010	DATE November 1990

SCALE 1:5000

100 0 100 200 METRES

42A01NE0100 63.6025 EBY

214

63.6025

569000 E

572500 E

5332000 N

5330000 N

CHAPUT HUGHES

Tailings

CANADIAN KIRKLAND

KIRKLAND LAKE

KIRKLAND GOLD RAND

AMALGAMATED KIRKLAND FAULT

LAKESHORE FAULT

MURDOCK CREEK FAULT

HUNTON SHAFT

CO-GENERATION PLANT

ABANDONED TRAIL

100 N. BASE LINE

LARDER LAKE ZONE

LAKESHORE FAULT

ABANDONED TRAIL

"107" "105" "106" "104" "103" "102" "101" "100" "99" "98" "97" "96" "95" "94" "93" "92" "91" "90" "88" "102E" "103E" "100E" "99E"

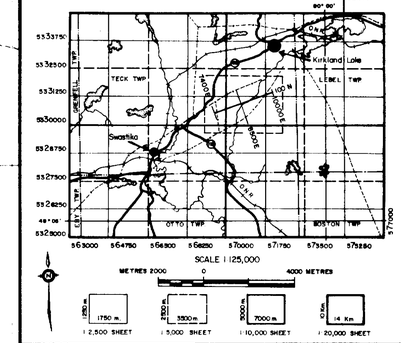
7400 E 7500 E 7600 E 7700 E 7800 E 7900 E 8000 E 8100 E 8200 E 8300 E 8400 E 8500 E 8600 E 8700 E 8800 E 8900 E 9000 E 9100 E 9200 E 9300 E 9400 E 9500 E 9600 E 9700 E 9800 E 9900 E 10000 E

215

42A01NE0100 63.6825 EBY

LEGEND

- FAULT
- "102" "STRUCTURAL BREAK" MAGNETIC LOW
- IP CHARGEABILITY (Pole-dipole a=12.5m.)
- GOLD PROSPECT
- OVERBURDEN TRENCH



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

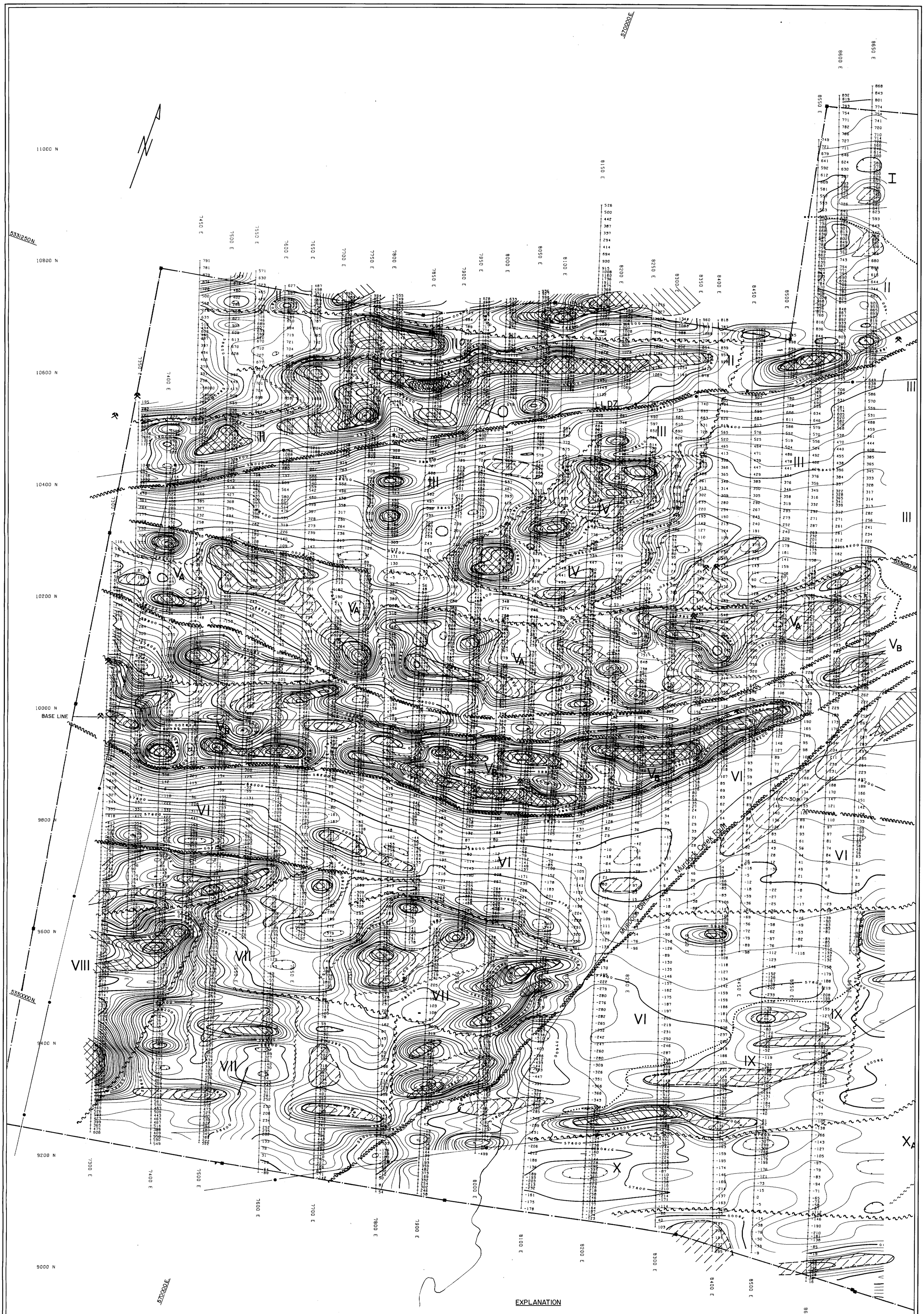
AMALGAMATED KIRKLAND PROPERTY

GROUND MAGNETIC INTERPRETATION

PROJECT No.: 75-JV-28	DATA BY: W Benham
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GP-001	DATE: Revised January 1991

SCALE: 1:5000

100 0 100 200 METRES



EXPLANATION

MAGNETIC SOURCES: (Dashed where uncertain)

- Very high susceptibility
- High susceptibility
- Medium susceptibility
- Low susceptibility

FAULTS:

- Major
- Intermediate
- Minor

X / XI — MAGNETIC DOMAINS

Au occurrences

Interpretation by : STRATAGEX LTD.
October, 1990.

42A01NE0100 63.6025 EBY

216

BASE LEVEL = 58000 GAMMAS

63.6025

BATTLE MOUNTAIN (CANADA) INC.

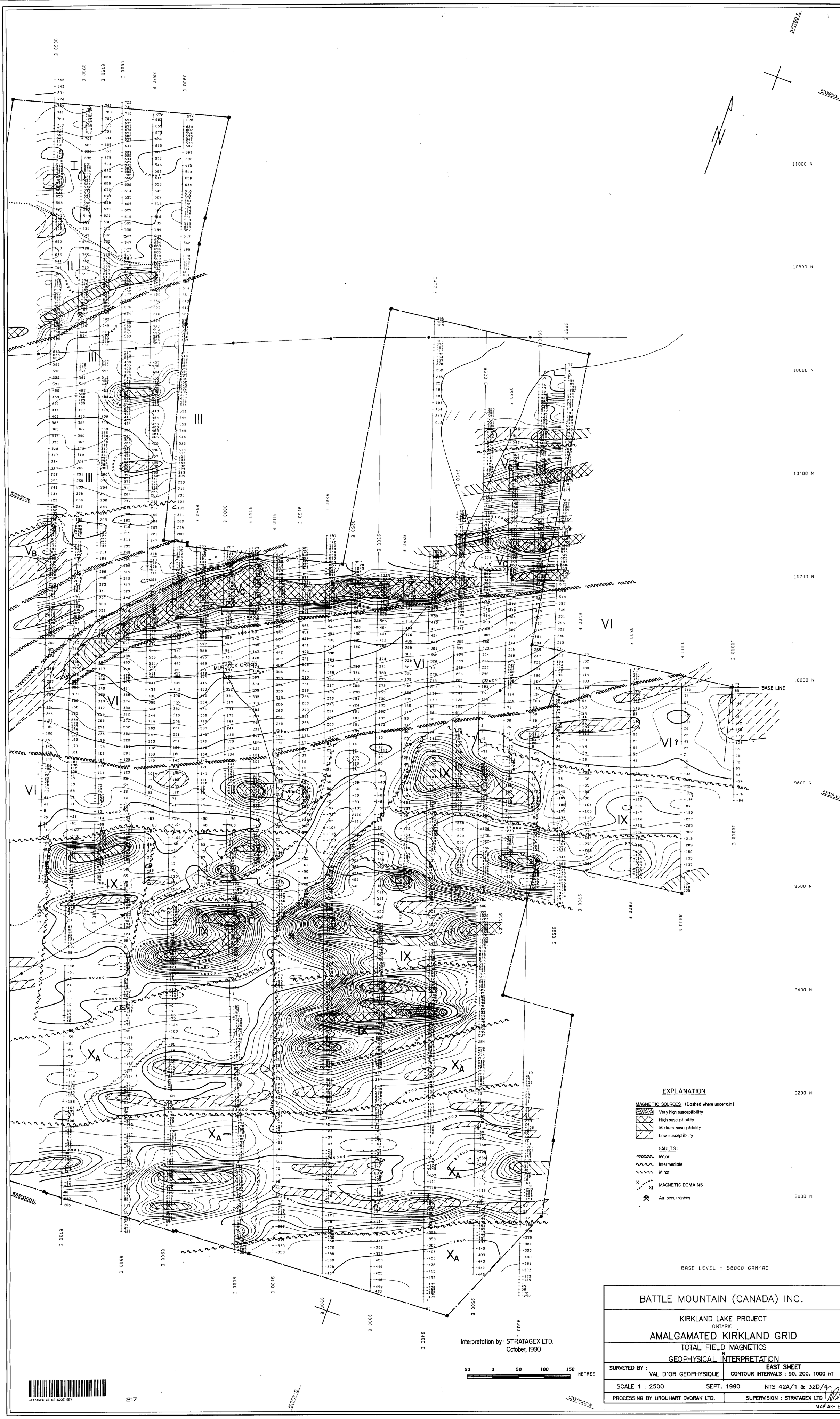
KIRKLAND LAKE PROJECT
ONTARIO

AMALGAMATED KIRKLAND GRID

TOTAL FIELD MAGNETICS
&
GEOPHYSICAL INTERPRETATION

SURVEYED BY : VAL D'OR GEOPHYSIQUE	WEST SHEET CONTOUR INTERVALS : 50, 200, 1000 nT
SCALE 1 : 2500 — SEPT. 1990 — NTS 42A/1 & 32D/4	
PROCESSING BY URQUHART DVORAK LTD.	SUPERVISION : STRATAGEX LTD

MAP AK-1W



EXPLANATION

MAGNETIC SOURCES: (Dashed where uncertain)

- Very high susceptibility
- High susceptibility
- Medium susceptibility
- Low susceptibility

FAULTS:

- Major
- Intermediate
- Minor

MAGNETIC DOMAINS

Au occurrences

BASE LEVEL = 58000 GAMMAS

Interpretation by: STRATAGEX LTD.
October, 1990.

50 0 50 100 150 METRES

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
ONTARIO

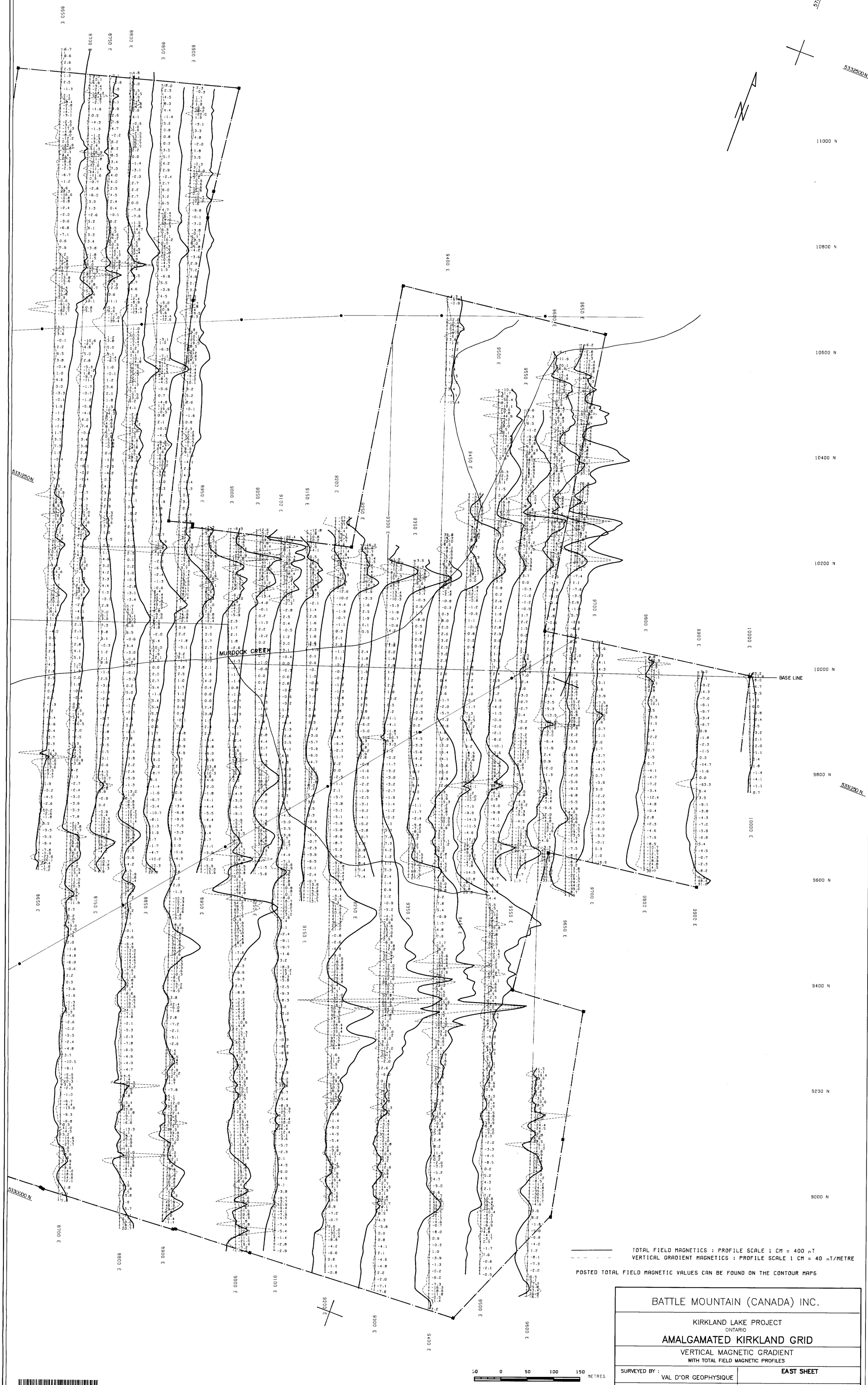
AMALGAMATED KIRKLAND GRID

TOTAL FIELD MAGNETICS
& GEOPHYSICAL INTERPRETATION

SURVEYED BY : VAL D'OR GEOPHYSIQUE	EAST SHEET CONTOUR INTERVALS : 50, 200, 1000 nT
SCALE 1 : 2500	SEPT. 1990 NTS 42A/1 & 32D/4
PROCESSING BY URQUHART DVORAK LTD.	SUPERVISION : STRATAGEX LTD

MAP AK-IE

42A01NE0100 63.6025 EBY



TOTAL FIELD MAGNETICS : PROFILE SCALE 1 CM = 400 nT

VERTICAL GRADIENT MAGNETICS : PROFILE SCALE 1 CM = 40 nT/METRE

POSTED TOTAL FIELD MAGNETIC VALUES CAN BE FOUND ON THE CONTOUR MAPS

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
ONTARIO

AMALGAMATED KIRKLAND GRID

VERTICAL MAGNETIC GRADIENT
WITH TOTAL FIELD MAGNETIC PROFILES

SURVEYED BY : VAL D'OR GEOPHYSIQUE	EAST SHEET
SCALE 1 : 2500 SEPT. 1990	NTS 42A/1 & 32D/4
PROCESSING BY URQUHART DVORAK LTD.	SUPERVISION : STRATAGEX LTD

MAP AK-2E

42A01NE0100 63.6025 EBY

570000 E.

533(250 N.

11000 N

10800 N

10600 N

10400 N

10200 N

10000 N

BASE LINE

9800 N

9600 N

9400 N

9200 N

9000 N

7350 E

7400 E

7450 E

7500 E

7550 E

7600 E

7650 E

7700 E

7750 E

7800 E

7850 E

7900 E

7950 E

8000 E

8050 E

8100 E

8150 E

8200 E

8250 E

8300 E

8350 E

8400 E

8450 E

8500 E

8550 E

8600 E

8650 E

MUIRDOCK CREEK

533(250 N.

5330000N.

570000 E.

5330000N.

42A01NE0100 63.6025 EBY

219

TOTAL FIELD MAGNETICS : PROFILE SCALE 1 CM = 400 nT

VERTICAL GRADIENT MAGNETICS : PROFILE SCALE 1 CM = 40 nT/METRE

POSTED TOTAL FIELD MAGNETIC VALUES CAN BE FOUND ON THE CONTOUR MAPS

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT

ONTARIO

AMALGAMATED KIRKLAND GRID

VERTICAL MAGNETIC GRADIENT

WITH TOTAL FIELD MAGNETIC PROFILES

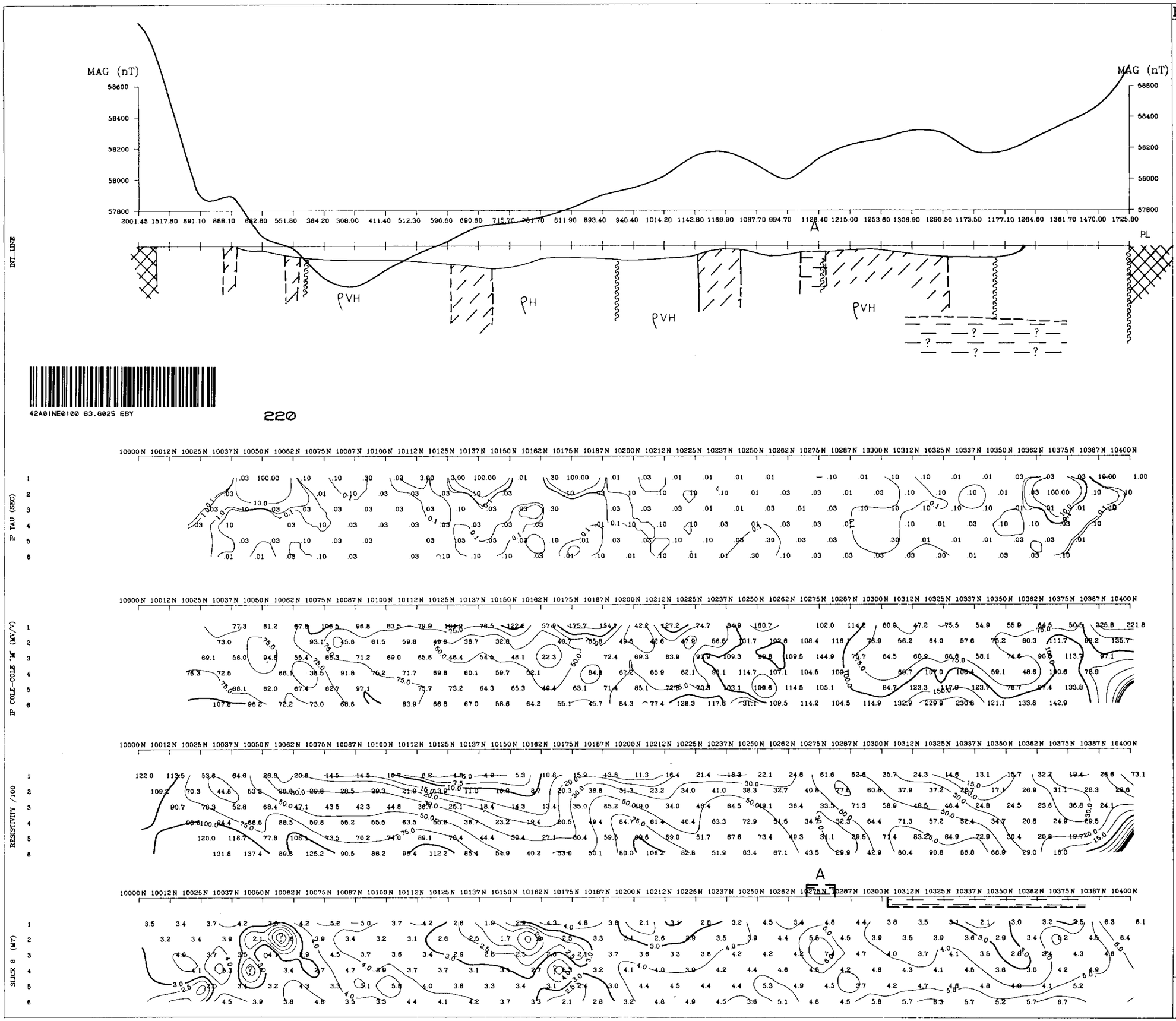
SURVEYED BY : VAL D'OR GEOPHYSIQUE	**WEST SHEET**
SCALE 1 : 2500 SEPT. 1990	NTS 42A/1 & 32D/4
PROCESSING BY URQUHART DVORAK LTD.	SUPERVISION : STRATAGEX LTD

63.6025

50 0 50 100 150

METRES

MAP AK-2W



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 7350 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7350E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
See also a = 50m. data

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

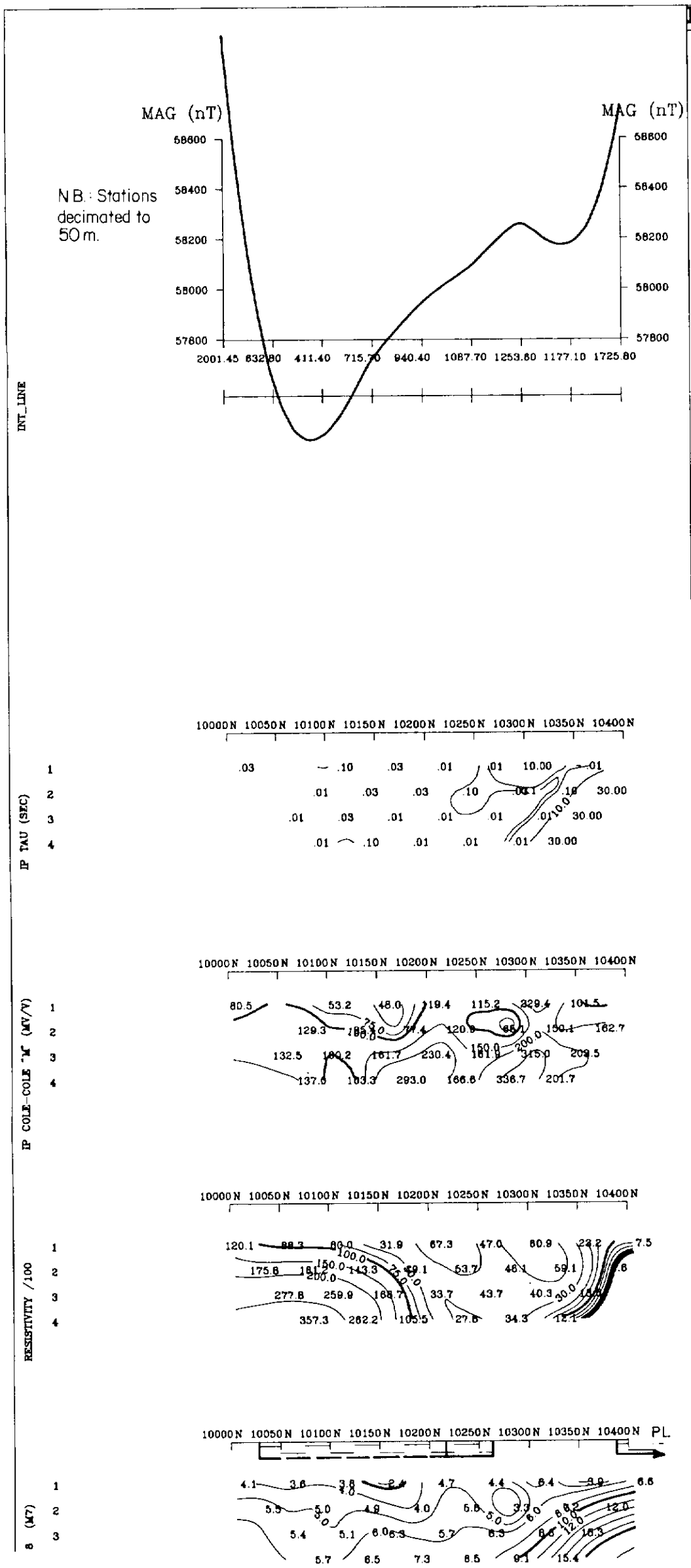
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L–7350E.IND
JVX LIMITED	DATA FILE: L–7350E.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 7350 EAST
"A" SPACING = 50.0 METRES
N = 1 TO 4
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 5000
METRIC GRID

7350 E.

a = 50 m.
TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
Stations at 12.5 (6.25) m.

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

40 20 12 mv/v
Surface
At Depth

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

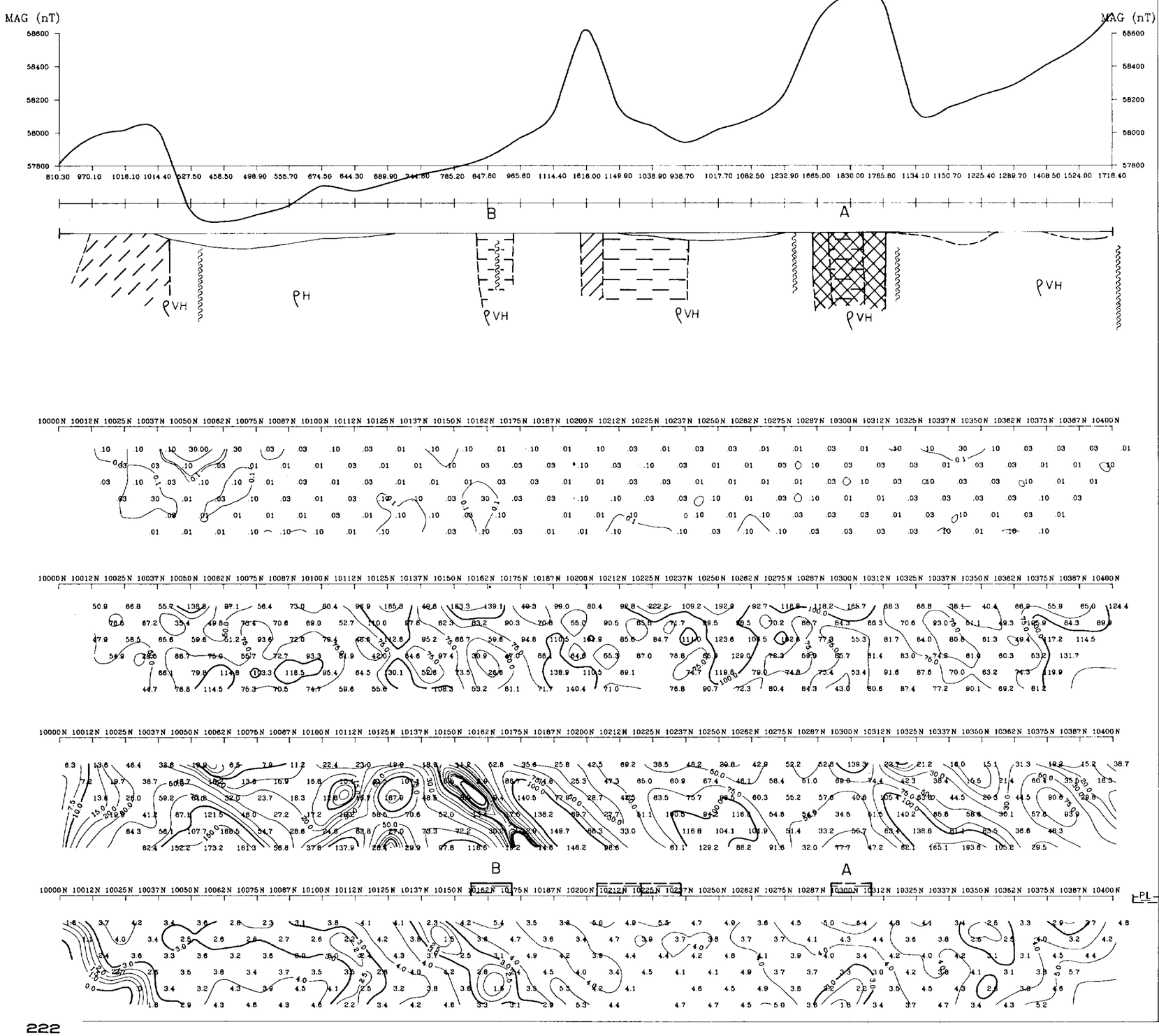
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Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L–735–50.IND
JVX LIMITED	DATA FILE: L–735–50.DAT

PS-1a

42A01NE0100 63.6025 EBY



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 7400 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7400 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off-line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

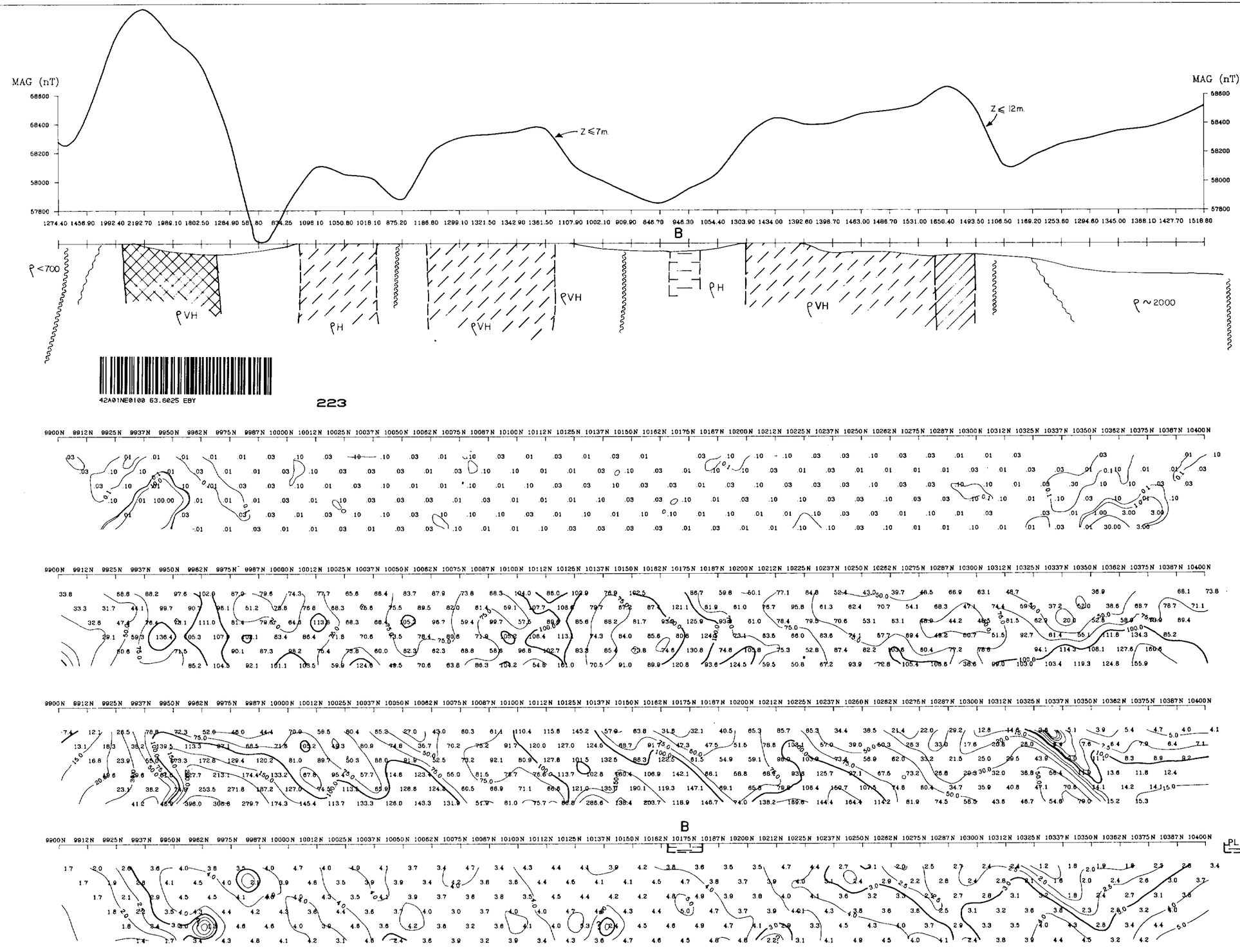
Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-7400E.IND
JVX LIMITED	DATA FILE: L-7400E.DAT

42A01NE0100 63.6025 EBY



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 7500 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7500 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

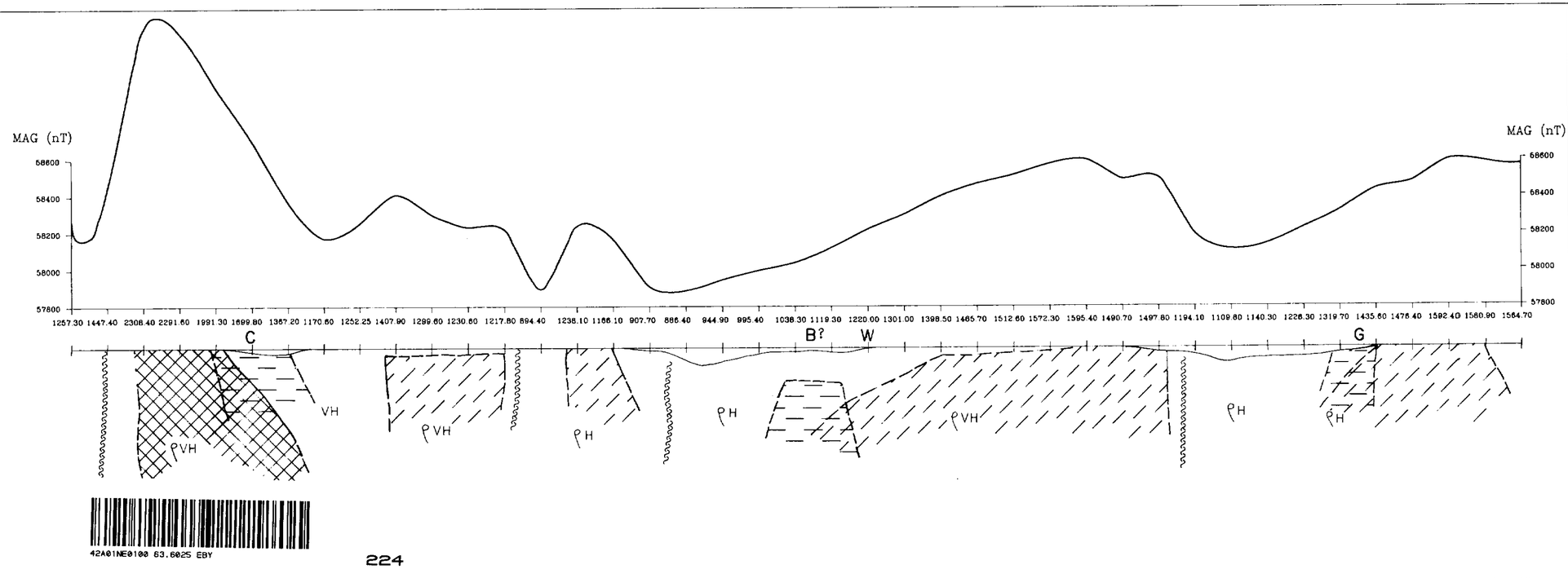
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63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

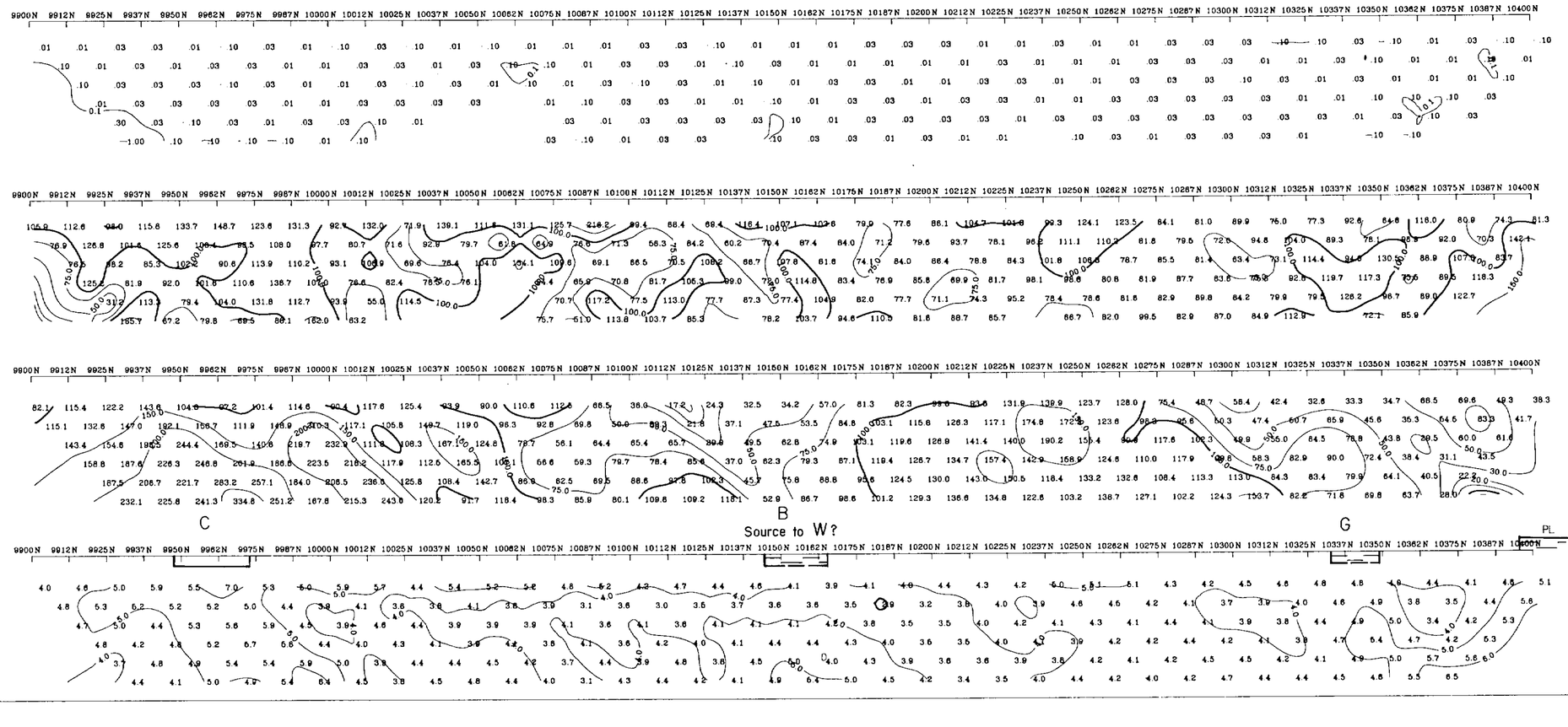
SURVEY BY	INDEX FILE: L-7500E.IND
JVX LIMITED	DATA FILE: L-7500E.DAT

INT_LINE



42A01NE0100 63.6025 EBY

224



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 7600 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7600 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB

Bedrock

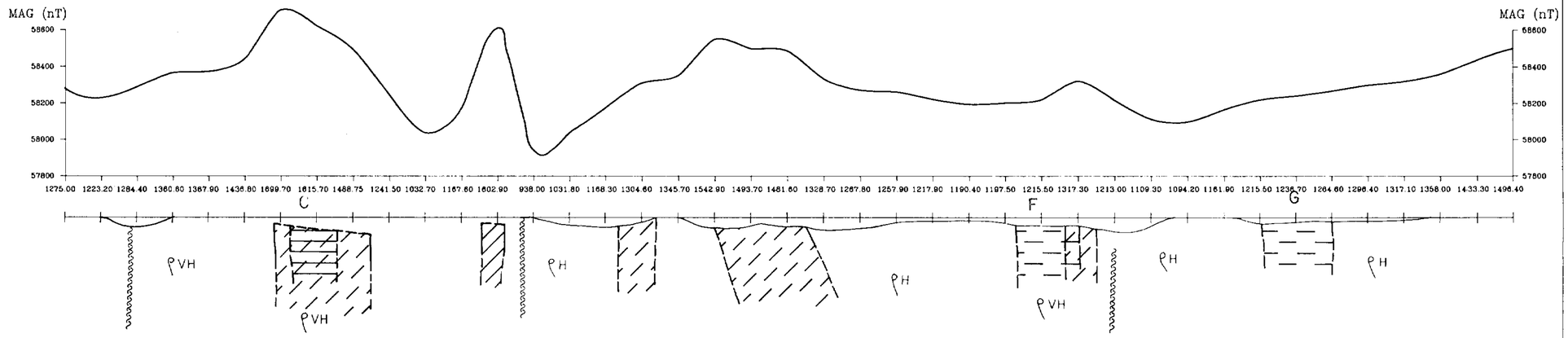
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd

63.6025

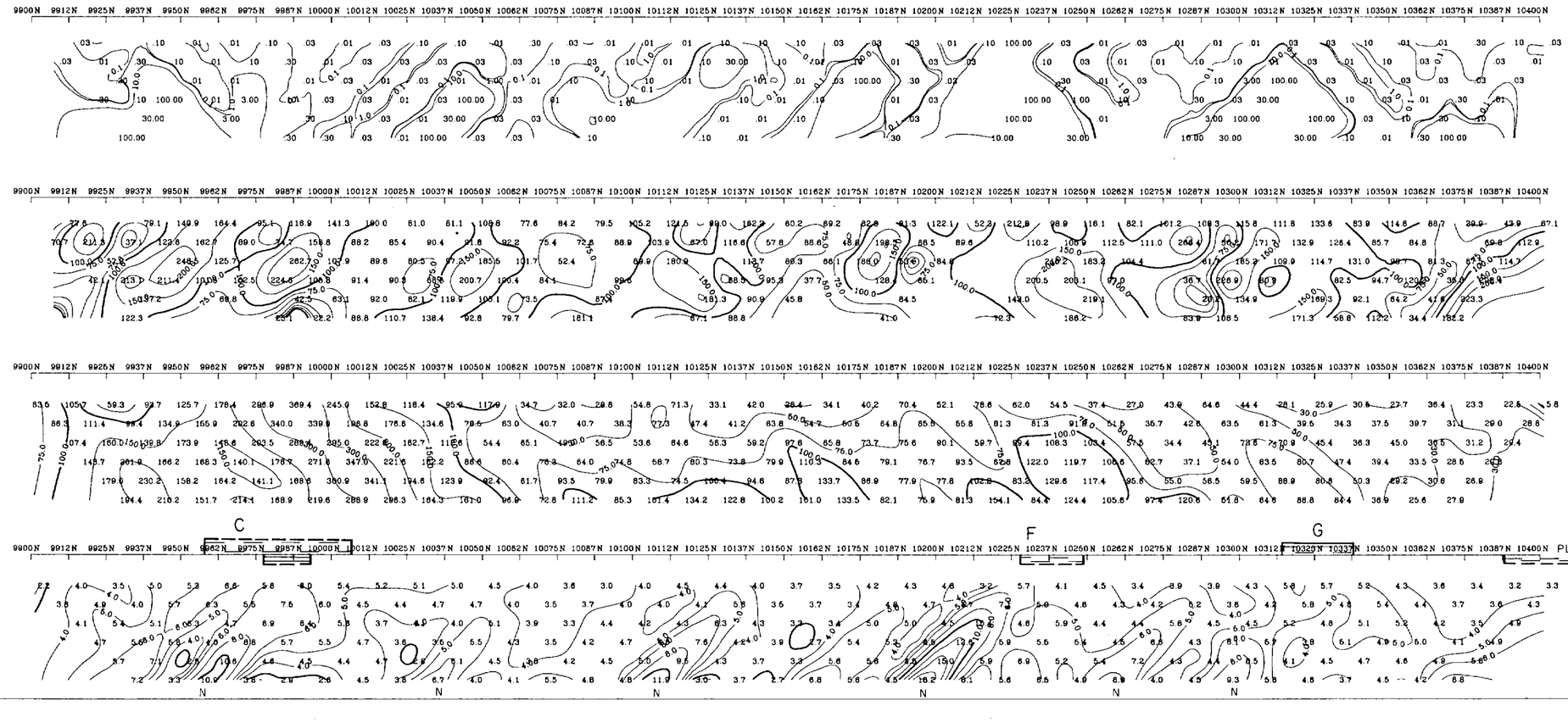
Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-7600E.IND
JVX LIMITED	DATA FILE: L-7600E.DAT



42A01NE0100 63.6025 EBY

225



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 7700 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7700 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

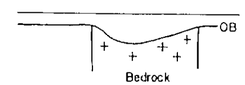
z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS



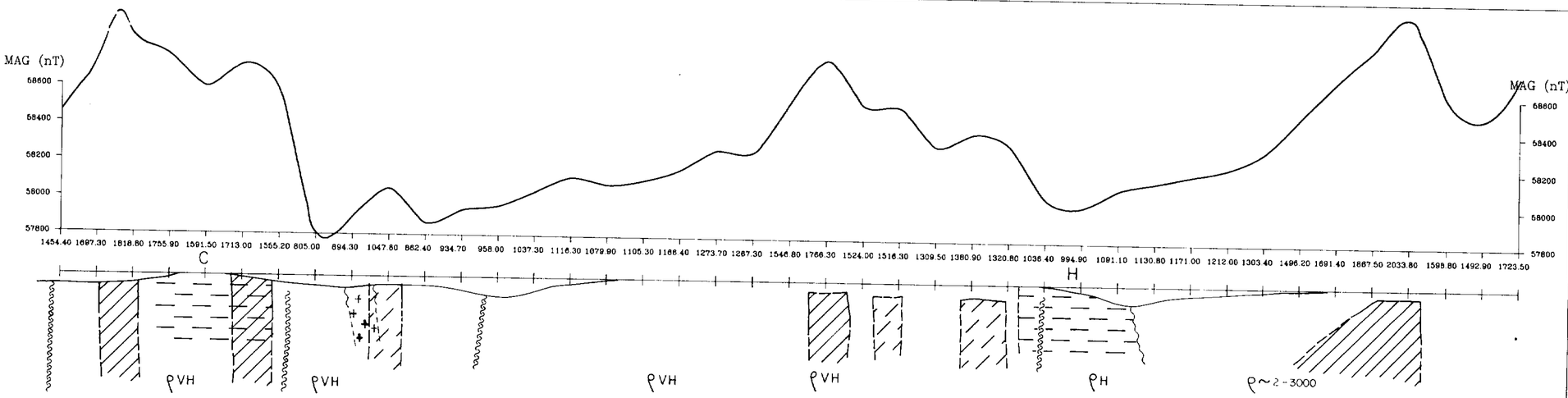
ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

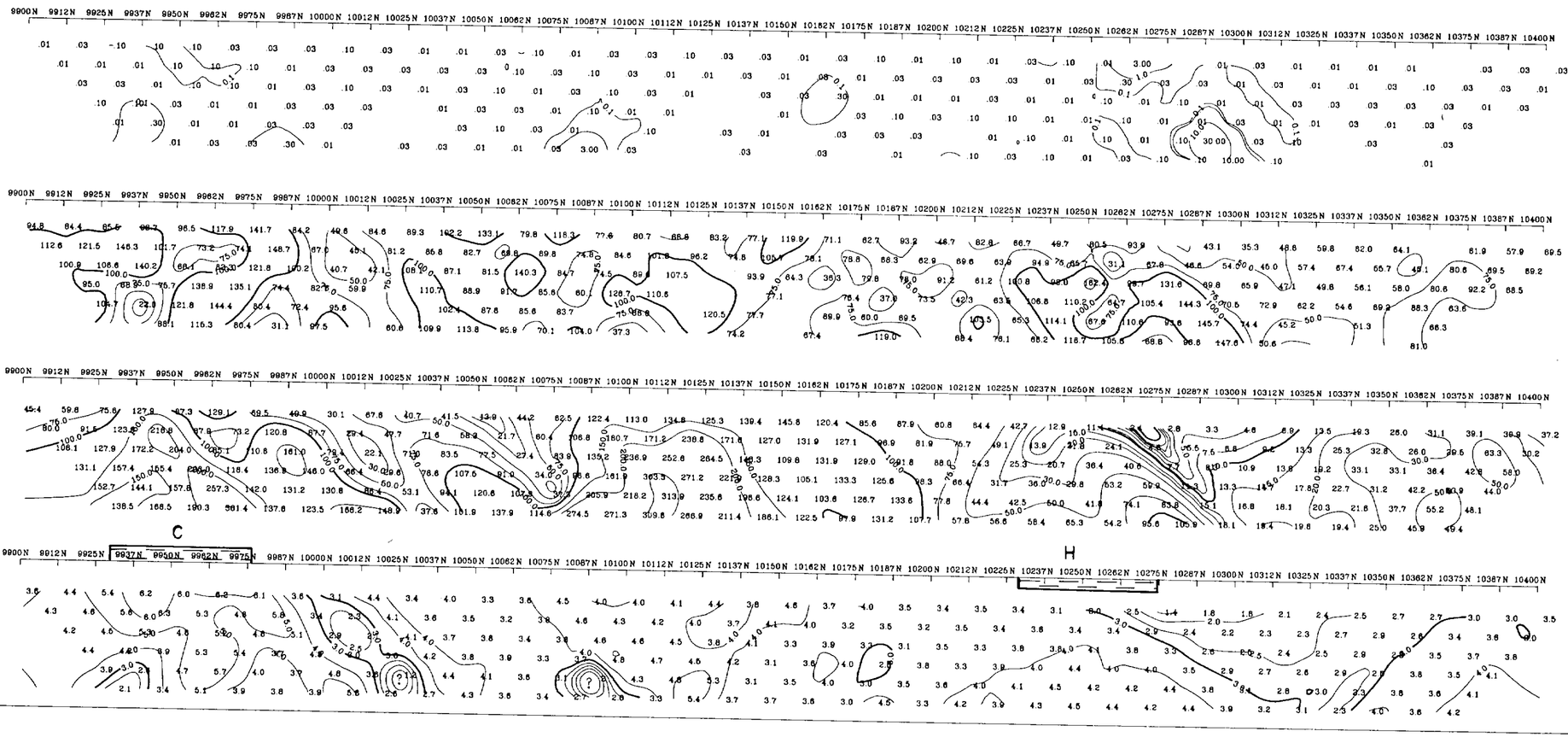
63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L–7700E.IND
JVX LIMITED	DATA FILE: L–7700E.DAT



226



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 7800 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7800 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

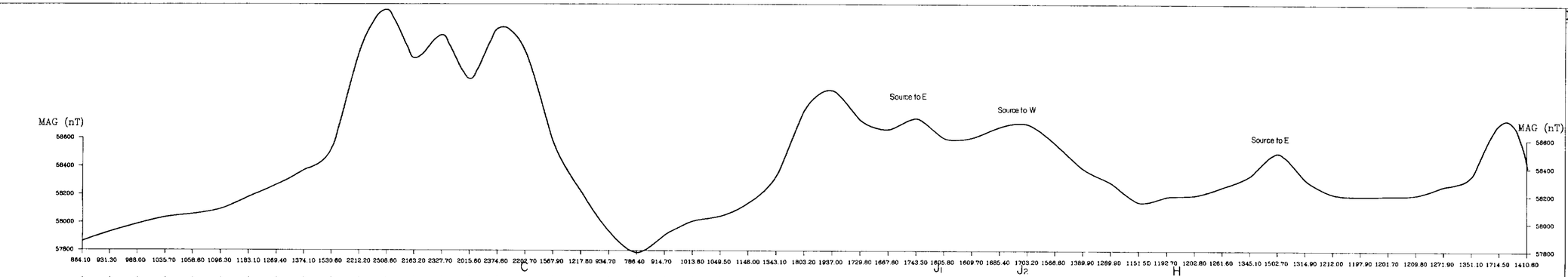
Interpretation by: STRATAGEX Ltd

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

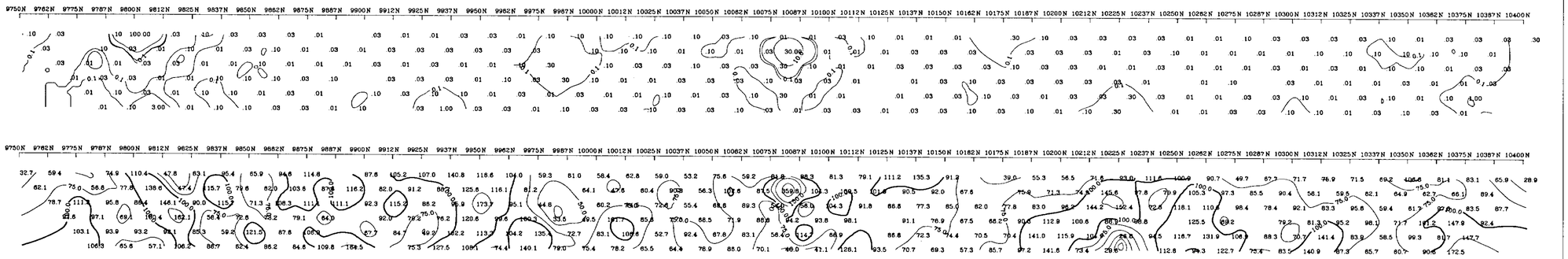
SURVEY BY	INDEX FILE: L-7800E.IND
JVX LIMITED	DATA FILE: L-7800E.DAT

PS-6



42A01NE0100 63.6025 EBY

227



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 7900 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

7900 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

See also a = 50 m. data

EXPLANATION

MAGNETIC SOURCES:
- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

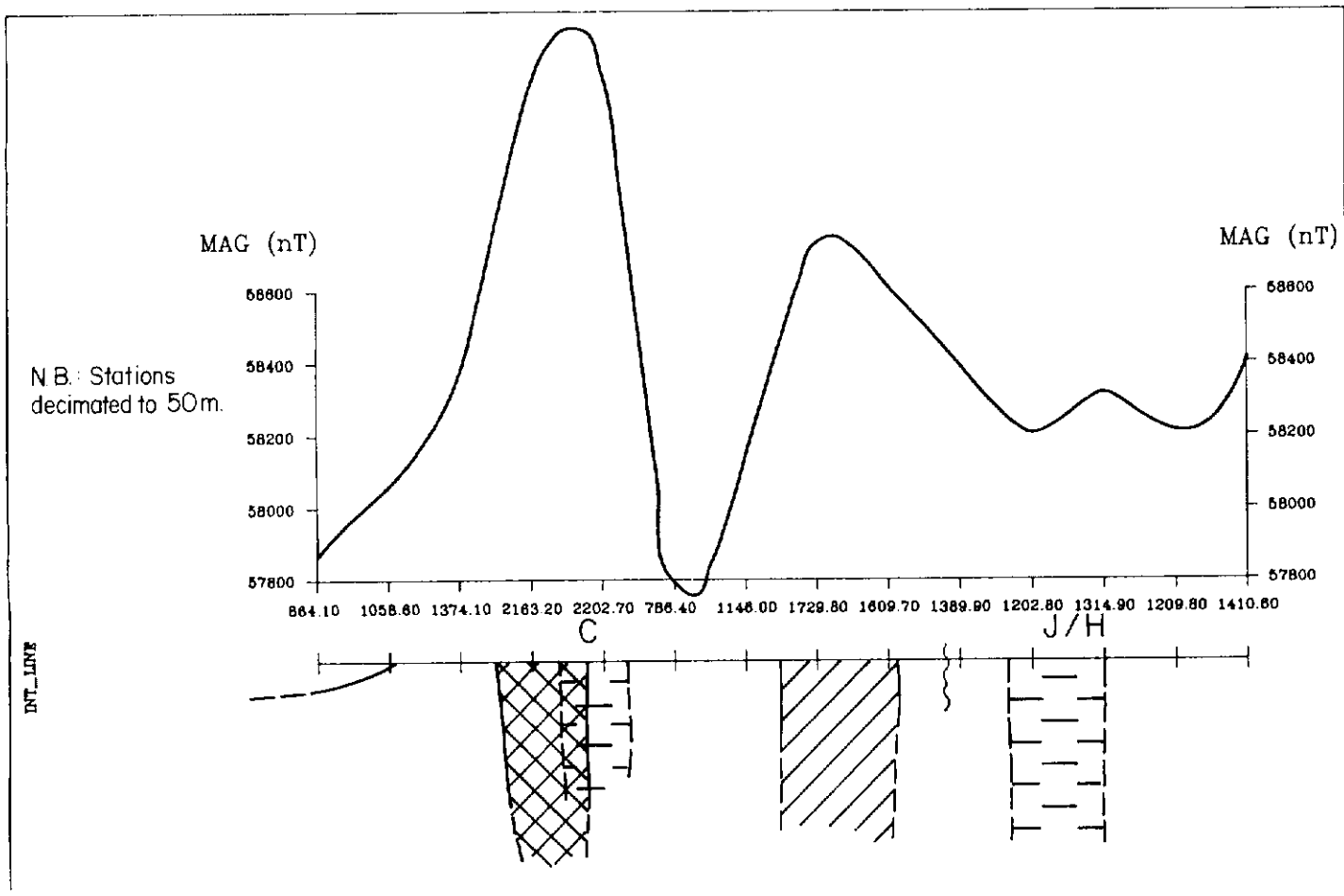
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd

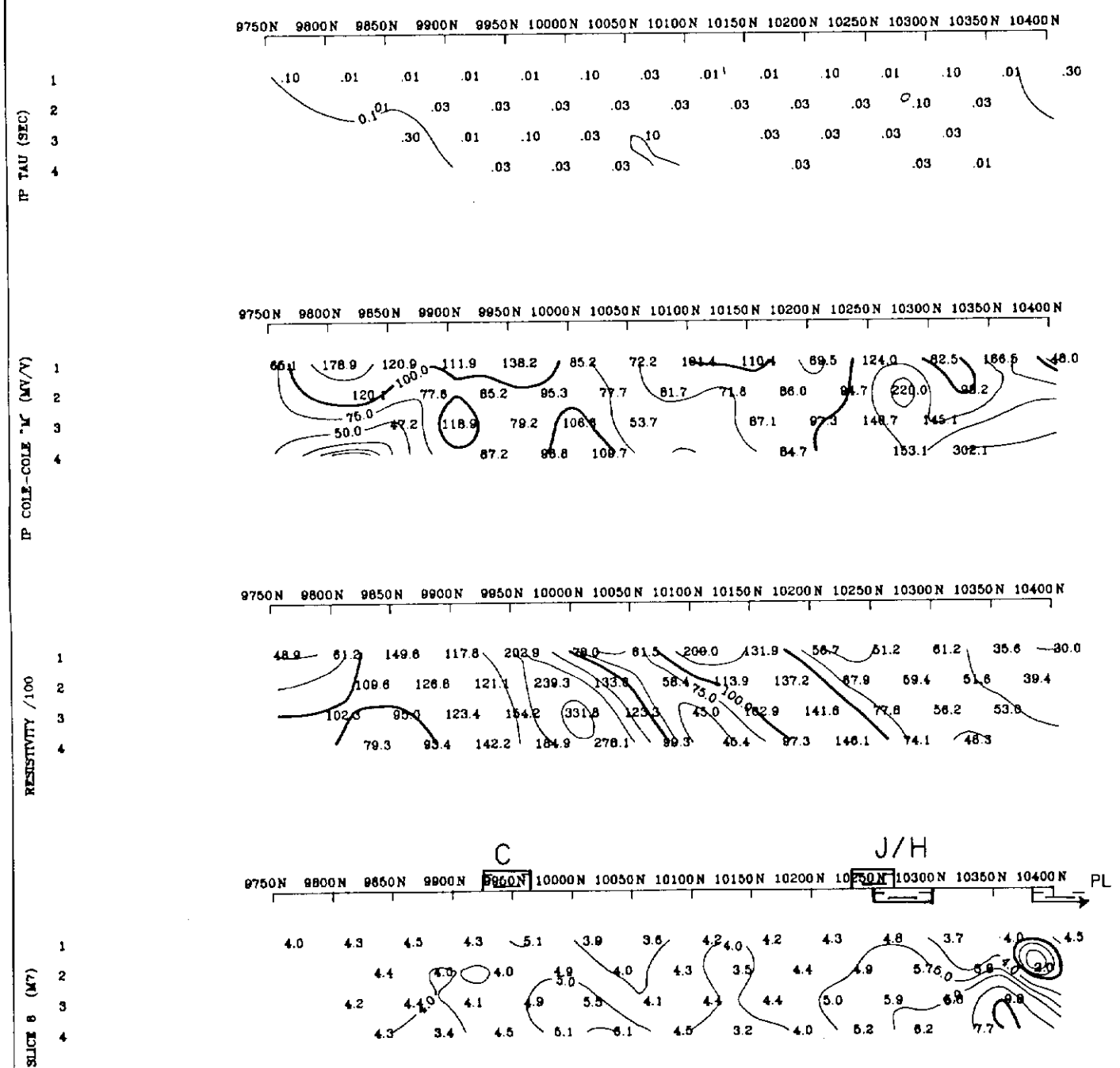
63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-7900E.IND
JVX LIMITED	DATA FILE: L-7900E.DAT



42A01NE0100 63.6025 EBY



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 7900 EAST
"A" SPACING = 50.0 METRES
N = 1 TO 4
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 5000
METRIC GRID

7900 E.

a=50 m.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

Stations at: 12·5 (6·25) m.

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

z Depth

I.P. SOURCES:

40 20 12 mv/v
Surface
At Depth

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

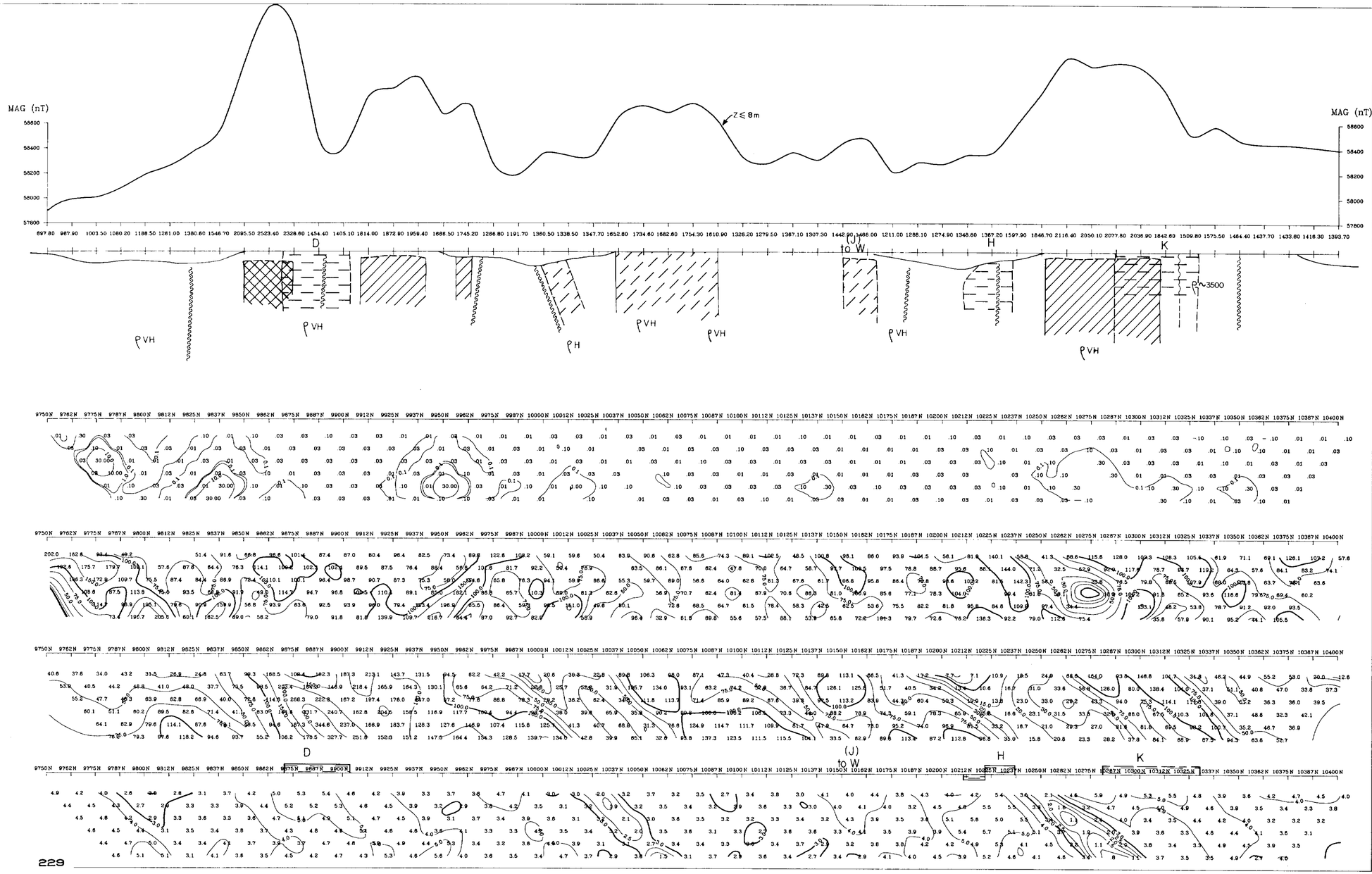
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L–79E–50.IND
JVX LIMITED	DATA FILE: L–79E–50.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8000 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8000 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:
- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed — Questionable response

RESISTIVITY: LOWS

OB
Bedrock

- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

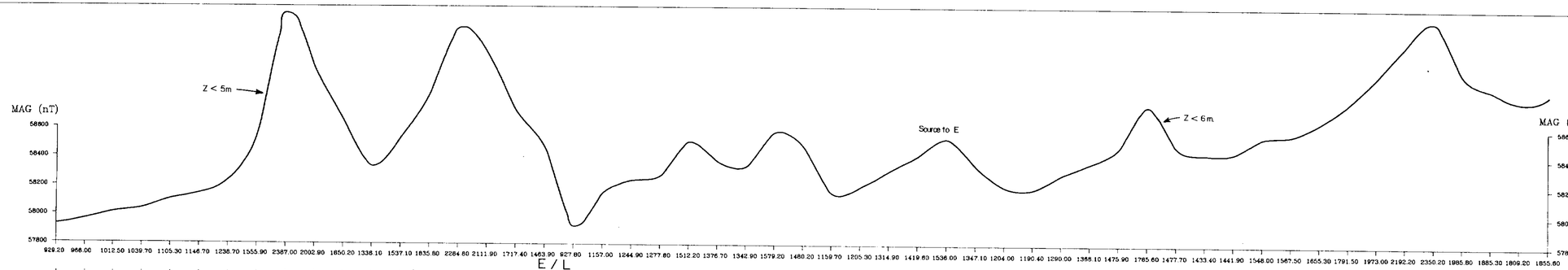
63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8000E.IND
JVX LIMITED	DATA FILE: L-8000E.DAT

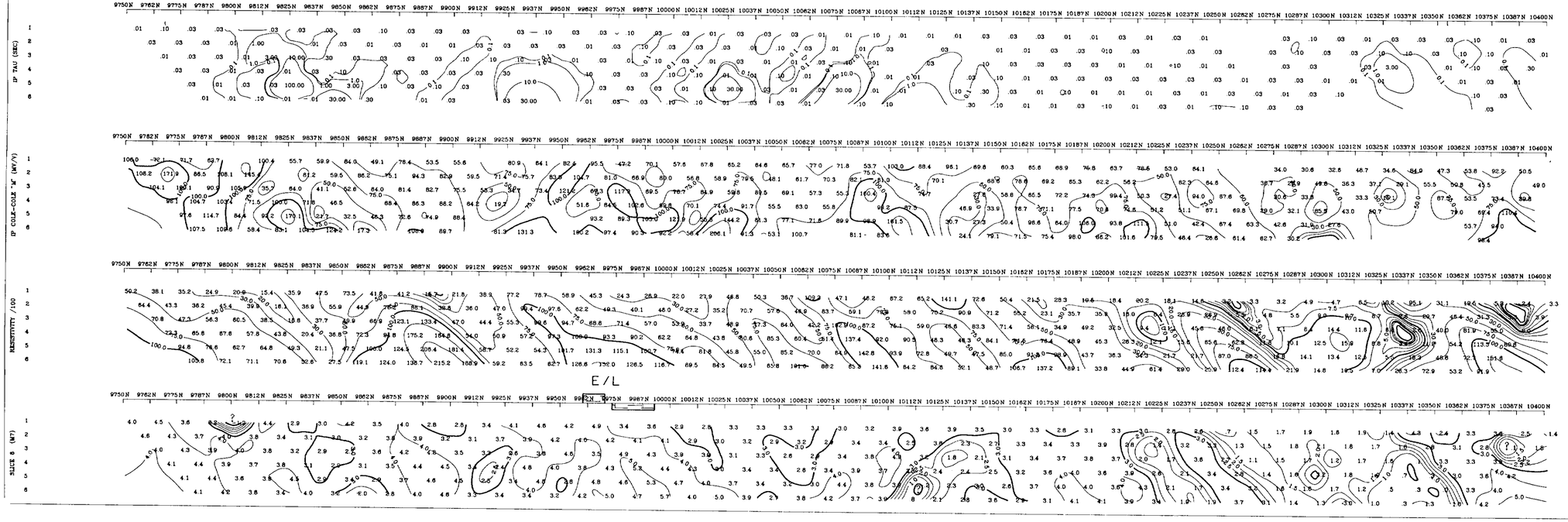
42A01NE0100 63.6025 EBY

PS-8





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BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8100 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8100 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:
- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

Z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

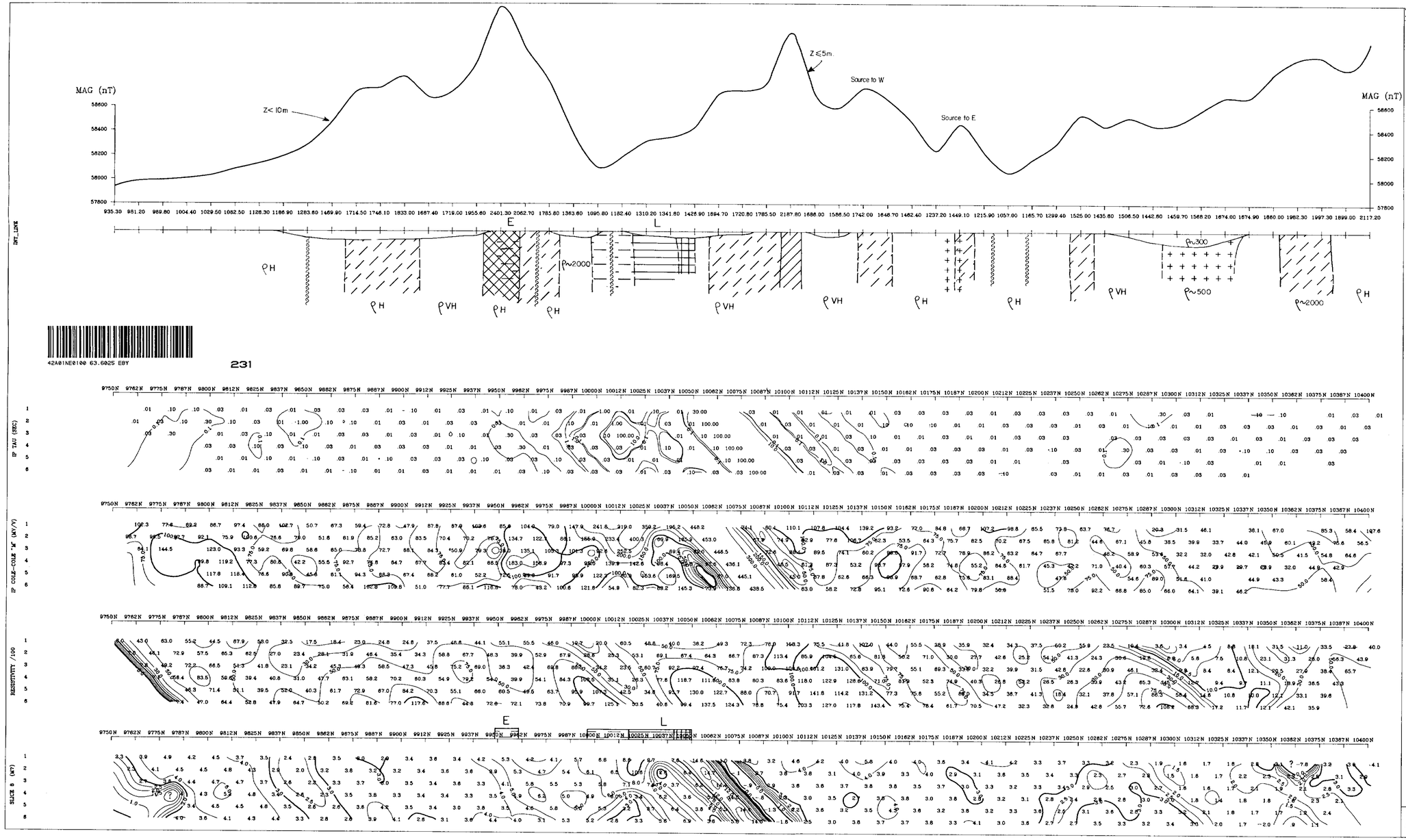
ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

63-6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8100E.IND
JVX LIMITED	DATA FILE: L-8100E.DAT



42A01NE0100 63.6025 EBY

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BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8200 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8200 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:
- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

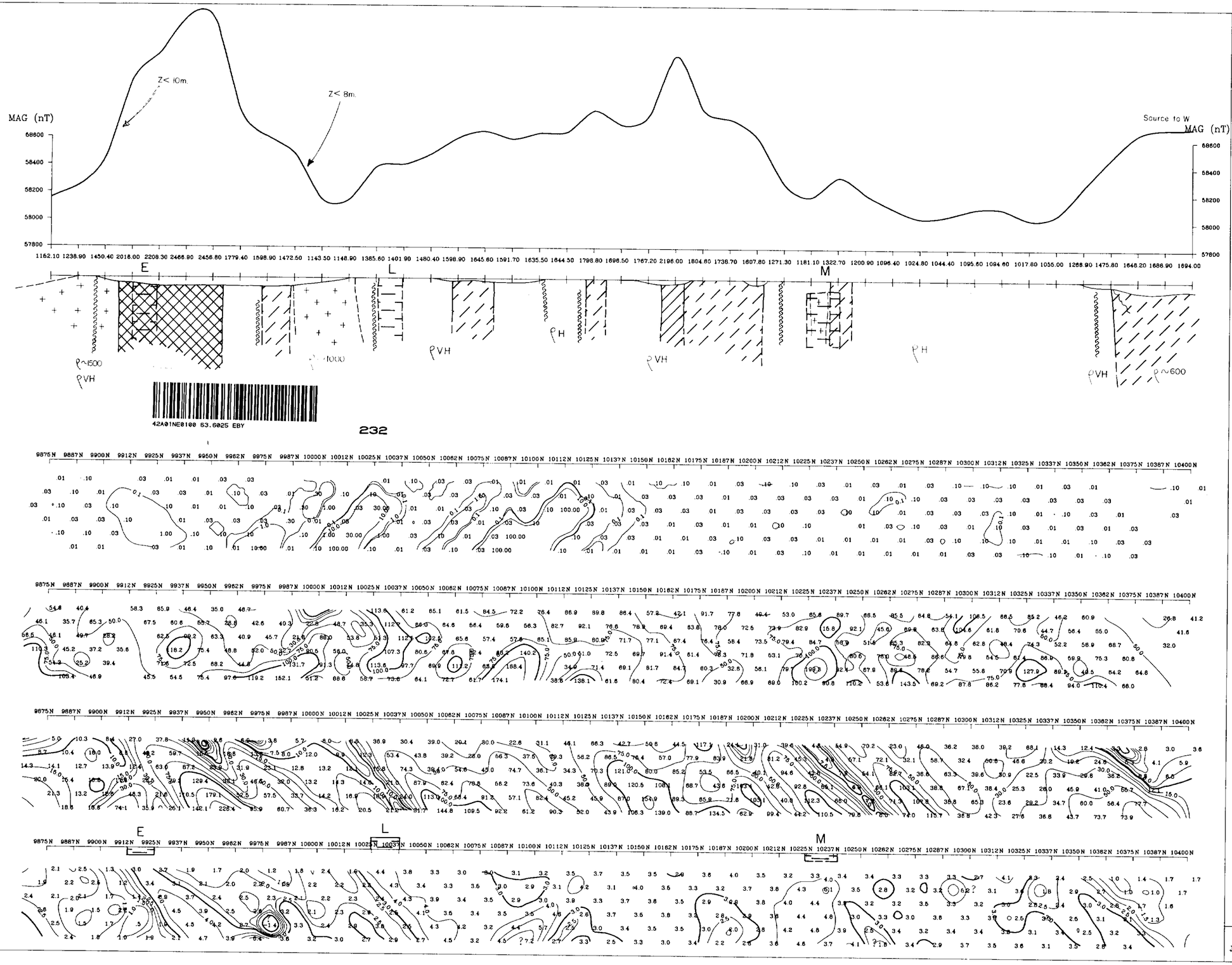
ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8200E.IND
JVX LIMITED	DATA FILE: L-8200E.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 8300 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8300 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

See also a = 25m. and a = 50m. data

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

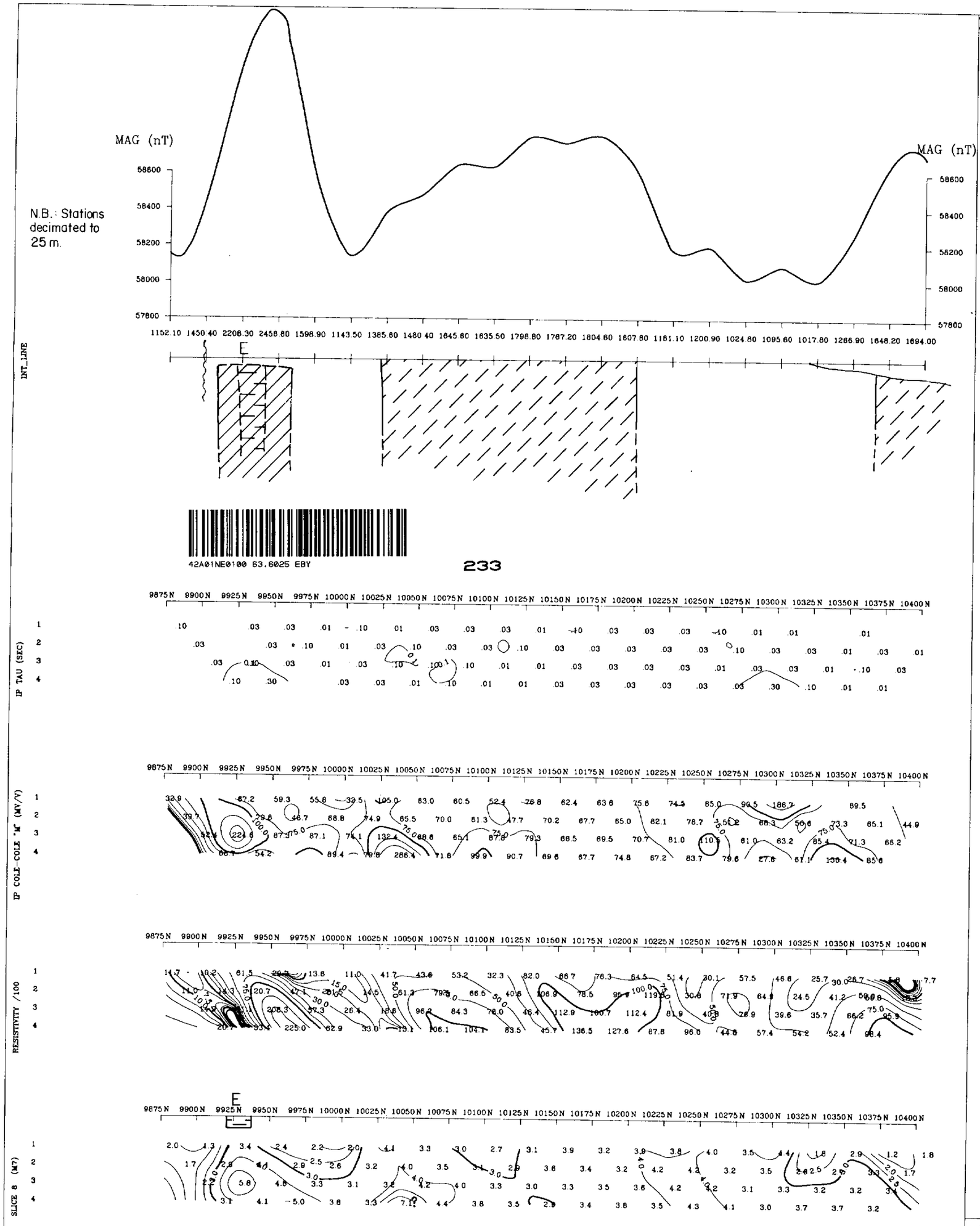
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8300E.IND
JVX LIMITED	DATA FILE: L-8300E.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 8300 EAST
"A" SPACING = 25.0 METRES
N = 1 TO 4
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 2500
METRIC GRID

8300 E.

a = 25 m.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
Stations at: 12.5 (6.25) m.

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8300E2.IND
JVX LIMITED	DATA FILE: L-8300E2.DAT

BATTLE MOUNTAIN (CANADA) INC.

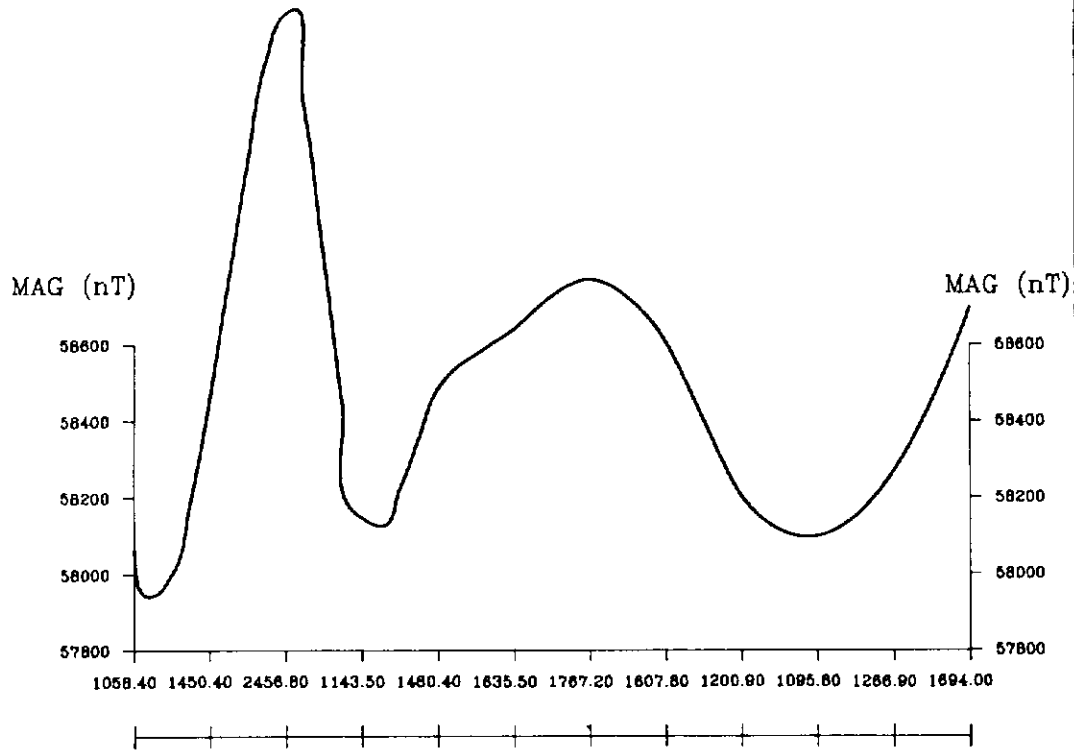
Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8300 EAST
"A" SPACING = 50.0 METRES
N = 1 TO 4
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 5000
METRIC GRID

8300 E.

a = 50m.
TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
Stations at: 12.5 (6.25) m.

N.B.: Stations decimated to 50 m.



EXPLANATION

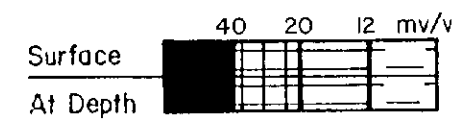
MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

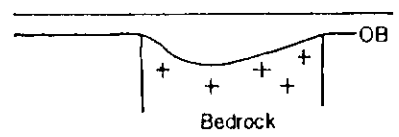
Z Depth

I.P. SOURCES:



Dashed Questionable response

RESISTIVITY: LOWS



- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

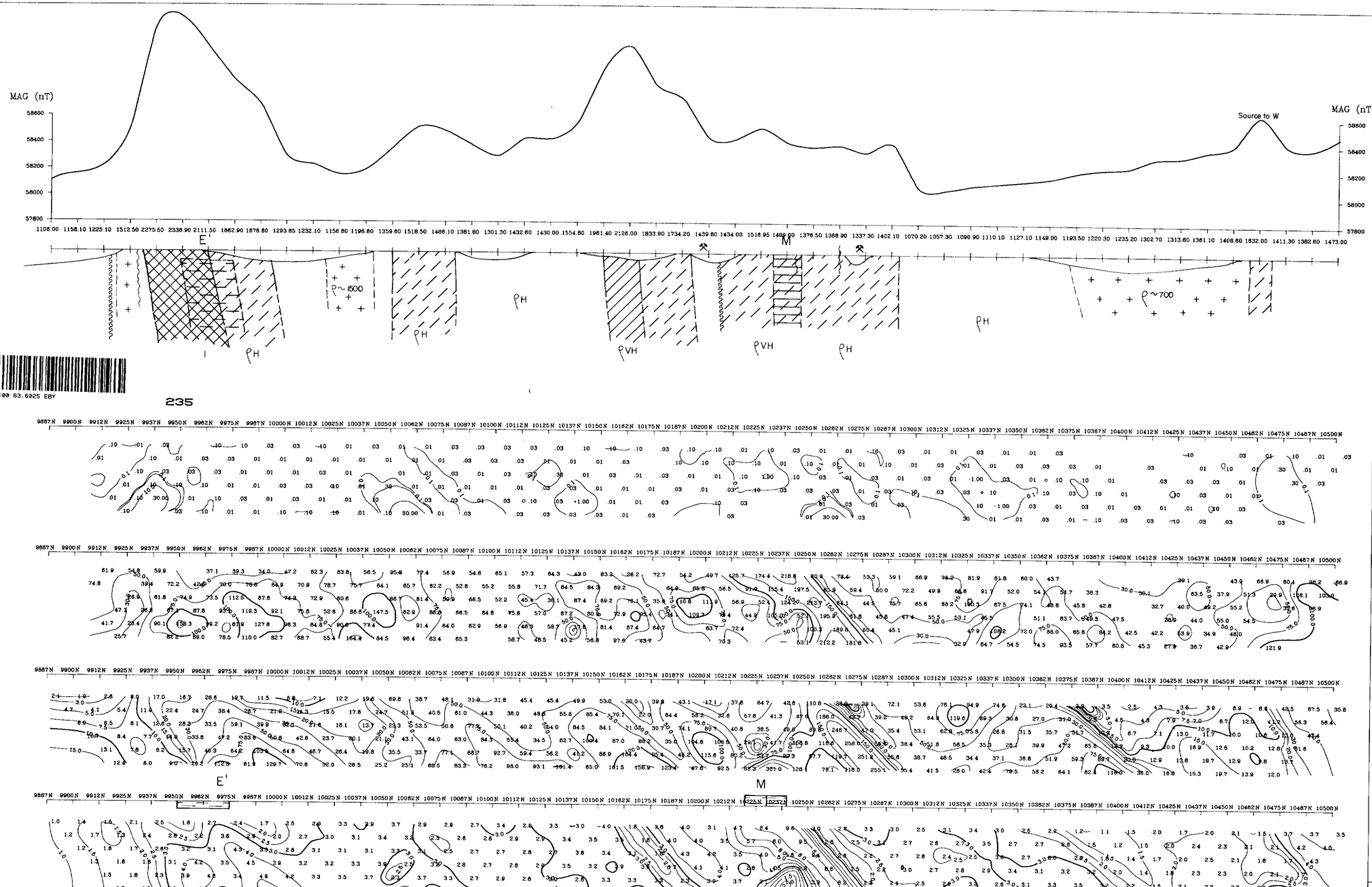
63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-83E-50.IND
JVX LIMITED	DATA FILE: L-83E-50.DAT

42A01NE0100 63.6025 EBY

PS-11b



42A01NE0100 63.6025 EBY

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BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8360 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8360 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
See also a = 25 m. data

EXPLANATION

MAGNETIC SOURCES:
- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

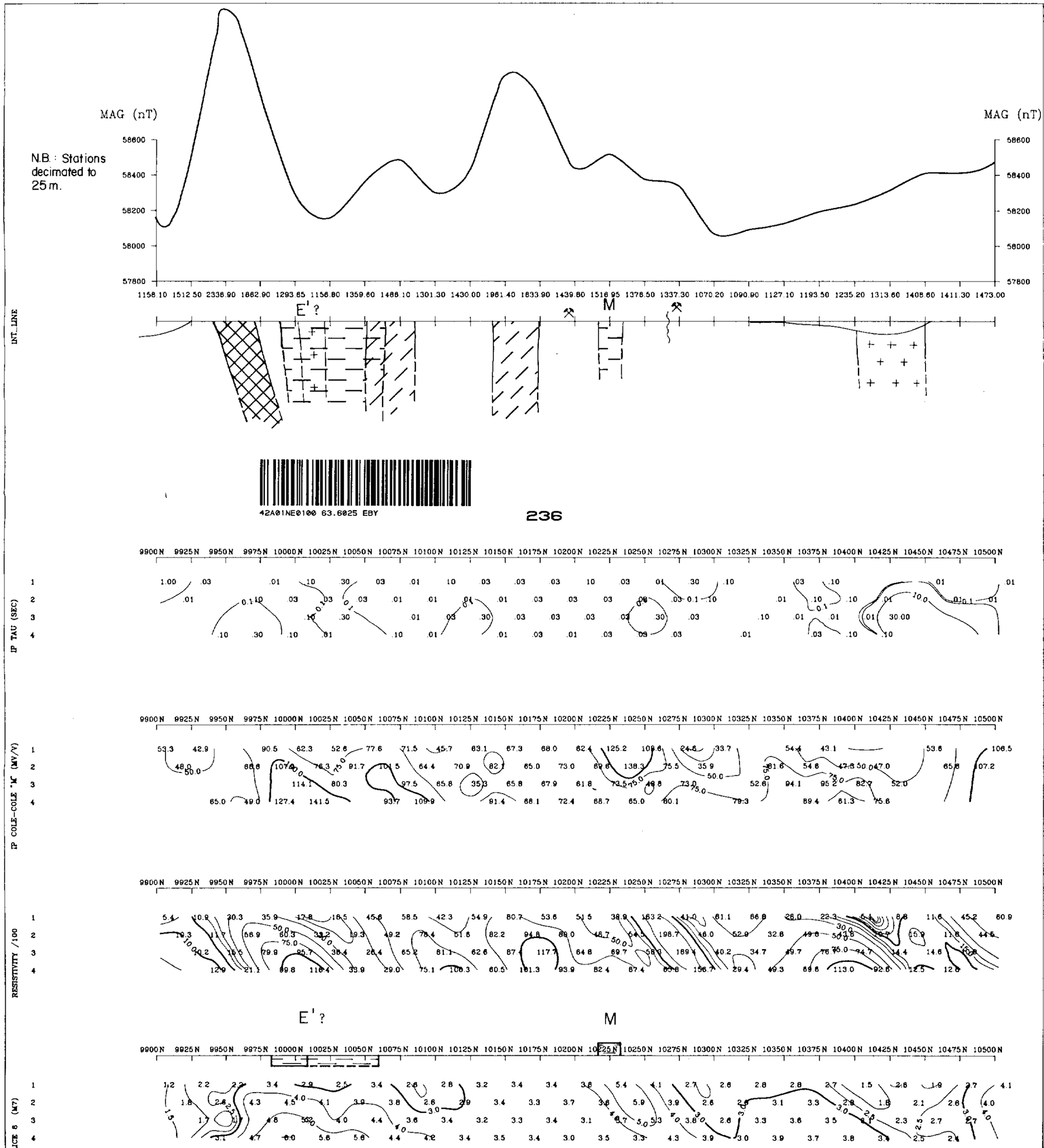
ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8360E.IND
JVX LIMITED	DATA FILE: L-8360E.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 8360 EAST
"A" SPACING = 25.0 METRES
N = 1 TO 4
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 2500
METRIC GRID

8360 E.

a = 25 m.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
Stations at : 12.5 (6.25) m.

EXPLANATION

MAGNETIC SOURCES :

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES :

40 20 12 mv/v
Surface
At Depth

Dashed Questionable response

RESISTIVITY : LOWS

OB
Bedrock

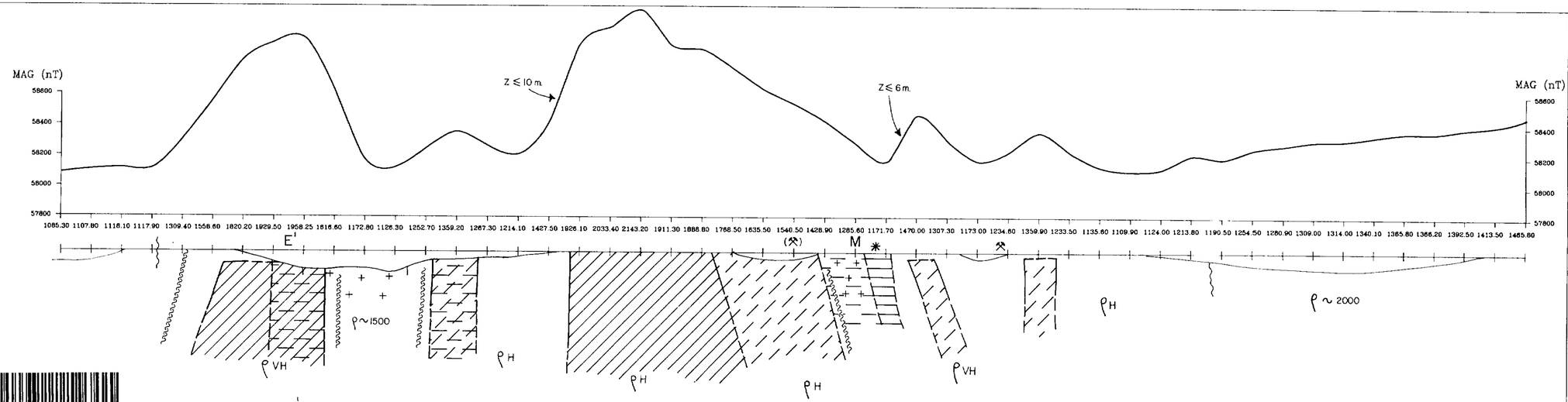
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by : STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

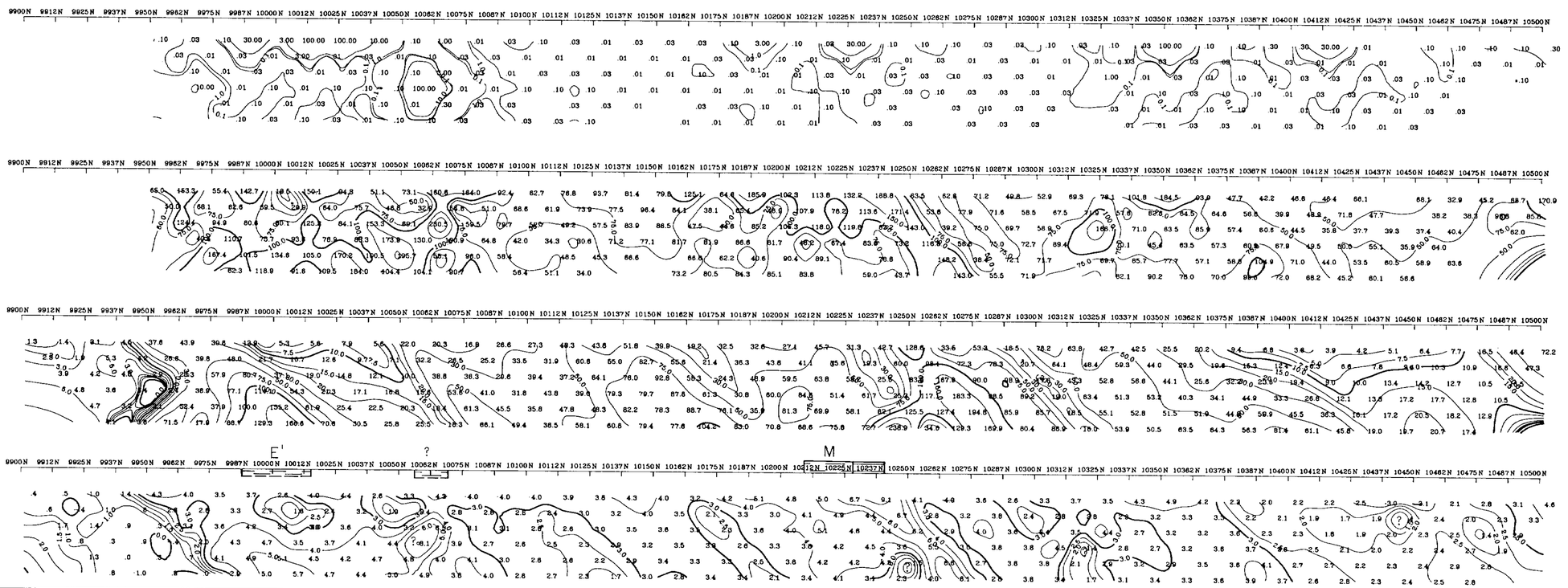
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JVX LIMITED	DATA FILE: L-8360E2.DAT





42A01NE0100 63.6025 EBY

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BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8400 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8400 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:
- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

Z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

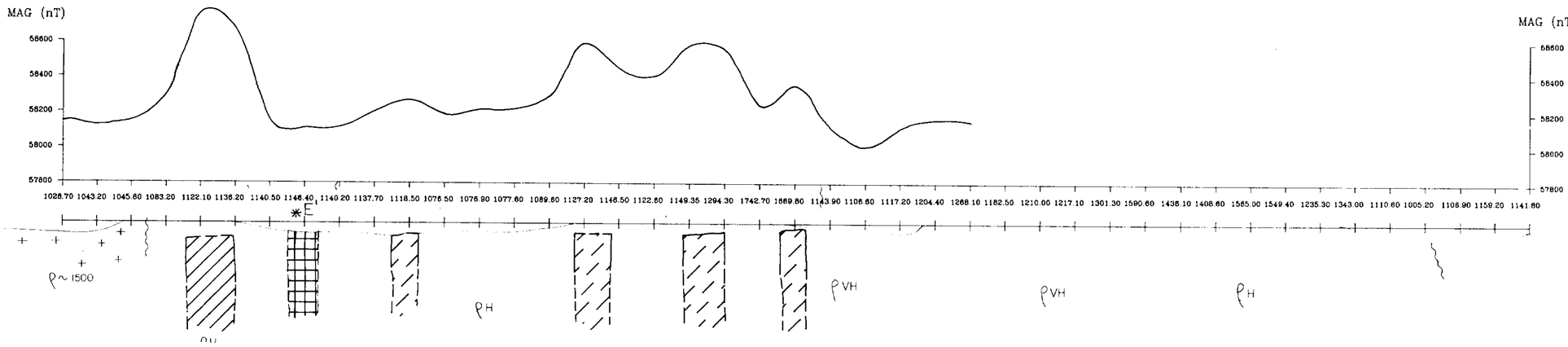
ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8400E.IND
JVX LIMITED	DATA FILE: L-8400E.DAT





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9975N 9987N 10000N 10012N 10025N 10037N 10050N 10062N 10075N 10087N 10100N 10112N 10125N 10137N 10150N 10162N 10175N 10187N 10200N 10212N 10225N 10237N 10250N 10262N 10275N 10287N 10300N 10312N 10325N 10337N 10350N 10362N 10375N 10387N 10400N 10412N 10425N 10437N 10450N 10462N 10475N 10487N 10500N

IP TAU (SEC)

IP COLE-COLE "M" (MV/V)

RESISTIVITY /100

SLICE 5 (M7)

E'

9975N 9987N 10000N 10012N 10025N 10037N 10050N 10062N 10075N 10087N 10100N 10112N 10125N 10137N 10150N 10162N 10175N 10187N 10200N 10212N 10225N 10237N 10250N 10262N 10275N 10287N 10300N 10312N 10325N 10337N 10350N 10362N 10375N 10387N 10400N 10412N 10425N 10437N 10450N 10462N 10475N 10487N 10500N

BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 8500 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8500 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

Z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB

Bedrock

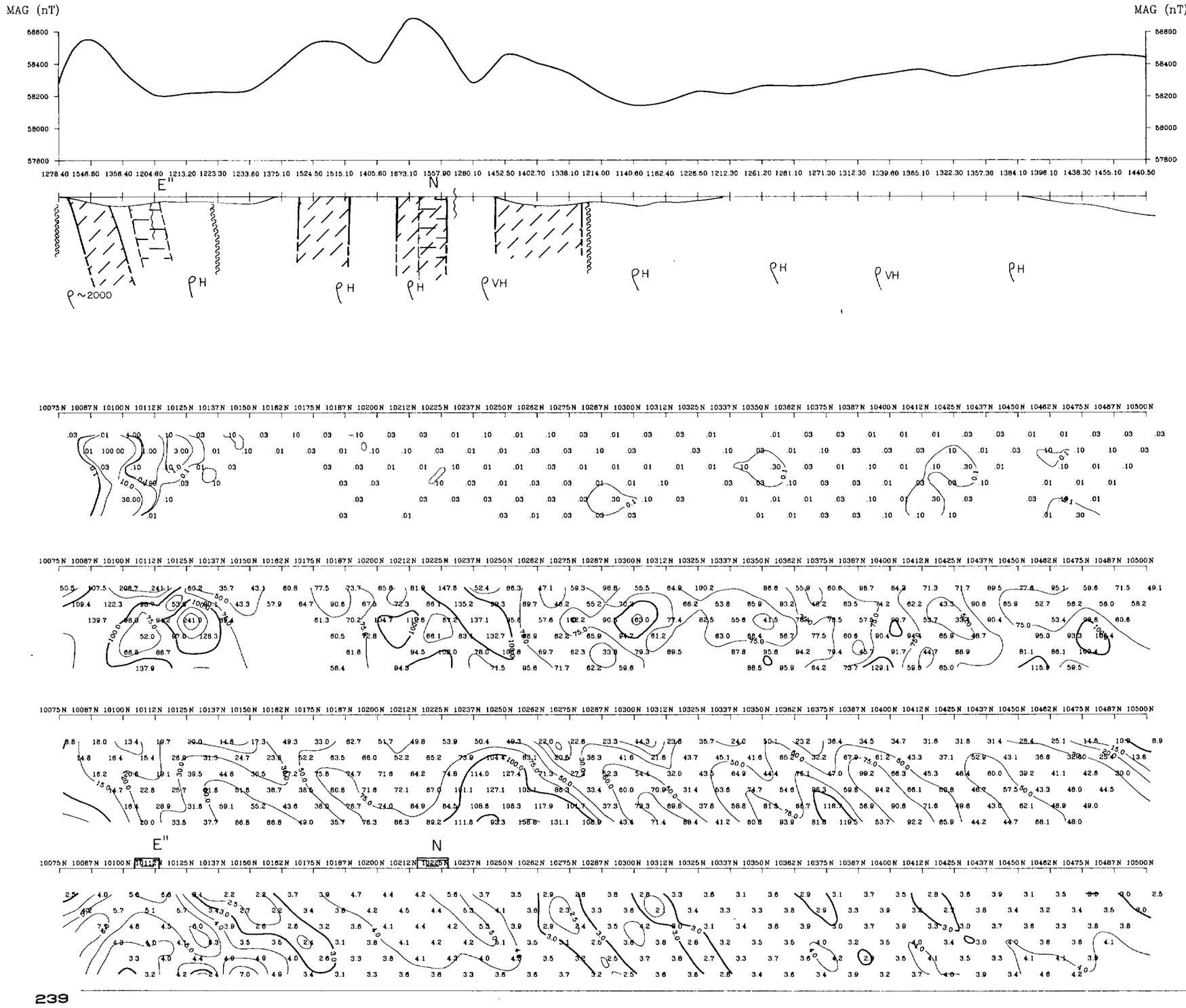
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8500E.IND
JVX LIMITED	DATA FILE: L-8500E.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8600 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8600 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

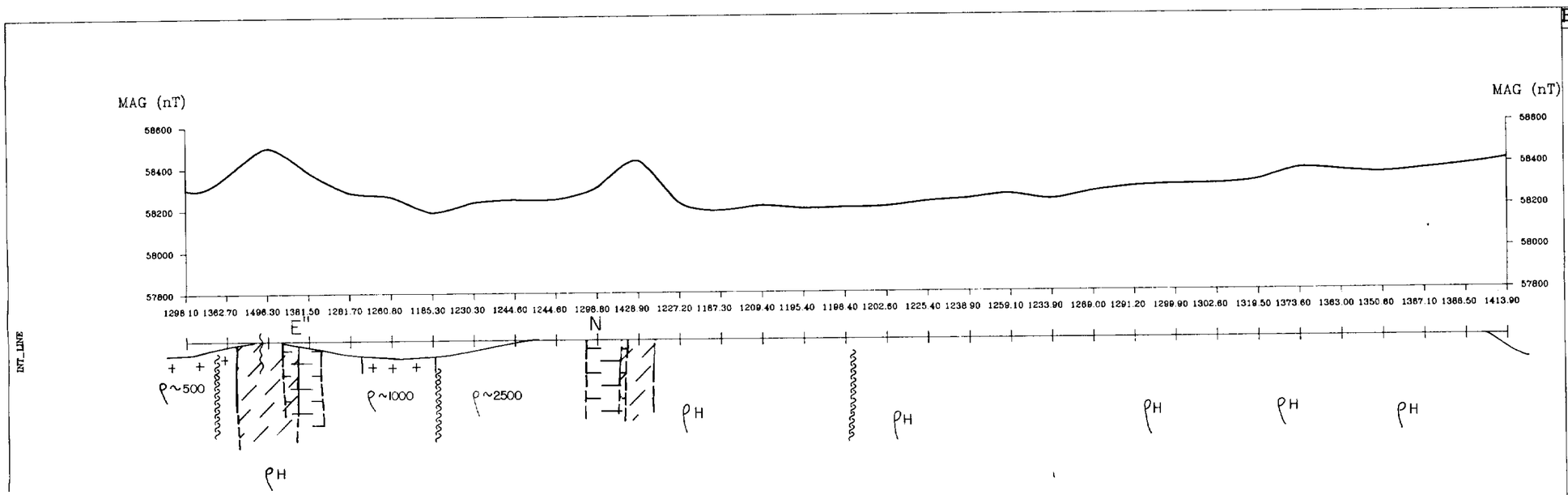
Interpretation by: STRATAGEX Ltd

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

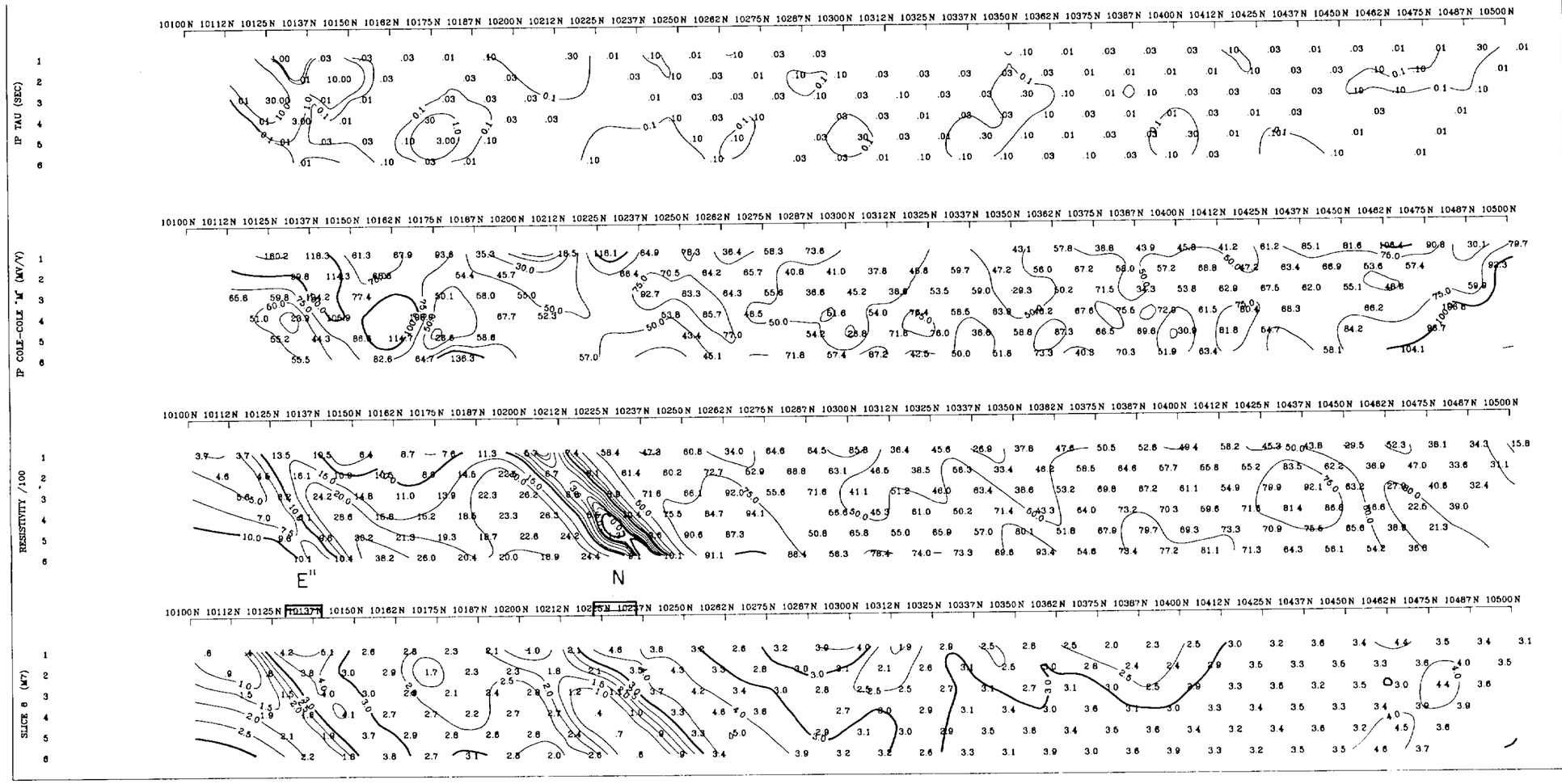
SURVEY BY	INDEX FILE: L-8600E.IND
JVX LIMITED	DATA FILE: L-8600E.DAT

42A01NE0100 63.6025 EBY



42A01NE0100 63.6025 EBY

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BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 8700 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8700 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well - defined or off - line)

z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

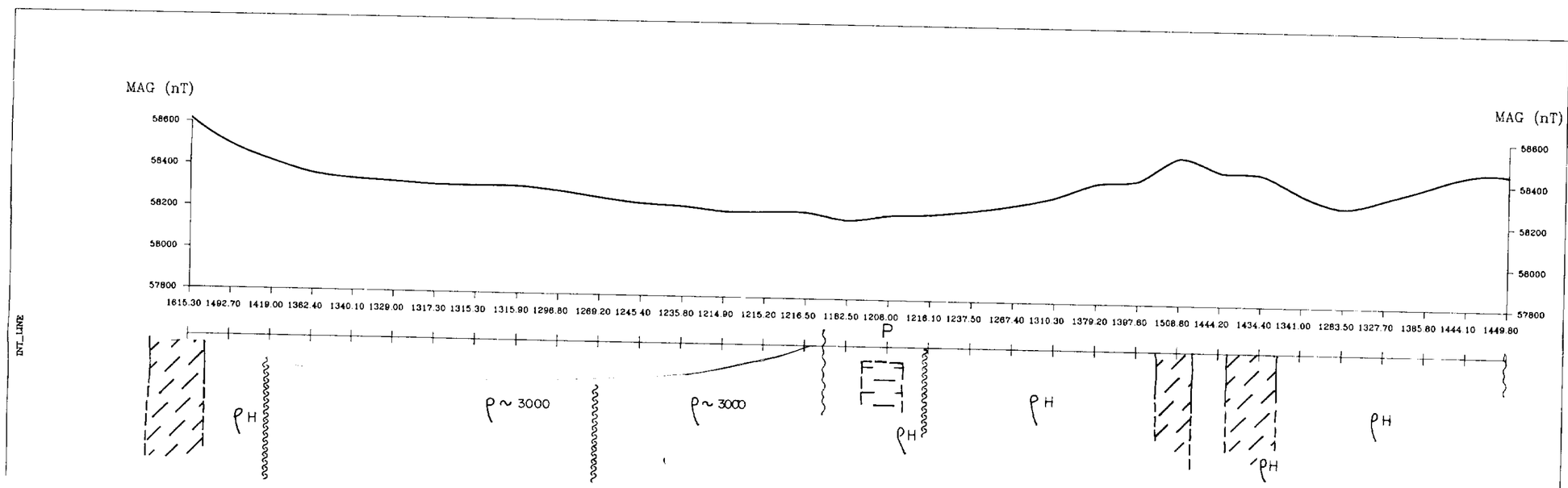
- ρH High Resistivity
- ρVH Very High Resistivity
- Contacts
- Fault
- PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

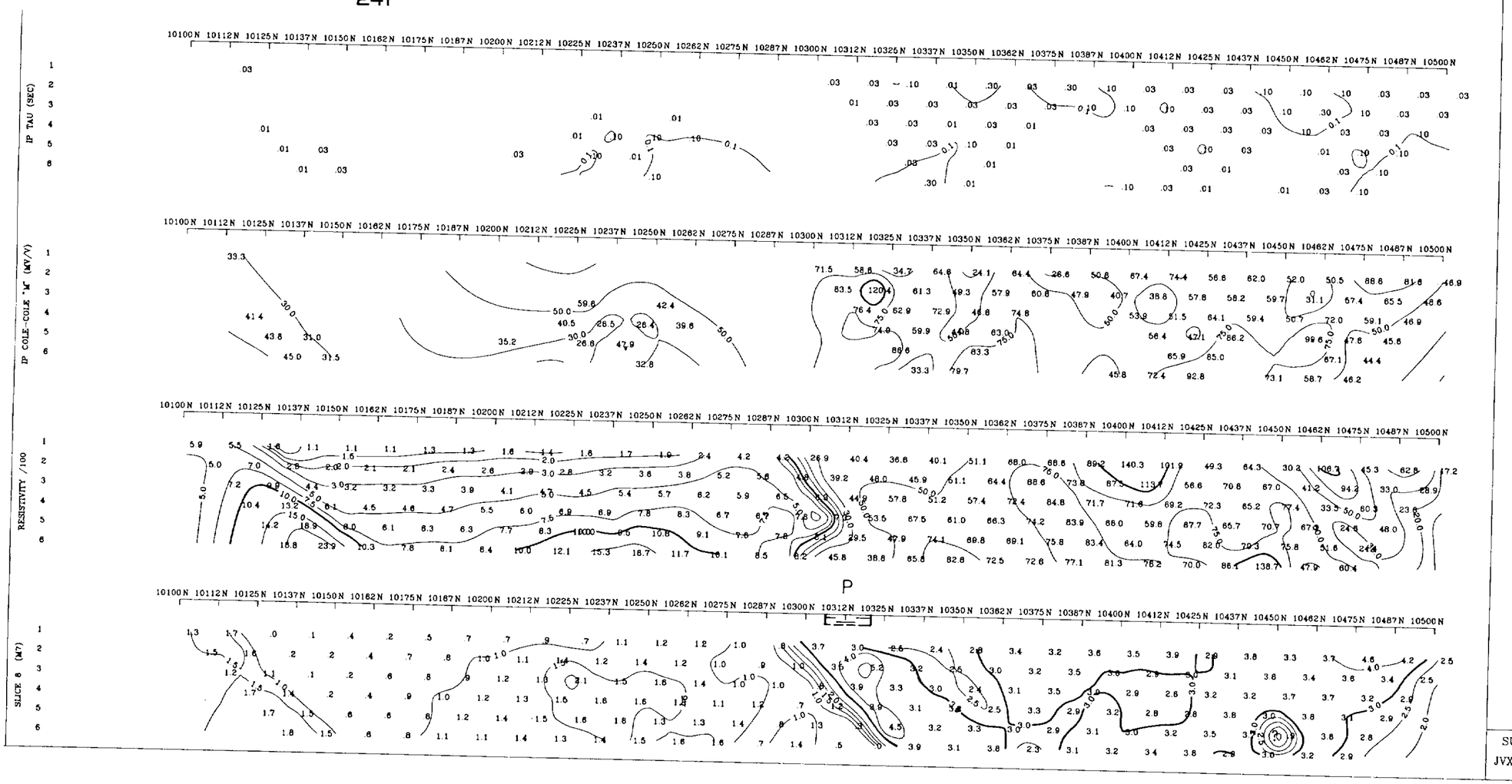
Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8700E.IND
JVX LIMITED	DATA FILE: L-8700E.DAT



42A01NE0100 63.6025 EBY

241



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland
– NE ONTARIO –

LINE NUMBER: 8800 EAST
"A" SPACING = 12.5 METRES
N = 1 TO 6
POLE-DIPOLE ARRAY
SCINTREX IPR-11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 1250
METRIC GRID

8800 E.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla
See also a = 50 m. data

EXPLANATION

MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

Z Depth

I.P. SOURCES:

Surface / At Depth — 40 20 12 mv/v

Dashed Questionable response

RESISTIVITY: LOWS

OB
Bedrock

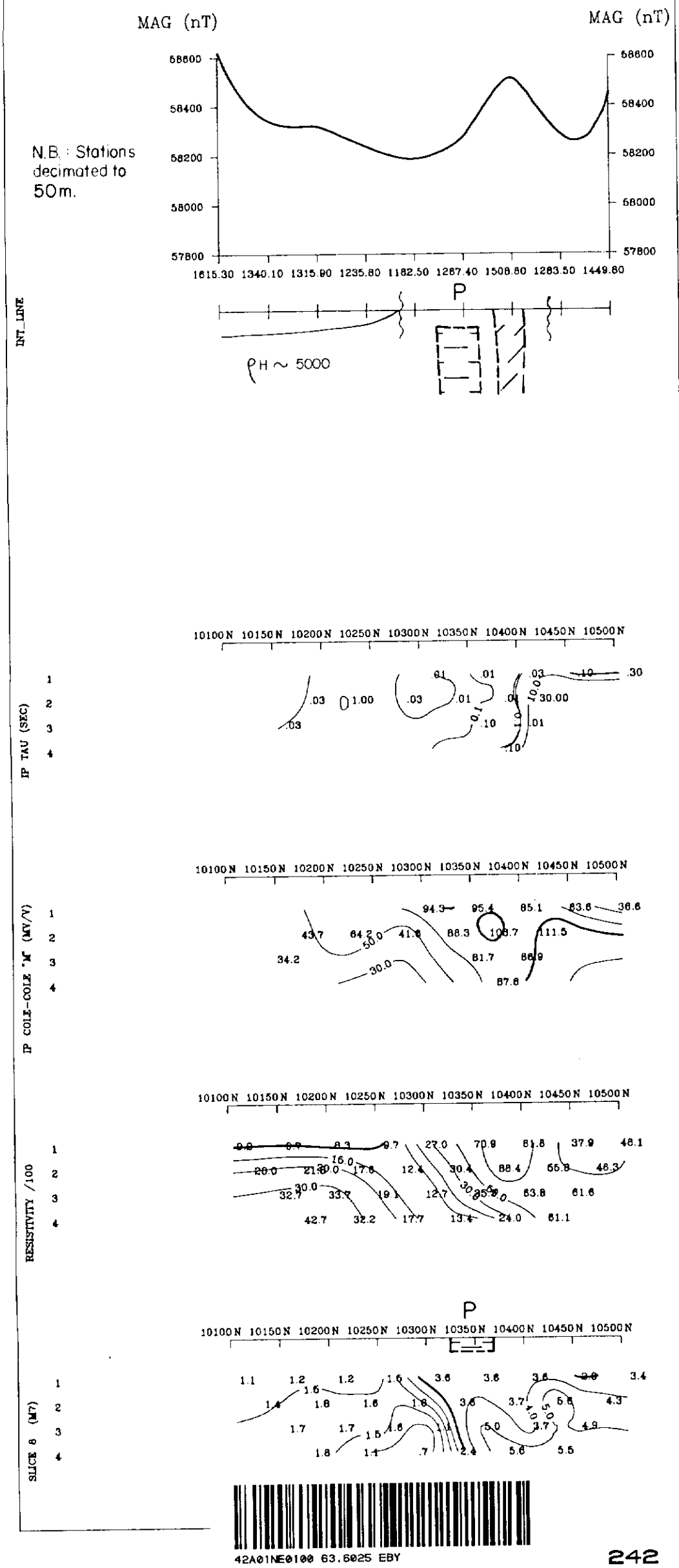
ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L-8800E.IND
JVX LIMITED	DATA FILE: L-8800E.DAT



BATTLE MOUNTAIN (CANADA) INC.

Amalgamated Kirkland

– NE ONTARIO –

LINE NUMBER: 8800 EAST
"A" SPACING = 50.0 METRES
N = 1 TO 4
POLE–DIPOLE ARRAY
SCINTREX IPR–11 RECEIVER
TRANSMITTER PULSE TIME: 2.0 SEC
RECEIVE TIME: 2.0 SEC
TRAVEL DIRECTION: SOUTH
CURRENT POSITION: TRAILING
SCALE 1: 5000
METRIC GRID

8800 E.

a = 50 m.

TOTAL FIELD MAGNETICS
POSTED BASE VALUE = 57,000 nT
EDA MAGNETOMETER
UNITS: nTesla

Stations at 12·5 (6·25) m.

EXPLANATION

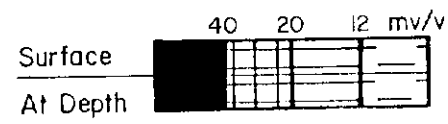
MAGNETIC SOURCES:

- High K
- Medium - High K
- Medium K

(dashed where not well-defined or off-line)

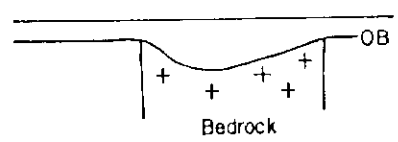
z Depth

I.P. SOURCES:



Dashed Questionable response

RESISTIVITY: LOWS



ρH High Resistivity
ρVH Very High Resistivity
Contacts
Fault
PL Pipeline

Interpretation by: STRATAGEX Ltd.

63.6025

Survey Date : JUNE 1990
N.T.S : 42 A\1

SURVEY BY	INDEX FILE: L–88E–50.IND
JVX LIMITED	DATA FILE: L–88E–50.DAT

PS-17a

42A01NE0100 63.6025 EBY

42A01NE0100 63.6025 EBY

7300 E. 7400 E. 7500 E. 7600 E. 7700 E. 7800 E. 7900 E. 8000 E. 8100 E. 8200 E. 8300 E. 3500 E. 4000 E. 8500 E. 8600 E. 8700 E. 8800 E.

10400 N
10200 N
10000 N
9800 N
9600 N

MURDOCK CREEK
Murdock Creek Fault
N 30° E
N 50° E
N 70° E
N 85° E
N 45° E
N 60° E
N 30° E
N 50° E

MAGNETIC SOURCES: (Dashed where uncertain)
- Very high susceptibility
- High susceptibility
- Medium susceptibility
- Low susceptibility

FAULTS:
- Major
- Intermediate
- Minor

Gold occurrence

X/X1 MAGNETIC DOMAINS

I.P. Surveyed line

Line also surveyed w/a = 50m. or a = 25m.

Interpretation : STRATAGEX Ltd.

63.6025

BATTLE MOUNTAIN (CANADA) INC.

BOUSQUET MOUNTAIN GOLD COMPANY

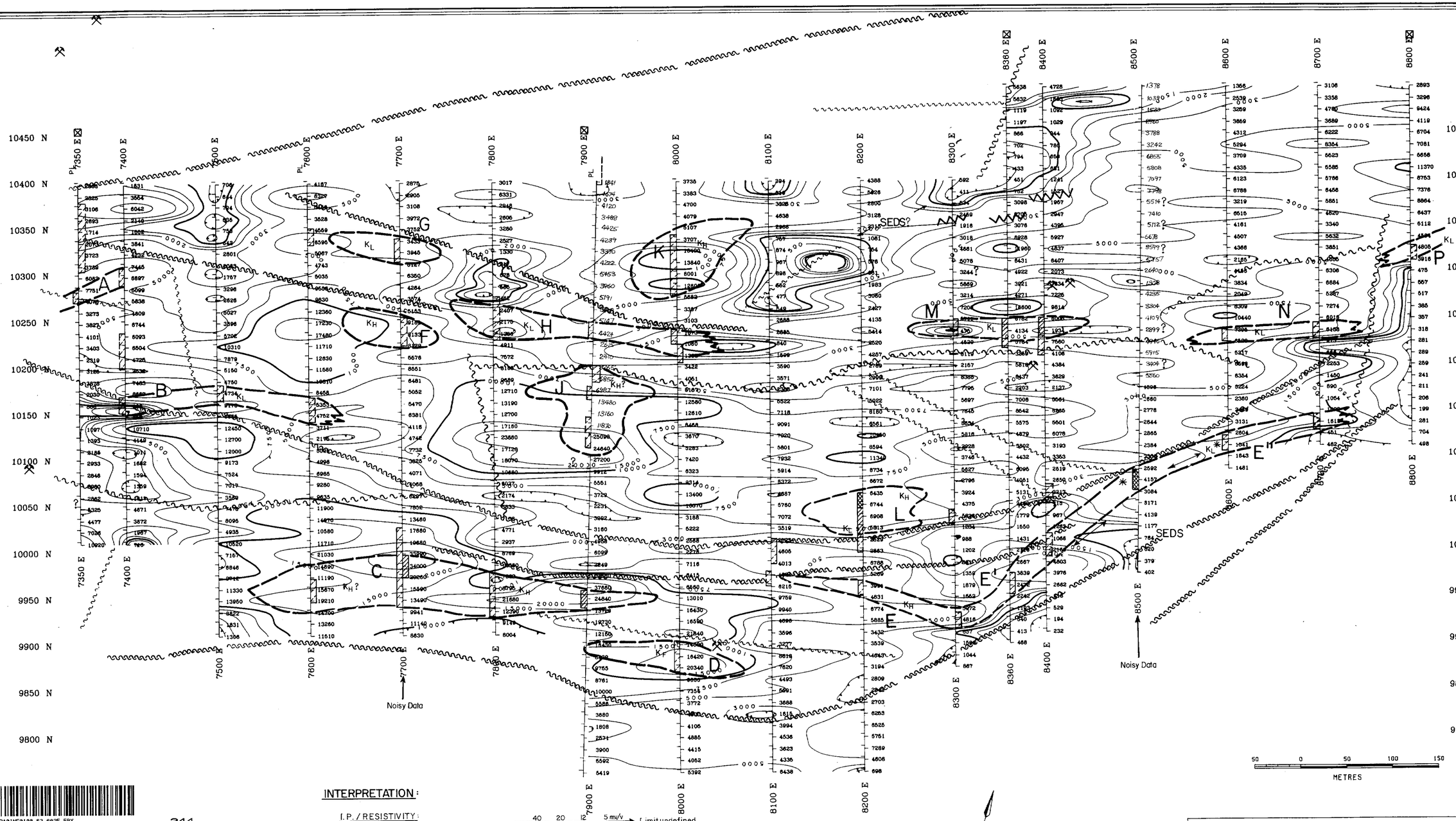
AMALGAMATED KIRKLAND PROPERTY
KIRKLAND LAKE AREA, ONTARIO
I.P. COVERAGE & INTERPRETED MAGNETIC SURVEY

PROJECT No. 75-JV-28	DATA BY JVX LTD.
N.T.S.	DRAWN BY
DRAWING No.	DATE JANUARY, 1991

SCALE 1:2,500

50 0 50 100 METRES

MAP A-1



42A01NE0100 63.6025 EBY

244

LEGEND

RESISTIVITY CONTOUR IN MULTIPLES (*1, *10, *100, etc.) OF
10 ohm-m
1.5, 2, 3, 5, 7.5 ohm-m
DEPRESSION

⊠ Also surveyed w/a=25m, a/o a=50m

INTERPRETATION:

I.P./RESISTIVITY:

CHARGEABILITY SOURCES: Surface (L) / At Depth (R) — 40 20 12 5 mv/v → Limit undefined; Uncertain

? Questionable readings

✳ Correlating resistivity low

K_L Low susceptibility

K_H High susceptibility

CHARGEABILITY ZONES: K_H Priority targets

A, Etc.

Susceptibility (High - Low) Flanks

Lithologic boundaries

Units: SEDS, etc.

FAULTS: (from magnetics)

Major

Intermediate

Minor

Gold occurrence

BATTLE MOUNTAIN (CANADA) INC.

AMALGAMATED KIRKLAND PROPERTY

KIRKLAND LAKE AREA, ONTARIO

APPARENT RESISTIVITY (RHO) PLAN MAP

POLE-DIPOLE ELECTRODE ARRAY
N=2.A=12.5M : TD=SOUTH : C1=TRAILING
SCINTREX IPR-11 RECEIVER
SCINTREX IPC-7 2.5KW TRANSMITTER

SCALE 1:2500

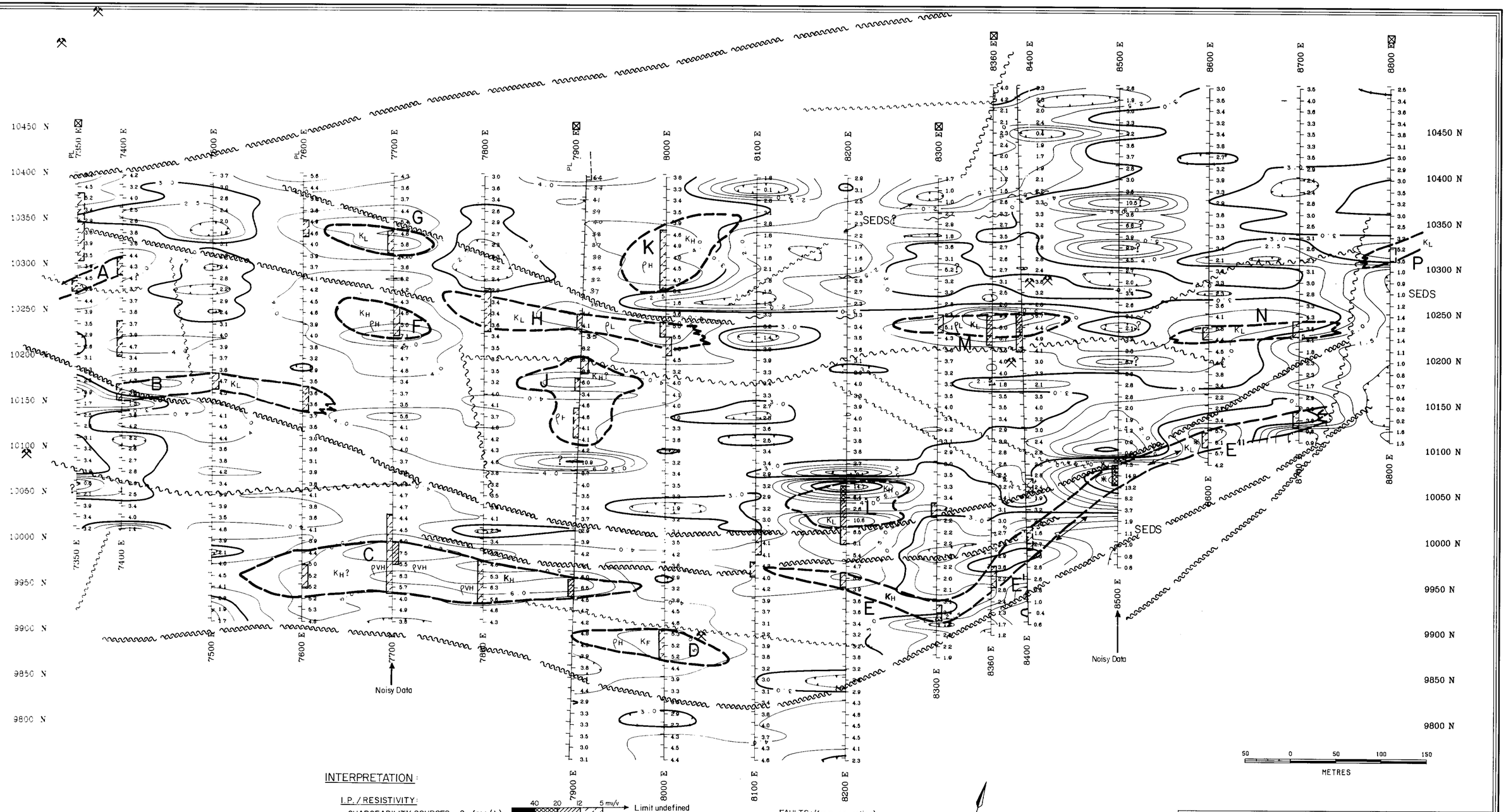
SURVEYED BY
JVX LTD.
JUNE, 1990

Interpretation:
STRATAGEX Ltd.

PLATE 2

MAP A-2

63.6025



INTERPRETATION:

I.P. / RESISTIVITY:

CHARGEABILITY SOURCES: Surface (L) / At Depth (R) — 40 20 12 5 mv/v — Limit undefined / Uncertain

? Questionable readings

* Correlating resistivity low

ρ_L Resistivity low

ρ_H High resistivity

ρ_{VH} Very high resistivity

K_L, K_H Low, high susceptibility

Lithologic boundaries
Units: SEDS, etc.

CHARGEABILITY ZONES: K_H — Priority targets

A, Etc.

Susceptibility (High - Low) Flanks

FAULTS: (from magnetics)

Major

Intermediate

Minor

Gold occurrence

LEGEND

CHARGEABILITY CONTOUR

0, 3, 10, 20 mV/V

5.2, 4.5, 6 mV/V

DEPRESSION

⊠ Also surveyed w/a = 25m., a/a a = 50m.

BATTLE MOUNTAIN (CANADA) INC.

AMALGAMATED KIRKLAND PROPERTY

KIRKLAND LAKE AREA, ONTARIO

CHARGEABILITY (M7) PLAN MAP

POLE-DIPOLE ELECTRODE ARRAY
N=2, A=12.5M : TD=SOUTH : C1=TRAILING
SCINTREX IPR-11 RECEIVER
SCINTREX IPC-7 2.5KW TRANSMITTER

SCALE 1:2500

SURVEYED BY JVX LTD. JUNE, 1990

Interpretation: STRATAGEX Ltd.

PLATE 1

MAP A-3

42A01NE0100 63.6025 EBY

63.6025

TECK TOWNSHIP

LEBEL TOWNSHIP

OTTO TOWNSHIP

BOSTON TOWNSHIP

GULL LAKE PROPERTY

AMALGAMATED KIRKLAND PROPERTY

TECK "A" PROPERTY

TECK "B" PROPERTY

VIGRASS LAKE PROPERTY

LEBEL STOCK PROPERTY

KIRKLAND LAKE TOWNSITE

KING KIRKLAND TOWNSITE

DANE TOWNSITE

ONTARIO NORTHLAND RAILWAY

TRANSMISSION LINE H.E.P.C.

NORTHERN ONTARIO NATURAL GAS CO. LTD.

Victoria Lake

McTavish Lake

Mud Lake

Crystal Lake

Otto Lake

Elsie Lake

Parson Lake

Long Lake

Fox Lake

Swastika

Kirkland Lake

246

LEGEND

- HIGHWAY and ROUTE No. (66)
- OTHER ROADS
- TRAILS
- SURVEYED LINES TOWNSHIP BASE LINE, etc.
- UNSURVEYED LINES PARCEL BOUNDARY MINING CLAIMS

NOTE: The information that appears on this map has been compiled from various sources, therefore accuracy cannot be guaranteed.

42 A/1 | 32 D/4

SCALE 1:125,000

METRES 2000 0 4000 METRES

1:2,500 SHEET	1:5,000 SHEET	1:10,000 SHEET	1:20,000 SHEET
125m	250m	500m	1 Km
750 m	1500 m	3000 m	14 Km

BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

CLAIM MAP

PROJECT No.: 75 - JV - 28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. PL - 001	DATE 07/11/90

SCALE: 1 inch = 1/2 mile
FEET 0 1000 2000 4000 6000 8000
METRES 0 200 1000 2000

568250E

570000 E

5330000 N

5328750 N.

SHEET ALIGNMENT POINT

+ SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ±Carbonate ±Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ±Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ±Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- e - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- d - flow
- fbr - flow breccia

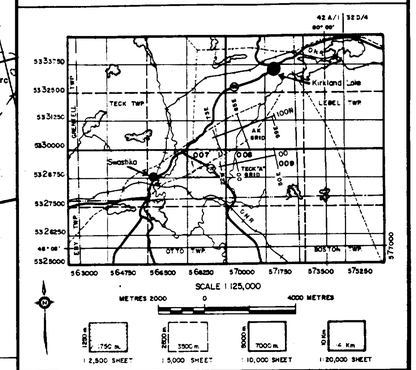
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 ← PPB AU — 1.6 ↖ g/t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)

SHEET No: 568250E / 5328750 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GL-007	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.6025 EBY

247

568250 E.

570000 E.

5328750

+ SHEET ALIGNMENT POINT

570000 E

571750 E

5330000 N

5328750 N

SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuchsite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18o Tuffs

SYMBOLS

Bedding, dipping, vertical (facing unknown)
Bedding, dipping, vertical, overturned (facing known)
Pillow, facing direction, dipping, vertical, or undefined
Foliation (Sfo), dipping, vertical dip unknown
Foliation (Sfo or Stb), dipping, vertical, dip unknown.
Joint, dipping, vertical
Fault, dipping, vertical
Shear zone, defined, inferred
Mineral elongation strike and plunge
Minor fold showing plunge
Geological contact, known, inferred
Diamond Drill Hole
Outcrop Area
Limit of deep suboarop
Historic trench
Pit or trench outline
Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pebble
o - cobble
e - boulder
g - grit

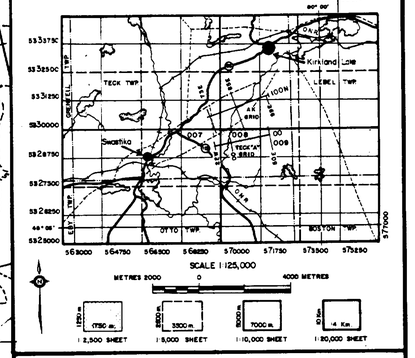
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 LOCATION — 1600+ PPB AU — 1.6 g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spholerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)

SHEET No: 570000 E / 5328750 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. G L - 008	DATE: October 1990
SCALE: 1:2,500	


50 0 50 100 METRES

42A01NE0108 63.6025 EBY

570000E. 05 10 15 571750 E.

5328750 N.

SHEET ALIGNMENT POINT



571750 E.
573500 E
5330000 N
Tailings
Dam
+ 325
+ 323
333
BASE LINE
2000 S. TIE LINE
4200 E
4600 E
5000 E
TECK TWP
LEBEL TWP
330
340
350
360
46
61,11
13
13a
LEGEND
60 ALTERATION
61 Chlorite ± Talc ± Carbonate ± Quartz
612 Weak
613 Moderate
614 Strong
62 Sericite ± Carbonate ± Chlorite ± Quartz
622 Weak
623 Moderate
624 Strong
65 Carbonate ± Chlorite Fuschite ± Quartz
652 Weak
653 Moderate
654 Strong
69 Carbonatized Syenite
40 INTRUSIVES
41 Diabase
412 Lamprophyre
42 Peridotite
43 Pyroxenite
44 Gabbro
45 Diorite
46 Syenite
461 Augite Syenite
462 Mela Syenite
463 Meso Syenite
464 Leuco Syenite
20 SEDIMENTS
21 Conglomerate
22 Graywacke
23 Arenite
25 Siltstone
26 Mudstone
27 Iron Formation
10 VOLCANICS
11 Komatiites
13 Basalts
18 Trachytes
18f Flows
18a Tuffs
SYMBOLS
GRAIN/CLAST SIZE
ABBREVIATIONS
SCALE 1:125,000
BATTLE MOUNTAIN (CANADA) INC.
KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
SHEET No: 571750 E / 5328750 N
CHECKED BY: W. Benham
PROJECT No.: 75-JV-28
DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32 D/4
DRAWN BY: B.H. Madill, Tech.
DRAWING No. GL-009
DATE: October 1990
SCALE: 1:2,500
METRES
249

569000 E

572500 E

5330000 N

5328000 N

AMALGAMATED KIRKLAND PROPERTY

ABANDONED

MUDROCK CREEK

LAKESHORE FAULT

BASE LINE 00

TIE LINE 2000 S

"A" FAULT ZONE

TECK

BEAVER POND

L 636799

L 636796

L 636800

L 636798

L 620930

L 620931

L 620929

L 626766

L 565139

L 565138

L 566532

L 545728

L 565152

L 565150

565133

L 545729

L 822939

L 822938

L 495721

L 495720

L 626767

L 676769

L 620932

L 495722

L 891865

L 1111433

6817 (P)

TECK TWP

OTTO TWP

250

42A01NE0100 63.6825 EBY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 418 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 180 Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sfol), dipping, vertical dip unknown
- Foliation (Sfol or Slb), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Stlandi elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

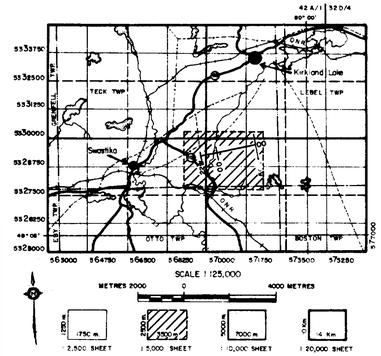
IGNEOUS ROCKS

- e - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 6501 LOCATION — 1600 PPB AU — 1.6 g./t. AU

ABBREVIATIONS

agp.	- augite porphyritic	fp.	- feldspar porphyritic	qv.	- quartz vein
amg.	- amygdaloidal	fsp	- feldspathic	ser.	- sericitic
amp.	- amphibolite	gf.	- graphitic	sil.	- silicic
ank.	- ankerite	hem.	- hematite	sp.	- sphalerite
bx.	- breccia	lam.	- laminated	spx.	- spinifex
cg.	- calcite	m.	- massive	sh.	- sheared
cb.	- carbonate	mag.	- magnetite	trc.	- trachoidal
ch.	- chlorite	p.	- pillowed	var.	- variolitic
cp.	- chalcopyrite	pb.	- galena	ves.	- vesicular
fc.	- fractured	py.	- pyrite		



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)

PROJECT No. 75 - JV - 28	DATA BY W. Benham
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. GL - 011	DATE: November 1990

SCALE: 1:5000

100 0 100 200 METRES

568250E

570000 E

5530000 N

5529750 N

+SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sfol), dipping, vertical dip unknown
- Foliation (Sfol or Sslt), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep suboarp
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- c - cobble
- x - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

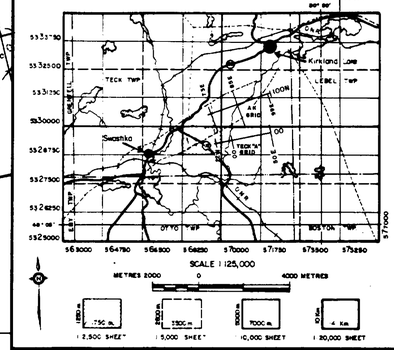
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 6501 — 1600 PPB AU — 1.6 g/t AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(*GEOLOGY PLAN*)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 568250E / 5529750 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., K.B.
N.T.S 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. GA-007	DATE October 1990
SCALE 1:2,500	

50 0 50 100 METRES

+SHEET ALIGNMENT POINT

570000 E

571750 E

5330000 N

5328750 N

SHEET ALIGNMENT POINT

TECK "A" FAULT ZONE

MURDOCK CREEK

BEAVER POND

BEAVER DAM

TIE LINE 2000 S

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

Bedding, dipping, vertical (facing unknown)
Bedding, dipping, vertical, overturned (facing known)
Pillow facing direction, dipping, vertical, overturned
Foliation (S1c), dipping, vertical dip unknown
Foliation (S2 or S1b), dipping, vertical, dip unknown.
Joint, dipping, vertical
Fault, dipping, vertical
Shear zone, defined, inferred
Mineral elongation strike and plunge
Minor fold showing plunge
Geological contact, known, inferred
Diamond Drill Hole
Outcrop Area
Limit of deep subcrop
Historic trench
Pit or trench outline
Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pebble
o - cobble
e - boulder
g - grit

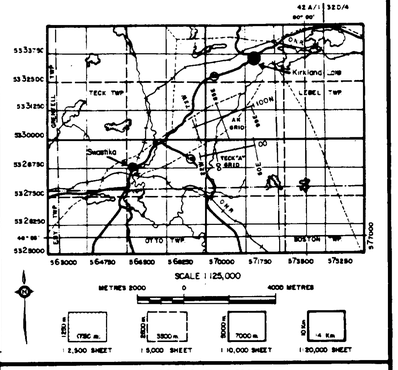
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbr - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — 1600 ← PPB AU — 1.6 ← g/t AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - cryptitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 570000 E / 5328750 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., K.B.
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. GA-008	DATE October 1990
SCALE 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.0625 EBY

571750 E

573500 E

5330000 N

5328750 N

BASE LINE

Tailings

Dam

TECK TWP

LEBEL TWP

2000 S. TIE LINE

4200 E

4600 E

5000 E

+323

+325

+333

330

340

350

360

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
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  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
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- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical
- dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
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- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- o - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
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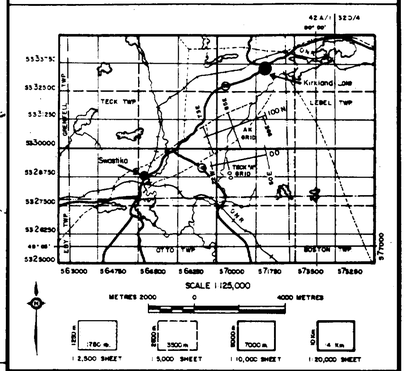
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU / 1.6 g/t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 571750 E / 5328750 N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S. 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No GA-009	DATE: October 1990
SCALE 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.6825 EBT

253

SHEET ALIGNMENT POINT

L 400(ti)W | 120W | 110W | 100W | 090W | 080W | 070W | L 200(ti)W | 060W | 050W | 040W

120S
130S
140S
150S
160S
170S

OLD TRENCH

- well foliated to schistose
- ch. + cc.

13p
- ves.
- very wkly mag.

13p
- ves.
- non-mag.

13p - ves.

- wispy "horsetail" dovetopes between shears

2 cm. ch + cc.

13p
- ves.
- non-mag.

- massive, foliated
- very fine grained
- ch + cc.
- non - magnetic

- 1-5 cm. ch + cc. qtz. shears along selvages
- drusy qtz infilling

080

13p - non-mag.
- ves.

prominant pillow elongation + foliation

13p
- massive
- ves.
- open space filling (qtz. + ch.) prominant on selvages.

070

Mg. thoteiitic basalt
- pillow selvages up to 2-5 cm. wide

- open dry ch. shear 1-2 cm. with patchy late drusy qtz.

drusy qtz. pod.

13p

- well foliated, schistose
- ch. + cc.
- late drusy qtz. filling < 1 cm

13p
- massive, ves.
- pillowed
- very wk. to non-mag.
- abundant cc. + cb.
- very minor patchy py

- tight, dry 1-2 cm. ch. shear
- irregular shape due to wrapping on pillow selvages.

- massive, fine grained
- well developed pillows
- weak to non-magnetic
- pillow elongation strong at 040° (facing ?)

13p

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18q Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1e), dipping, vertical dip unknown.
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

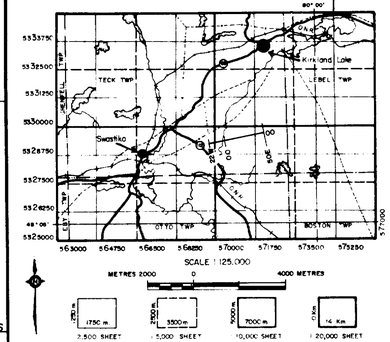
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbr - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatite

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracture
ch. - chlorite	p. - pillowed	vac. - vesicular
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

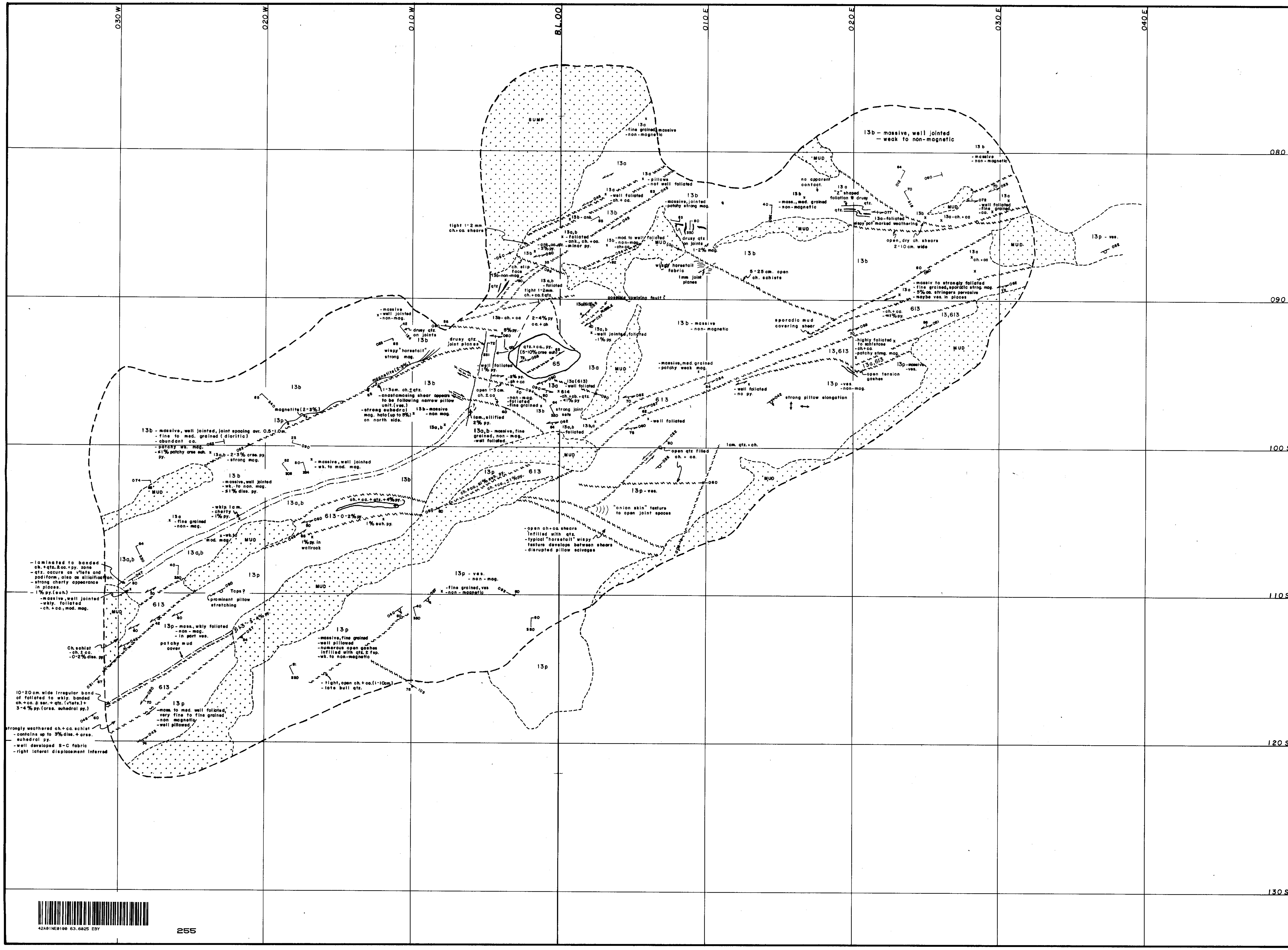
BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 200 W

PROJECT No. 75-JV-28	DATA BY D. Boucher
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No TG-021	DATE November 1990

SCALE: 1:125
0 1 2 3 4 5 10
metres

42A01NE0100 63.0825 EBY



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
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20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18e Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
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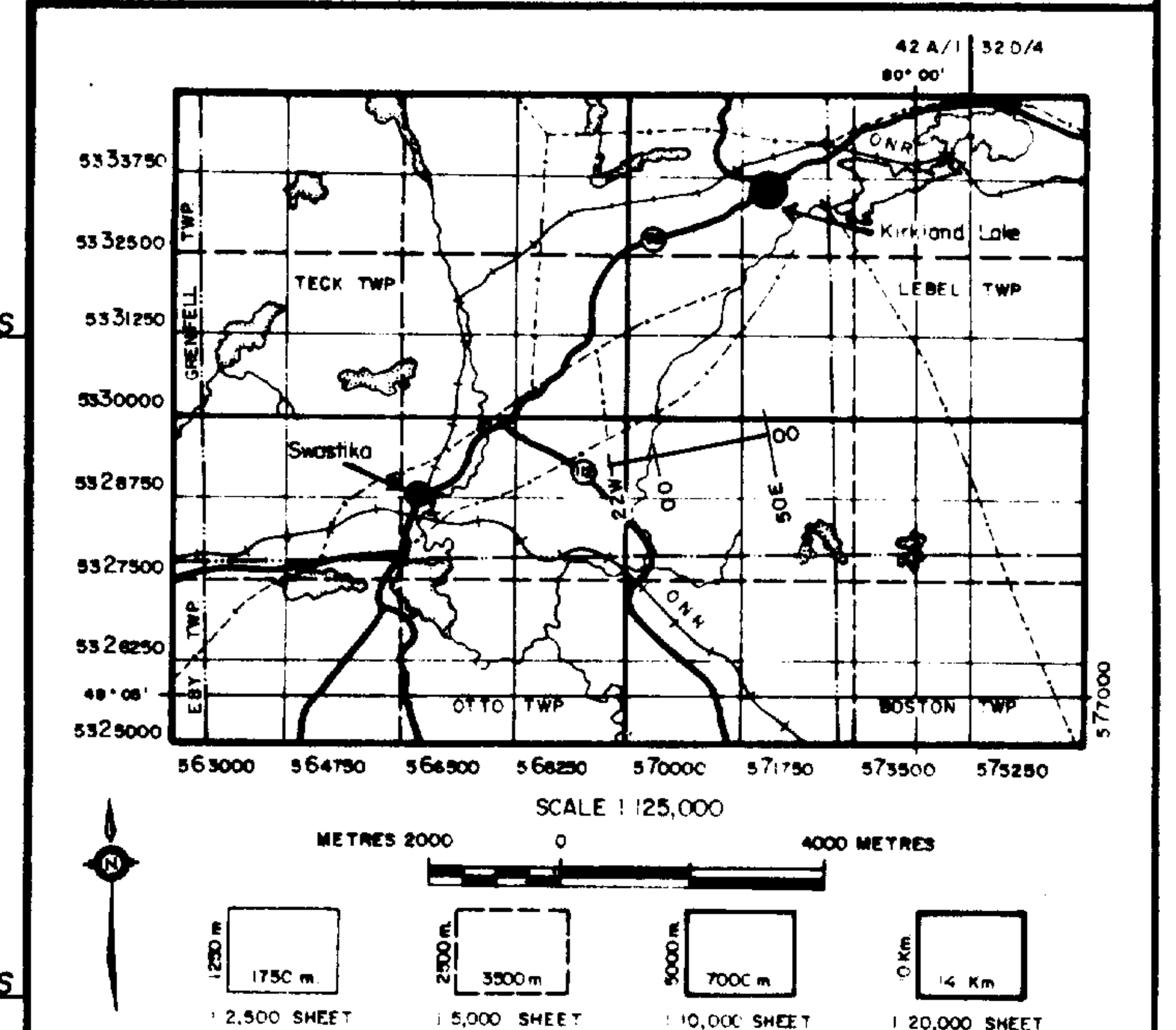
VOLCANIC ROCKS
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SAMPLE NO. → 8501 △ 1600 ← PPB AU
LOCATION 1.6 ← g./t. AU

ABBREVIATIONS

agp.	- augite porphyritic	fp.	- feldspar porphyritic	q.v.	- quartz vein
amg.	- amygdaloidal	fsp	- feldspathic	ser.	- sericitic
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BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

TECK "A" PROPERTY

(GEOLOGY PLAN)

TRENCH 000

PROJECT No. 75 - JV - 28	DATA BY M. Masson
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. TG - 022	DATE November 1990

SCALE 1:125
0 1 2 3 4 5 10
metres

060 E | L 200 (tie) E | 070 E | 080 E | 090 E | 100 E | 110 E | 120 E | L 400 (tie) E | 130 E

050 S
060 S
070 S
080 S
090 S
100 S
110 S

652,613
– minor py.

61, 13c
– massive, non-magnetic

MUD

61, 13b
– massive

MUD

61 – weak cb alt.
– 5-10% q.v.

61
13p, 61
– var., highly foliated

13b
– massive
– non-magnetic

613
– weak to mod. cb.

SHEAR VEIN
q.v., bx.

13p

61, 13p
– highly foliated

13p
– var., weakly foliated

613
– mod. to strong cb.
– tr. - 5% py.

13p
– weakly foliated

q.v.

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
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- e – boulder
- g – grit

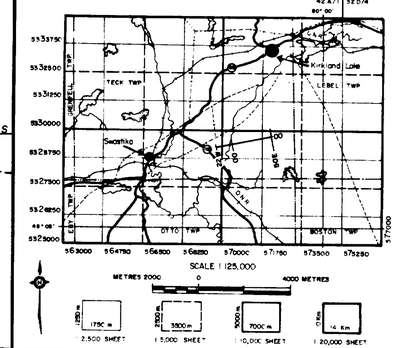
VOLCANIC ROCKS
- a – ash tuff
- b – lapilli tuff
- c – block tuff
- f – flow
- fbx – flow breccia

IGNEOUS ROCKS
- a – fine grained
- b – medium grained
- c – coarse grained
- p – pegmatite

SAMPLE NO. 8501 | 1600 – PPB AU | 1.6 – g/t. AU
LOCATION

ABBREVIATIONS

- agp. – augite porphyritic
- amg. – amygdaloidal
- amp. – amphibolite
- ank. – ankerite
- bx. – breccia
- ca. – calcite
- cb. – carbonate
- ch. – chlorite
- cp. – chalcopyrite
- fc. – fractured
- fp. – feldspar porphyritic
- fsp – feldspathic
- gf. – graphitic
- hem. – hematite
- lam. – laminated
- m. – massive
- mag. – magnetite
- p. – pillowed
- pb. – galena
- py. – pyrite
- q.v. – quartz vein
- ser. – sericitic
- sil. – silicic
- sp. – sphalerite
- spx. – spinifex
- sh. – sheared
- frc. – fracholder
- var. – variolitic
- ves. – vesicular



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 300 E

PROJECT No. 75-JV-28	DATA BY D. Boucher
NTS 42A/1 B 32D/4	DRAWN BY B.H. Modill, Tech.
DRAWING No. TG-023	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10 metres

42A01NE0100 63.6825 EBY

140 E | 150 E | 160 E | 170 E | 180 E | L600(ft) E | 190 E | 200 E | 210 E | 220 E

050 S
060 S
070 S
080 S
090 S
100 S
110 S

chdnk ± qtz. schist
– contains ductile cremulation or drag folding within OTO? trend

OTO

613 – 614

SPOTTED SCHIST
– dark green ch. spots in a light green-gray ch.+ank. altered matrix.
– well foliated to schistose

OTO

O/C Ridge

"spotted" ch. texture

41?
Massive, well foliated
– mod. to strong ank.
– abundant q.v's. on joints

MUD

13 – wkly. foliated

613
mod. to strong ch.

SHEAR VEIN

PIT

OTO

257

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 180 Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S3b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a – fine grained
b – medium grained
c – coarse grained
p – pebble
d – cobble
e – boulder
g – grit

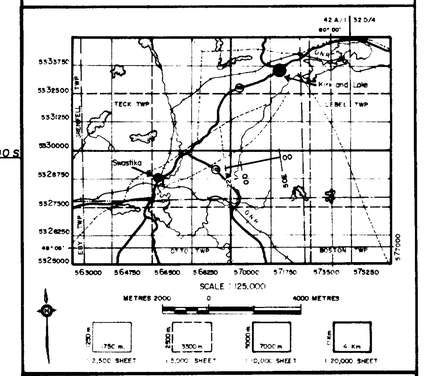
VOLCANIC ROCKS
a – ash tuff
b – lapilli tuff
c – block tuff
f – flow
fbx – flow breccia

IGNEOUS ROCKS
a – fine grained
b – medium grained
c – coarse grained
p – pegmatite

SAMPLE NO. – 6501 – LOCATION
1600 ← PPB AU
1.6 ← g./t. AU

ABBREVIATIONS

agp. – augite porphyritic
amg. – amygdaloidal
amp. – amphibolite
ank. – ankerite
bx. – breccia
cc. – calcite
cb. – carbonate
ch. – chlorite
cp. – chalcopyrite
fc. – fractured
fp. – feldspar porphyritic
fsp – feldspathic
gf. – graphitic
hem. – hematite
lam. – laminated
m. – massive
mag. – magnetite
p. – pillowed
pb. – galena
py. – pyrite
qv. – quartz vein
ser. – sericitic
sil. – silicic
sp. – sphalerite
spx. – spinifex
sh. – sheared
frc. – trachoidal
var. – variolitic
ves. – vesicular



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

TECK "A" PROPERTY

(GEOLOGY PLAN)

TRENCHES 300E, 500E and 700E

PROJECT No. 75-JV-28	DATA BY D. Boucher / M. Masson
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. TG-024	DATE October 1990

SCALE 1:125
0 1 2 3 4 5 10
metres

140E | 150E | 160E | 170E | 180E | L 600(11)E | 190E | 200E | 210E | 220E

010 N

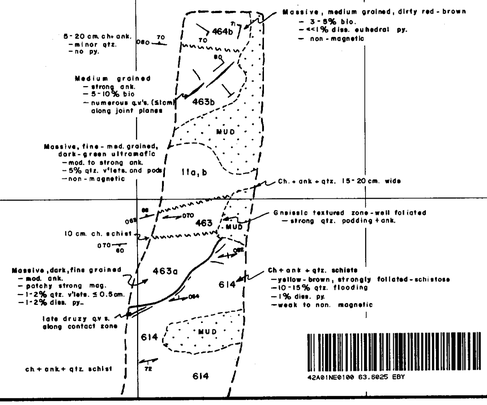
B.L. 0

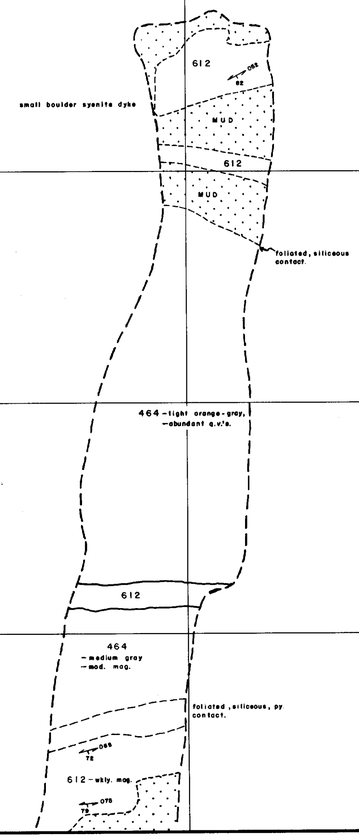
010 S

020 S

030 S

040 S





LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18g Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1,2), dipping, vertical dip unknown
- Foliation (S2 or S1,2), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

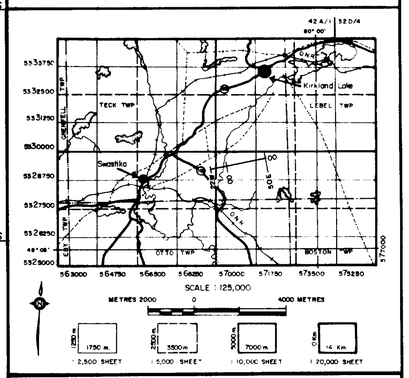
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCHES 500E and 700E

PROJECT No.: 75 - JV - 28	DATA BY: D. Boucher / M. Masson
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: TG - 025	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10 metres

060 E | L 200(ft)E | 070 E | 080 E | 090 E | 100 E | 110 E | 120 E | L 400(ft)E | 130 E

010 N

BL. 0

010 S

020 S

030 S

040 S

612
– very magnetic
– highly cb.
080
81
085
74

43
– very magnetic
– strong cb., ca.
– bio.
080
78
ZONE
MUD

43
– minor cb.

43
– weak foliation
– very magnetic

61
– bio schist
075
82
MUD

43
– strong cb.
– weakly magnetic
MUD

MUD

652,613
– minor py.
60
082

259

42A01NE0100 63.6825 EBY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 15 Basalts
- 18 Trachytes
  - 181 Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow lavas, direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep suboarp
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a – fine grained
- b – medium grained
- c – coarse grained
- p – pebble
- d – cobble
- e – boulder
- g – grit

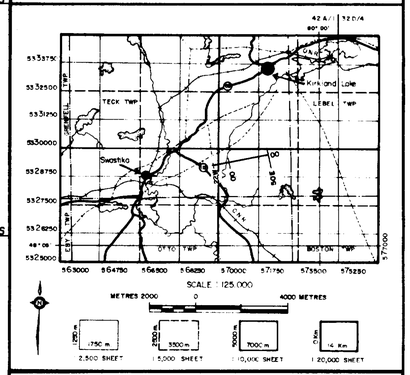
VOLCANIC ROCKS
- c – ash tuff
- b – lapilli tuff
- a – block tuff
- f – flow
- fbx – flow breccia

IGNEOUS ROCKS
- a – fine grained
- b – medium grained
- c – coarse grained
- p – pegmatite

SAMPLE NO. 8501 ▲ 1600 PPB AU
1.6 g./t. AU
LOCATION

ABBREVIATIONS

agp. – augite porphyritic	fp. – feldspar porphyritic	qv. – quartz vein
amg. – amygdaloidal	fsp – feldspathic	ser. – sericitic
amp. – amphibolite	gf. – graphitic	sil. – silicic
ank. – ankerite	hem. – hematite	sp. – sphalerite
bx. – breccia	lam. – laminated	spx. – spinifex
ca. – calcite	m. – massive	sh. – sheared
cb. – carbonate	mag. – magnetite	trc. – trachoidal
ch. – chlorite	p. – pillowed	var. – variolitic
cp. – chalcopyrite	pb. – galena	ves. – vesicular
fc. – fractured	py. – pyrite	



BATTLE MOUNTAIN (CANADA) INC.

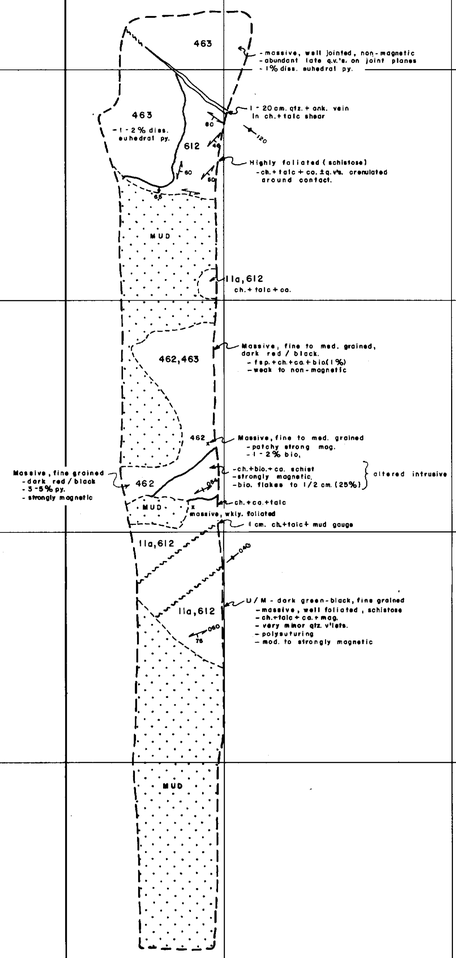
KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 300 E

PROJECT No. 75-JV-28	DATA BY D. Boucher
NTS 42A/1 B 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. TG-026	DATE October 1990

SCALE 1:125
0 1 2 3 4 5 10
metres

140 E | 150 E | 160 E | 170 E | 180 E | L 600(it) E | 190 E | 200 E | 210 E | 220 E

080 N
070 N
060 N
050 N
040 N
030 N



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 64 Carbonate ± Chlorite Fuchsite ± Quartz
  - 642 Weak
  - 643 Moderate
  - 644 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 418 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 23 Greywacke
- 25 Arenite
- 26 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 15 Basalts
- 16 Trachytes
- 16f Flows
- 16q Tuffs

SYMBOLS

- Bedding, dipping, vertical (tuning unknown)
- Bedding/dipping, vertical, overturned (fining known)
- Prime fining direction, dipping, vertical, overturned
- Foliation (Sfol), dipping, vertical dip unknown
- Foliation (qtz or cbt), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained, b - medium grained, c - coarse grained, p - pebble, d - cobble, e - boulder, g - grit

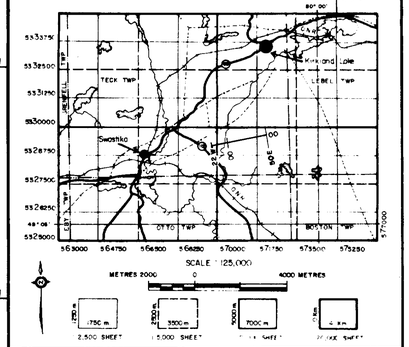
VOLCANIC ROCKS
a - ash tuff, b - lapilli tuff, c - block tuff, f - flow, fbr - flow breccia

IGNEOUS ROCKS
a - fine grained, b - medium grained, c - coarse grained, p - pegmatitic

SAMPLE NO. 6501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spharlerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
f.c. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.


KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 600E

PROJECT No. 75-JV-28	DATA BY M. Masson
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No TG-027	DATE November 1990
SCALE 1:125	

0 1 2 3 4 5 10
metres

42A01NE0100 63.6825 EBY

260



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

TECK "A" PROPERTY

(GEOLOGY PLAN)

TRENCH 1032 E
(NORTH SHEET)

PROJECT No.: 75-JV-28	DATA BY M. Masson
NTS 42A/1 & 32D/4	DRAWN BY B. H. Madill, Tech
DRAWING No.: TG-028	DATE: November 1990

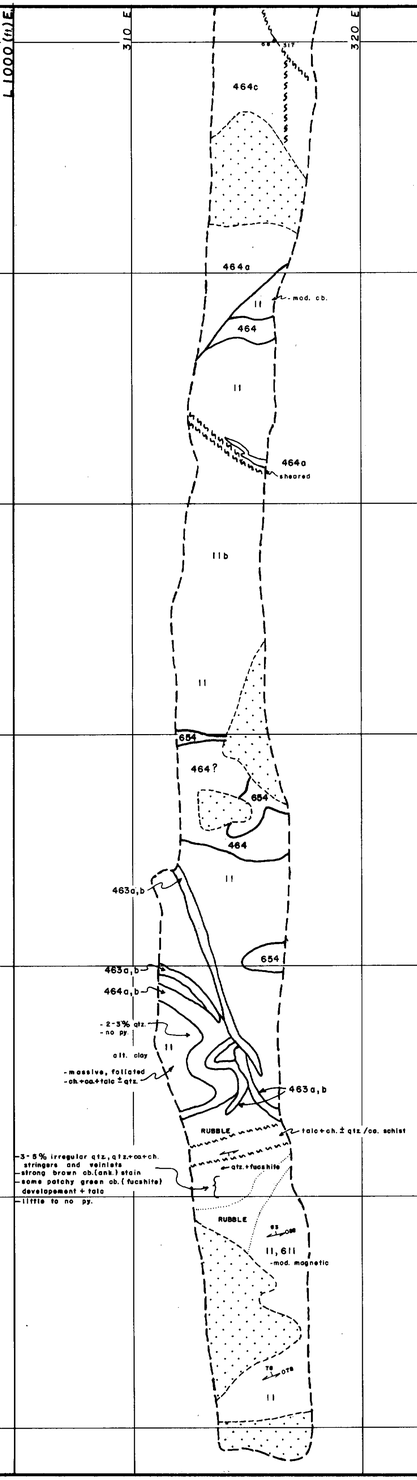
SCALE: 1:125

0 1 2 3 4 5 10
metres

261

270 E | 280 E | 290 E | 300 E | L 1000 (n) E | 310 E | 320 E | 330 E | 340 E | 350 E

070 N
060 N
050 N
040 N
030 N
020 N
010 N



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ±Carbonate ±Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ±Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 64 Carbonate ± Chlorite Fuschite ± Quartz
  - 642 Weak
  - 643 Moderate
  - 644 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 41f Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 24 Siltstone
- 25 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 12 Basalts
- 13 Trachytes
- 18f Flows
- 18a Tuffs

SYMBOLS

Bedding, dipping, vertical (tops unknown)
Bedding, dipping, vertical, overturned (tops known)
Fold: dipping direction, dipping, vertical, overturned
Foliation (shist), dipping, vertical alt. schistose
Foliation (gneiss or gneissic), dipping, vertical, alt. gneissoid
Joint, dipping, vertical
Fault, dipping, vertical
Shear zone, defined, inferred
Direct elongation strike and plunge
Minor fold showing plunge
Geological contact, known, inferred
Diamond Drill Hole
Outcrop Area
Limit of deep cover
Historic trench
Pit or trench outline
Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

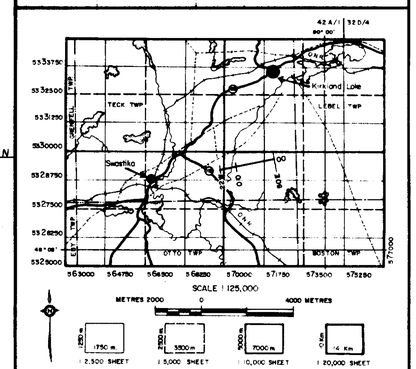
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbr - flow breccia

INTRUSIVE ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatite

SAMPLE NO. -6801 — 1800 ← PPB AU — 1.8 → g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp. - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pitted	var. - variolitic
cp. - chalcopyrite	gb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 1032 E (SOUTH SHEET)

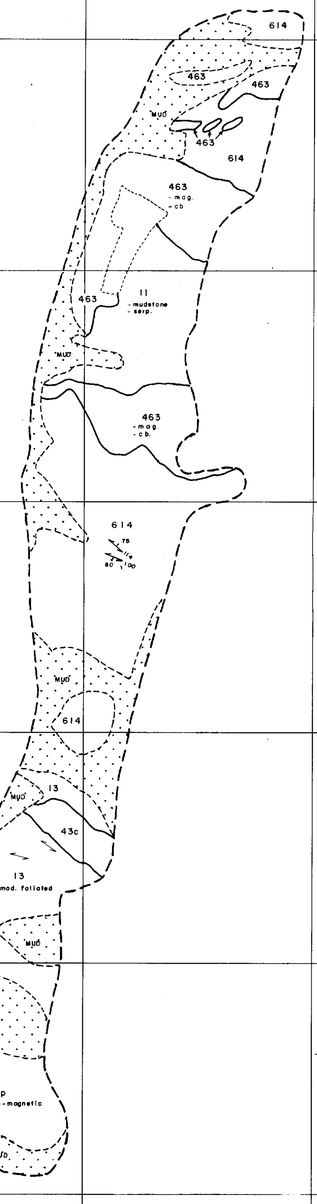
PROJECT No. 75-JV-28	DATA BY D. Boucher
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. TG-029	DATE November 1990
SCALE: 1:125	

0 1 2 3 4 5 10 metres

42A1NE0100 63.0825 EDY

370 E | 380 E | 390 E | 400 E | 410 E | 420 E | L 1400(11) E | 430 E | 440 E | 450 E

170 S
180 S
190 S
200 S
210 S
220 S



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sfol), dipping, vertical dip unknown
- Foliation (Sfol or Sfb), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbr - flow breccia

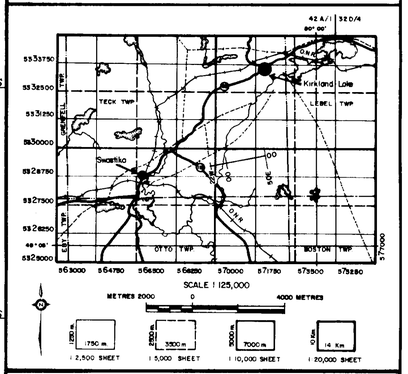
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 — LOCATION — 1600 ← PPB AU — 1.6 ← g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - siliceic
ank. - ankerite	hem. - hamatite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



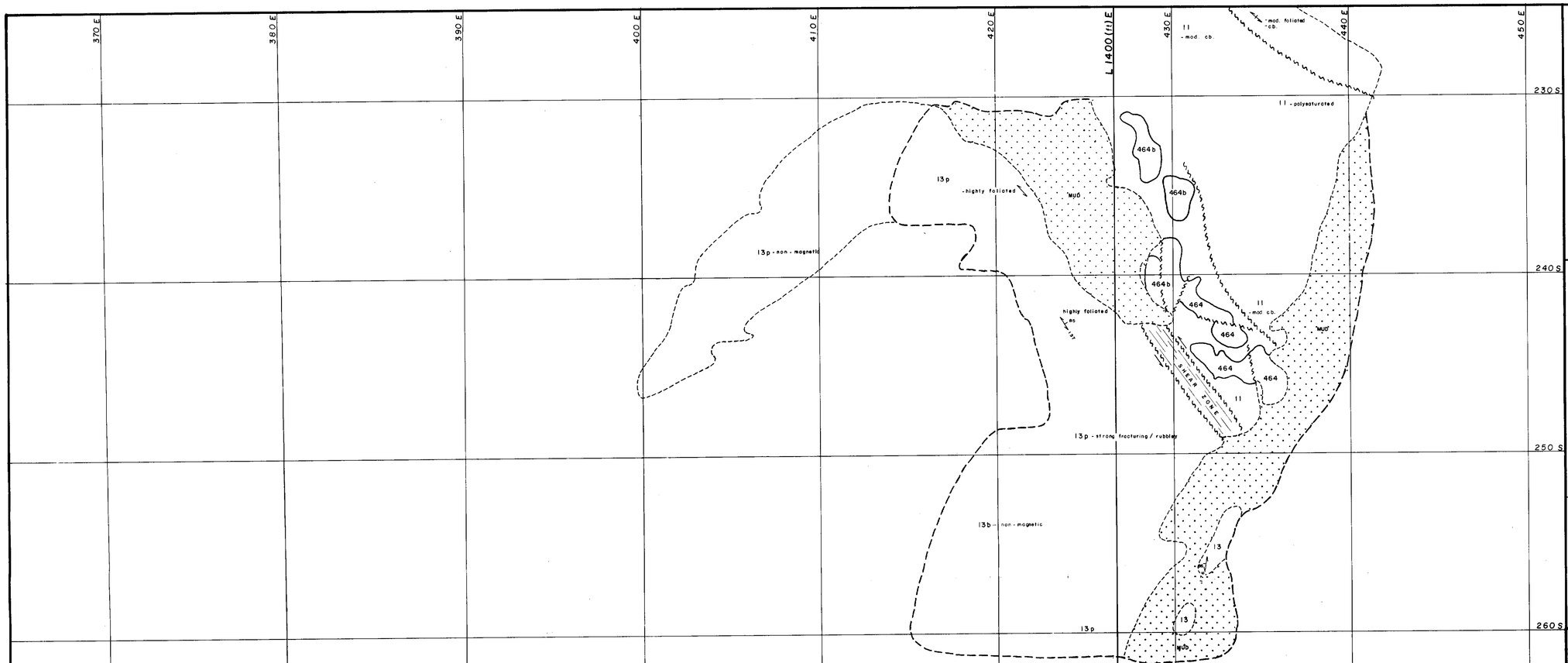
BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 1400 E (NORTH SHEET)

PROJECT No.: 75-JV-28	DATA BY: D. Boucher
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: TG-030	DATE: October 1990

SCALE: 1:125
0 1 2 3 4 5 10
metres

42A01NE0100 63.0825 EBY



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1z), dipping, vertical dip unknown
- Foliation (S2 or S3b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

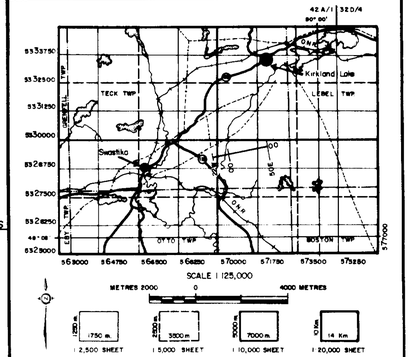
IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — LOCATION — 1600 ← PPB AU, 1.6 ← g/t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(GEOLOGY PLAN)
TRENCH 1400 E
(SOUTH SHEET)

PROJECT No. 75 - JV - 28	DATA BY D. Boucher
NTS - 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No.: TG - 031	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10
metres

42A01NE0100 83.0025 EBY

L 400(+)W

120W

110W

100W

090W

080W

070W

L 200(+)W

060W

050W

040W

120S

130S

140S

150S

160S

170S

11440

11433

N11

N11

N11

N11

N11

N11

N11

5

LEGEND

SAMPLE NUMBER — ASSAY VALUE

11080 — 1.65 g./t. AU / metre
177 ppb AU

< 100 ppb

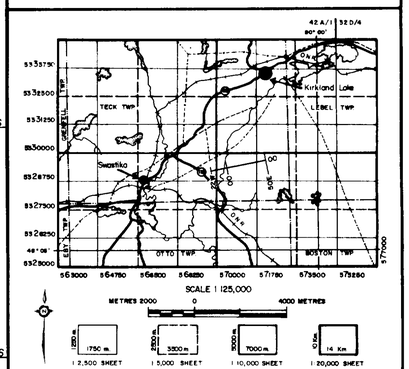
≥ 100 ppb

≥ 1.00 g./t.

≥ 3.50 g./t.

≥ 8.50 g./t.

≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

TECK "A" PROPERTY

(ASSAY PLAN)

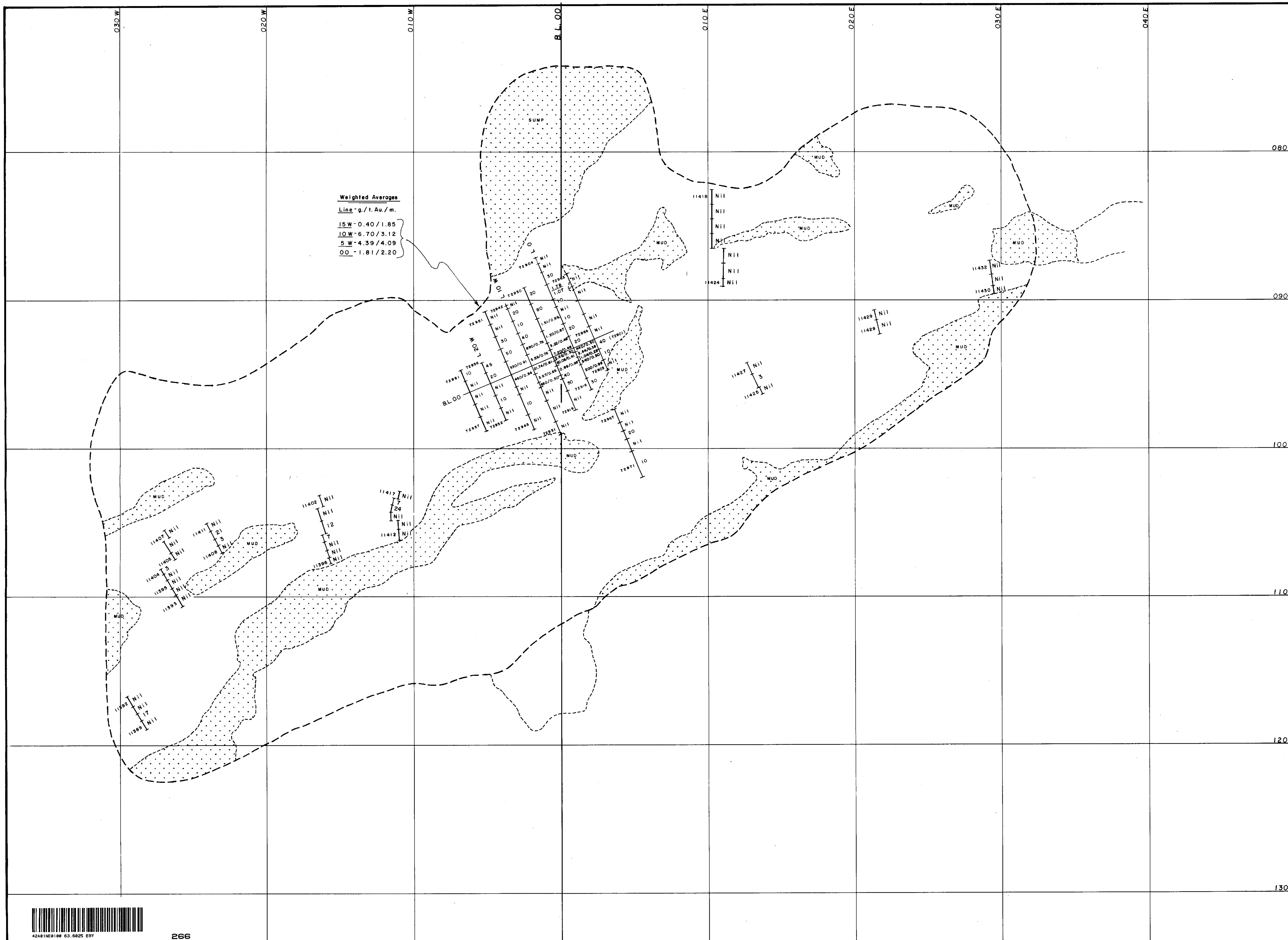
CHANNEL SAMPLING

TRENCH 200W

PROJECT No.: 75-JV-28	DATA BY
N.T.S. 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: TA-021	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10
metres

42A01NE0100 63.6025 EBY

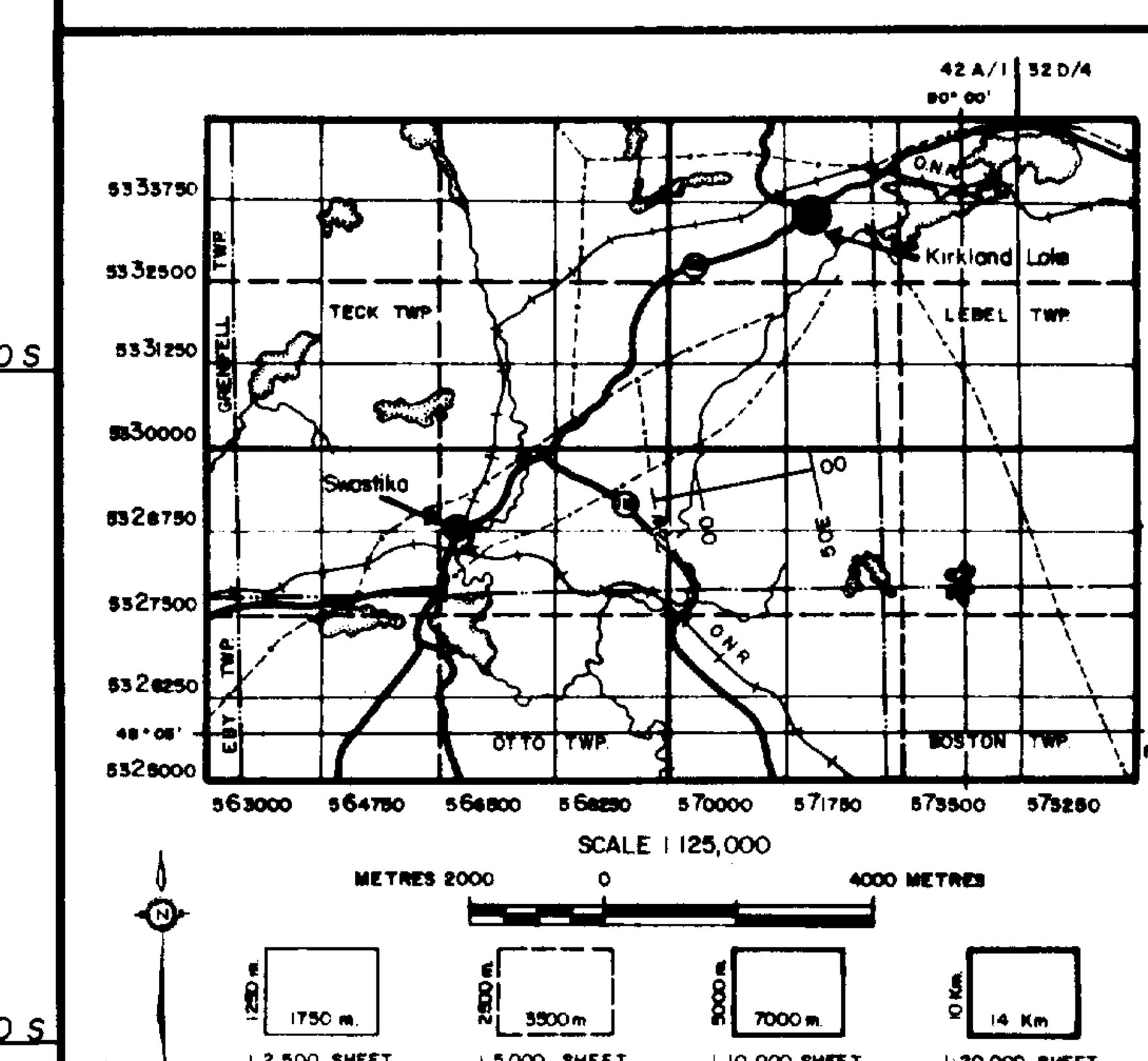


LEGEND

SAMPLE NUMBER — ASSAY VALUE

11080 — 1.6 5 g./t. AU / metre
177 ppb AU

- < 100 ppb
- ≥ 100 ppb
- ≥ 1.00 g./t.
- ≥ 3.50 g./t.
- ≥ 8.50 g./t.
- ≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 000

PROJECT No.: 75-JV-28	DATA BY:
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B. H. Madill, Tech.
DRAWING No.: TA-022	DATE: October 1990

SCALE: 1:125
0 1 2 3 4 5 10
metres

060 E | 070 E | 080 E | 090 E | 100 E | 110 E | 120 E | 130 E

L 200(ft)E

L 400(ft)E

050S

060S

070S

080S

090S

100S

110S

mud

mud

209 10 / Nil / 30 / 70 / 95 / 10 / Nil / Nil / 201 10

210 Nil / 10 / Nil / 20 / 130/0.91 / 20 / Nil / 30 / Nil / Nil / 10 / 221 Nil

222 Nil / Nil / Nil / Nil / Nil / 10 / Nil / 70 / 140/0.91 / 90 / 60 / 20 / 234 Nil

235 20 / 236 Nil / 40 / 295/0.91 / 130/0.91 / 240 110/0.91 — 178/2.73

241 10 / 242 Nil / 243 170 / 249 30 / 250 20 / 244 1.30/0.91 / 170 / 90 / 10 / 248 Nil

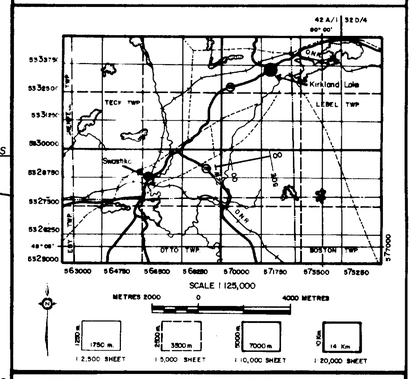
251 Nil / 252 Nil / 253 450/0.91 / 605/0.91 / 160/0.91 / 50 / 20 / 70 / Nil / 260 20 — 405/2.73

LEGEND

SAMPLE NUMBER | ASSAY VALUE

11080 | 1.65 g./t. AU / metre | 177 ppb AU

< 100 ppb
≥ 100 ppb
≥ 1.00 g./t.
≥ 3.50 g./t.
≥ 8.50 g./t.
≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 300 E

PROJECT No.: 75 - JV - 28	DATA BY:
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B. H. Modill, Tech.
DRAWING No.: TA - 023	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10
metres

42A01NE0100 63.6825 EBY

140 E | 150 E | 160 E | 170 E | 180 E | L 600 (ft) E | 190 E | 200 E | 210 E | 220 E

050 S
060 S
070 S
080 S
090 S
100 S
110 S

MUSK

261 | 10
10
20
268 | 1.68/0.30 | 190/0.91 | 265 | 1.82
265 | 340/0.91

PIT

42A01NE0100 63.6025 EBY

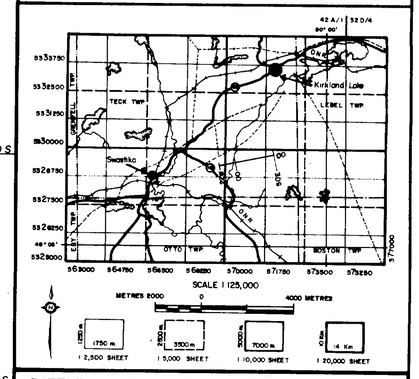
268

LEGEND

SAMPLE NUMBER — ASSAY VALUE

11080 | 1.65 g./t. AU / metre
177 ppb AU

< 100 ppb
≥ 100 ppb
≥ 1.00 g./t.
≥ 3.50 g./t
≥ 8.50 g./t.
≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCHES 300E, 500E and 700E

PROJECT No.: 75-JV-28	DATA BY:
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H Madill, Tech.
DRAWING No.: TA-024	DATE: October 1990

SCALE: 1:125
0 1 2 3 4 5 10
metres

140E | 150E | 160E | 170E | 180E | L 600 (ft) E | 190E | 200E | 210E | 220E

010 N

BL 0

BL 0

010 S

020 S

030 S

040 S

MUD

MUD

293 10 Nil Nil Nil Nil 20 10 10

300

501 Nil Nil 10 Nil Nil 10 Nil Nil Nil

30 Nil

511 20

MUD

11362 30

9 254 83 34 27

11356 10

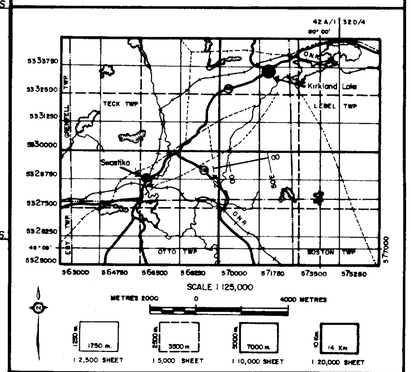
MUD

LEGEND

SAMPLE NUMBER | ASSAY VALUE

11080 | 1.65 g./t. AU/metre
177 ppb AU

< 100 ppb
≥ 100 ppb
≥ 1.00 g./t.
≥ 3.50 g./t.
≥ 8.50 g./t.
≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCHES 500E and 700E

PROJECT No. 75-JV-28	DATA BY:
N.T.S. 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. TA-025	DATE: October 1990

SCALE: 1:125

0 1 2 3 4 5 10
metres

42A01NE0100 63.6825 EBY

269

060 E | L 200(ti)E | 070 E | 080 E | 090 E | 100 E | 110 E | 120 E | L 400(ti)E | 130 E

010 N

BL. 0

010 S

020 S

030 S

040 S

MUD

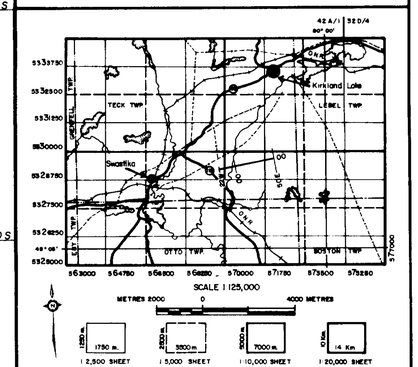
MUD

MUD

LEGEND

SAMPLE NUMBER	ASSAY VALUE
11080	1.65 g./t. AU/metre
	177 ppb AU

- < 100 ppb
- ≥ 100 ppb
- ≥ 1.00 g./t.
- ≥ 3.50 g./t.
- ≥ 8.50 g./t.
- ≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 300 E

PROJECT No.: 75-JV-28	DATA BY:
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: TA-026	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10
metres

42A01NE0100 63.6025 EBY

140 E | 150 E | 160 E | 170 E | 180 E | L 600 (tie) E | 190 E | 200 E | 210 E | 220 E

080 N
070 N
060 N
050 N
040 N
030 N

11370 17
38
10
11373 24
11371 17
24
11366 Nil
30
34
11575 14
21
11363 24
17
11374

MUD

MUD

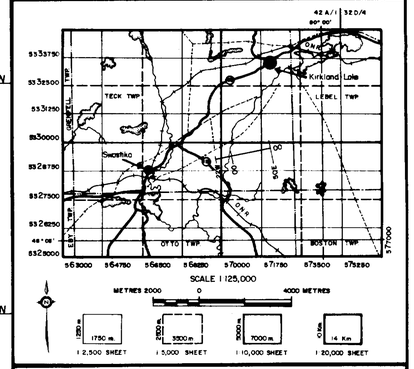
MUD

LEGEND

SAMPLE NUMBER — ASSAY VALUE

11080 | 1.65 g./t. AU / metre
177 ppb AU

< 100 ppb
≥ 100 ppb
≥ 1.00 g./t.
≥ 3.50 g./t.
≥ 8.50 g./t.
≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 600 E

PROJECT No.: 75-JV-28	DATA BY:
N.T.S. 42A/1 & 32D/4	DRAWN BY: B. H. Madill, Tech.
DRAWING No.: TA-027	DATE: October 1990

SCALE: 1:125
0 1 2 3 4 5 10
metres

42A01NE0100 63.6025 EBY

270 E | 280 E | 290 E | 300 E | L1000(m)E | 310 E | 320 E | 330 E | 340 E | 350 E

130N
120N
110N
100N
090N
080N

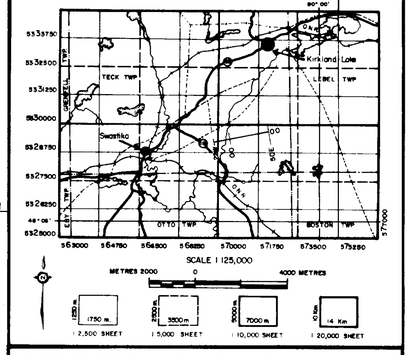
MUD
11463 Nil
11462 Nil
MUD
11461 14
11460 Nil
11459 7
11458 31
11456 3
11457 45
11455 9
Nil
11454 Nil
11453 3
MUD
11452 7
11451 Nil
MUD
11450 3
11449 7
11448 Nil
11447 Nil
11446
20
11388 Nil
Nil
3
11445 Nil
6
3
Nil
Nil
47
11390 Nil
Nil
Nil
276/8.14m
NOTE: Estimated true width-300m
11444 27/1.0m
11443
453/0.90m
11376
11442 262/0.70m
292 110/0.91m
11441 31/0.60m
250/0.91m
320/0.61m
455/0.91m
50
30
20
40
284 110

LEGEND

SAMPLE NUMBER | ASSAY VALUE

11080 | 1.65 g./t. AU / metre
177 ppb AU

< 100 ppb
≥ 100 ppb
≥ 1.00 g./t.
≥ 3.50 g./t.
≥ 8.50 g./t.
≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 1032 E

PROJECT No.: 75-JV-28	DATA BY
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.M. Medill, Tech.
DRAWING No.: TA-028 (North Sheet)	DATE: October 1990
SCALE: 1:125	

0 1 2 3 4 5 10
metres

42A01NE0100 63.6025 EBY

272

270 E
280 E
290 E
300 E
L 1000 (11) E
310 E
320 E
330 E
340 E
350 E
070 N
060 N
050 N
040 N
030 N
020 N
010 N

284 110
40
40
281 140
70
278
200
100
280
MUD
277 30
20
30
Nil
Nil
20
Nil
270 10

11355 Nil
22
107
38
3
MUD
11330 53
3
40

27
55
11345 Nil
21
24
3

7
11340 Nil
Nil
Nil
11337 10

MUD

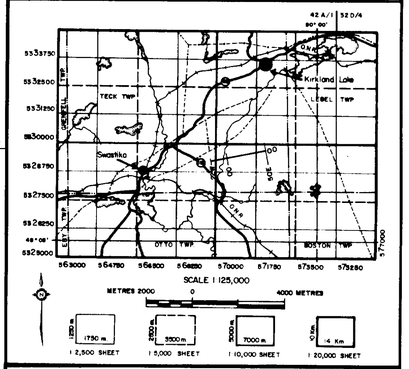
MUD

LEGEND

SAMPLE NUMBER — ASSAY VALUE

11080 — 1.65 g./t. AU/metre
177 ppb AU

< 100 ppb
≥ 100 ppb
≥ 1.00 g./t.
≥ 3.50 g./t.
≥ 8.50 g./t.
≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

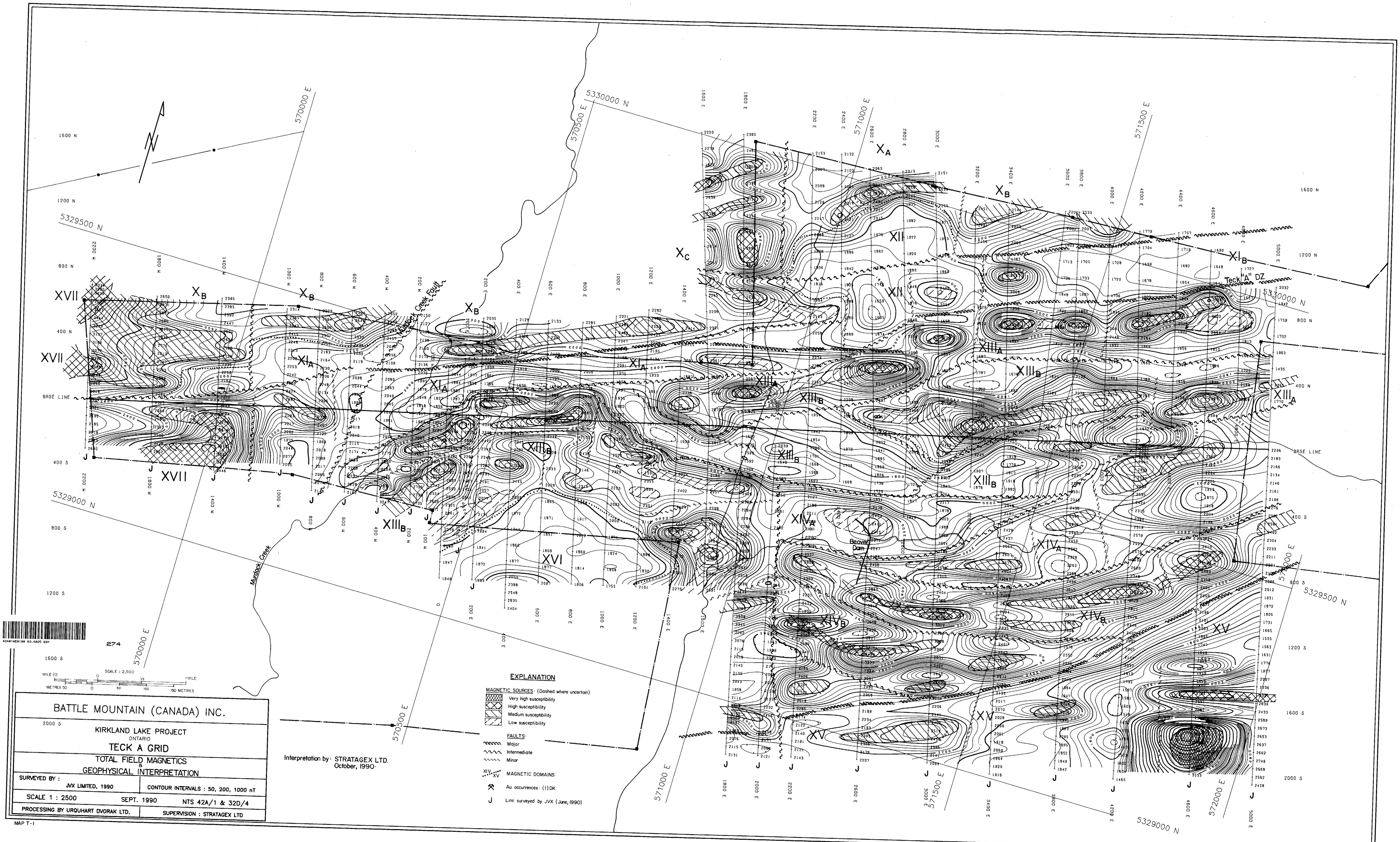
BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
TECK "A" PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 1032 E

PROJECT No.: 75-JV-28	DATA BY:
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: TA-029 (South Sheet)	DATE: October 1990

SCALE: 1:125
0 1 2 3 4 5 10
metres

42A01NE0100 63.6025 EBY



BATTLE MOUNTAIN (CANADA) INC.

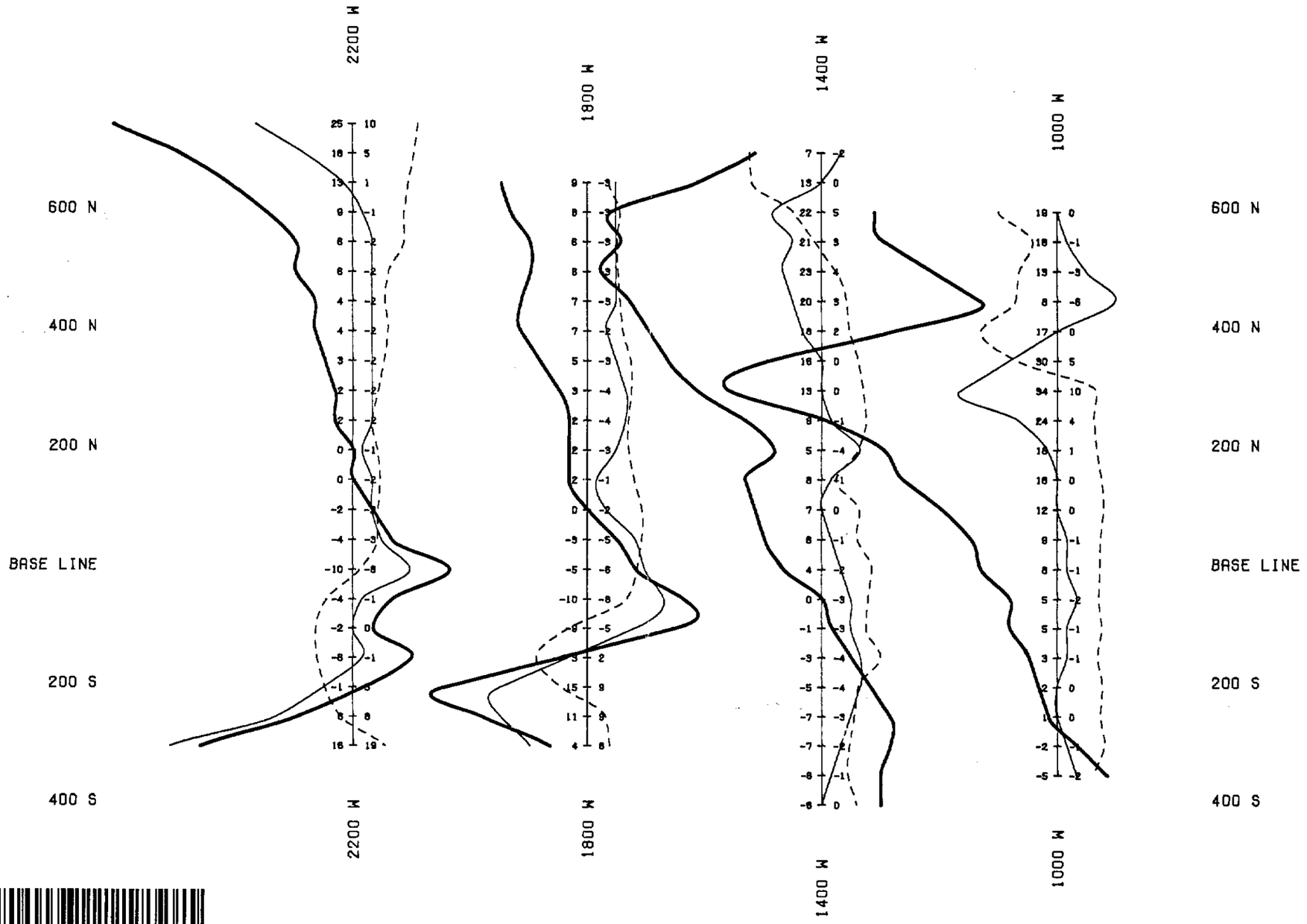
KIRKLAND LAKE PROJECT
ONTARIO

TECK A GRID

TOTAL FIELD MAGNETICS
&
GEOPHYSICAL INTERPRETATION

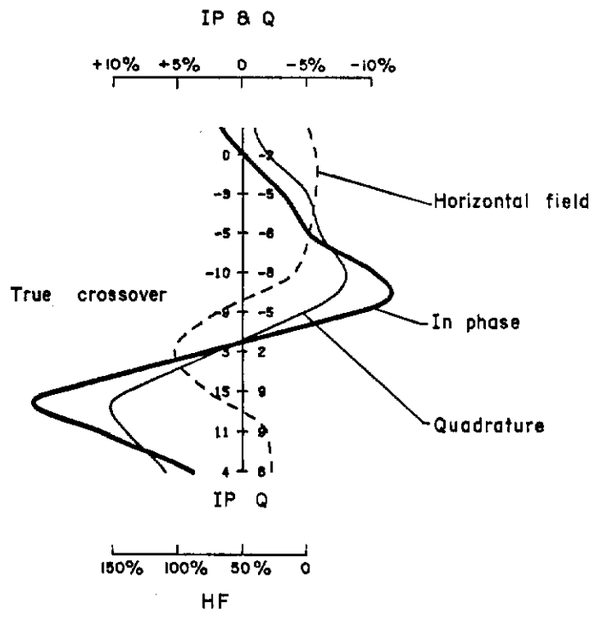
SURVEYED BY : JVX LIMITED, 1990	CONTOUR INTERVALS : 50, 200, 1000 nT
SCALE 1 : 2500 SEPT. 1990	NTS 42A/1 & 32D/4
PROCESSING BY URQUHART DVORAK LTD.	SUPERVISION : STRATAGEX LTD

MAP T-1



42A01NE0100 63.6025 EBY

LEGEND





50 0 50 100 150

METRES

BATTLE MOUNTAIN (CANADA) INC.

TECK "A" PROPERTY

KIRKLAND LAKE, ONTARIO

VLF PROFILES -- 24.0KHZ

VLF STATION : NAA,CUTLER,MAINE
POSITIVE Z-DIR = LEFT : Z-SCALE 1CM = 5.0%
HORIZONTAL FIELD BASE VALUE = 50.0%
SCINTREX IGS-2 / VLF-4

SCALE 1:2500

COMPILED BY JVX LTD. JULY, 1990	PROJECT NO.: 75-JV-28 N.T.S.: 42A/1 & 32D/4	**PLATE 5**

TECK TOWNSHIP

KIRKLAND LAKE TOWNSITE

GULL LAKE PROPERTY

AMALGAMATED KIRKLAND PROPERTY

TECK "A" PROPERTY

TECK "B" PROPERTY

VIGRASS LAKE PROPERTY

LEBEL STOCK PROPERTY

LEBEL TOWNSHIP

OTTO TOWNSHIP

BOSTON TOWNSHIP

DANE TOWNSITE

KING KIRKLAND TOWNSITE

Victoria Lake

McTavish Lake

Mud Lake

Crystal Lake

Otto Lake

Vigrass Lake

Swastika

N

LEGEND

- HIGHWAY and ROUTE No. (66)
- OTHER ROADS
- TRAILS
- SURVEYED LINES
  - TOWNSHIP BASE LINE, etc.
- UNSURVEYED LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS

NOTE: The information that appears on this map has been compiled from various sources, therefore accuracy cannot be guaranteed.

42A/1 / 32D/4

SCALE 1:125,000

METRES 2000 0 4000 METRES

1:2,500 SHEET | 1:5,000 SHEET | 1:10,000 SHEET | 1:20,000 SHEET

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

CLAIM MAP

PROJECT No. 75-JV-28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY: B.H Madill, Tech.
DRAWING No. PL-001	DATE 07/11/90

SCALE: 1 inch = 1/2 mile
FEET 0 1000 2000 4000 6000 8000
METRES 0 200 1000 2000

42A01NE0100 63.6025 EBY

276

564750 E

566500 E

5332750 N

5330000 N

SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

5326750 N

564750 E.

566500 E

532750 N.

Swastika

N.G.P.L. R.O.W.

112 N. TIE LINE

Trail

10800 E

10900 E

11000 E

11100 E

11200 E

10500 E

10600 E

10700 E

18f, asp.

18f, agp

18f, agp., fsp.

18f, ves., agp., fsp.

18f, agp., ves.

18f, agp., fsp., q.v., cb., ch.

18f, agp.

18f, agp., fsp.

18fbx, fp

18fbx

18f, ves

18f, fbx

18b, hem., py

18b, mag.

21p, 23

21p, d

21d, e

21d, c

18b, 21p

18b, c

18c

18a, b

18b, c

18f

18b

18c

21p

21d

21

22

18

464

Fe

277

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 15 Basalts
- 18 Trachytes
  - 18f Flows
  - 18c Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sf or Ss), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 6501 — LOCATION — 1600 PPB AU — 1.6 g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	

42A/1 | 32D/4

Kirkland Lake

TECK TWP

LEBEL TWP

OTTO TWP

BOSTON TWP

SCALE 1:125,000

METRES 2000 0 4000 METRES

1:2,500 SHEET — 1:5,000 SHEET — 1:10,000 SHEET — 1:20,000 SHEET

BATTLE MOUNTAIN (CANADA) INC.

SOUTH MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)

SHEET No: 564750E / 5326750N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GL-012	DATE: October 1990

SCALE: 1:2,500

50 0 50 100 METRES

42A01NE0100 63.6825 EBY

564750 E.

566500 E.

5326750 N.

5327500 N.

SHEET ALIGNMENT POINT

108 N TIE LINE

BLANCHE RIVER FAULT

BLANCHE RIVER

ONR

Swastika

N.G.P.L. R.O.W.

LARDER LAKE FAULT

HIGHWAY SHOWING

ADIT (1912) HOMESTEAD MINE

HWY 66

TECK TWP.

OTTO TWP.

100 N BASE LINE

LOT 10

LOT 11

VIGRASS LAKE

OTTO LAKE

SHALLOW SHAFT

VA88-38 (-46°)

VA87-1 (-46°)

VA87-2 (-72°)

VA87-3 (-49°)

VA88-4 (-47°)

VA88-5 (-75°)

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Mesc Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sx) dipping, vertical dip unknown
- Foliation (Sx = Sb), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep suboop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine (silica)
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
flbr - flow breccia

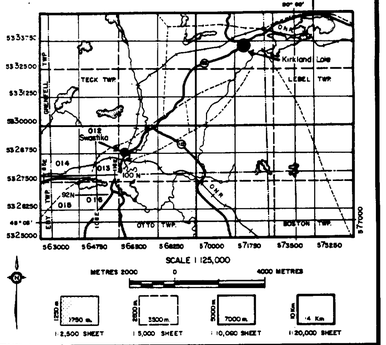
IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatite

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	

42 A/11 320/4



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)

SHEET No: 564750E / 5327500 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GL — 013	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

42A81NE0100 63.6825 EBY

278

SHEET ALIGNMENT POINT

563000 E

564750 E

5327750 N

5327500 N

9900 E

10000 E

10100 E

TIE LINE 108 N

BLANCHE

RIVER

ICG NATURAL GAS PIPELINE R.O.W.

O.N.R

BASE LINE 100 N

GRENFELL TWP

EBY TWP

TECK TWP

OTTO TWP

HWY 66

Waste Dump

PIT

OLD DUMP

8500 E

8600 E

8700 E

8800 E

8900 E

9000 E

9100 E

9200 E

9300 E

9400 E

9500 E

9600 E

9700 E

9800 E

LEGEND

60 ALTERATION

61 Chlorite ± Talc ± Carbonate ± Quartz
612 Weak
613 Moderate
614 Strong

62 Sericite ± Carbonate ± Chlorite ± Quartz
622 Weak
623 Moderate
624 Strong

65 Carbonate ± Chlorite Fuschite ± Quartz
652 Weak
653 Moderate
654 Strong

69 Carbonatized Syenite

40 INTRUSIVES

41 Diabase
412 Lamprophyre
42 Peridotite
43 Pyroxenite
44 Gabbro
45 Diorite
46 Syenite
461 Augite Syenite
462 Melo Syenite
463 Meso Syenite
464 Leuco Syenite

20 SEDIMENTS

21 Conglomerate
22 Graywacke
23 Arenite
25 Siltstone
26 Mudstone
27 Iron Formation

10 VOLCANICS

11 Komatiites
13 Basalts
18 Trachytes
18f Flows
18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pebble
c - cobble
e - boulder
g - grit

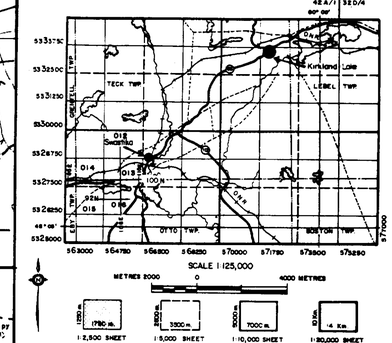
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatite

SAMPLE NO. 8501 — 1600 ← PPB AU; 1.6 ← g/t. AU; LOCATION

ABBREVIATIONS

dgp. - augite porphyritic
dmg. - amygdaloidal
amp. - amphibolite
ank. - ankerite
bx. - breccia
ca. - calcite
cb. - carbonate
ch. - chlorite
cp. - chalcopyrite
fc. - fractured
fp. - feldspar porphyritic
fsp - feldspathic
gf. - graphitic
hem. - hematite
lam. - laminated
m. - massive
mag. - magnetite
p. - pitched
pb. - galena
py. - pyrite
qv. - quartz vein
ser. - sericitic
sil. - silicic
sp. - schistosity
spx. - spinifex
sh. - sheared
trc. - trachyoidal
var. - variolitic
ves. - vesicular



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)

SHEET No: 863000E / 5327500N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GL - 014	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

SHEET ALIGNMENT POINT

SHEET ALIGNMENT POINT

563000 E

564750 E

5327450 N

5326250 N

SHEET ALIGNMENT POINT

EBY TWP.
OTTO TWP.

LOT 12
LOT 11

TIE LINE 92 N.

8500 E 8600 E 8700 E 8800 E 8900 E 9000 E 9100 E 9200 E 9300 E 9400 E 9500 E 9600 E 9700 E 9800 E 9900 E 10000 E

320 310 +333 +325 +326

13m,f 13m,f,ank 13f 13f,var 13m,f,qx 13f,var,py 13b,m,f 13b,f 13m,f 13f,amg. 462, 2%py 13f,cb 13f,ch. 13f,cb. 13f,ser. 13f,m,1%py. 13m,1%py. 13f,m 13cb 13cb,sil 13sil,1%py 13a V88-10 1%py 44

70 65 35 40 45

280

42A01NE0100 63.0825 EBY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 66 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 418 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 465 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S2a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

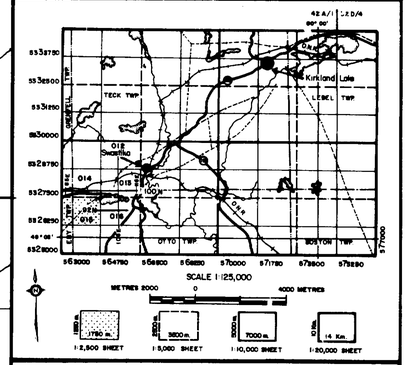
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 8501 LOCATION — 1600 ← PPB AU — 1.6 oz./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	ham. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracheoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

VIGRASS LAKE PROPERTY

(GEOLOGY PLAN)

SHEET No: 563000E / 5326250 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GL-015	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

564750 E

566500 E

5327450 N

5326250 N

SHEET ALIGNMENT POINT

VIGRASS LAKE

OTTO LAKE

LOT 11

LOT 10

LOT 9

OLD BASELINE

92 N. TIE LINE

VA90-1 (-50°)

VA90-2 (-50°)

V88-6 (-45°)

V88-9 (-45°)

V88-11 (-45°)

V88-6B (-45°)

V88-6A (-45°)

R85-1 (-90°)

VA-1

VA-2

VA-3

10000 E

10200 E

10300 E

10400 E

10500 E

10600 E

10700 E

10800 E

10900 E

11000 E

11100 E

11200 E

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sz.), dipping, vertical dip unknown
- Foliation (Sz.s or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep suborop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

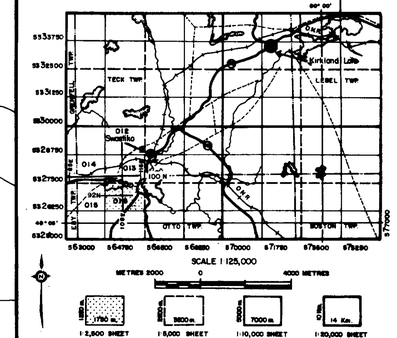
IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. — LOCATION — 1600 ← PPB AU — 1.6 ← g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein	
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic	
amp. - amphibolite	gf. - graphitic	sil. - silicic	
ank. - ankerite	hem. - hematite	sp. - spherulite	
bx. - breccia	lam. - laminated	spx. - spinifex	
ca. - calcite	m. - massive	sh. - sheared	
cb. - carbonate	mag. - magnetite	trc. - trachoidal	
ch. - chlorite	p. - pillowed	var. - variolitic	
cp. - chalcopyrite	pb. - galena	ves. - vesicular	
fc. - fractured	py. - pyrite		



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)

SHEET No: 564750E / 5326250N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GL-016	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.6825 EBY

563000 E

566500 E

5331000 N

5329000 N

LIMIT of 1:5000 TOPOGRAPHICAL COVERAGE

PERRON CREEK

L476845

L476846

L476847

18f

18

21

22

10800 E

10900 E

11000 E

11100 E

11200 E

10500 E

10600 E

10700 E

112 N.T.L.

H.E.P.C.

100 H.E.P.C. ROW

282

42A01NE0100 63.5625 EBY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 418 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep suboop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- flm - flow breccia

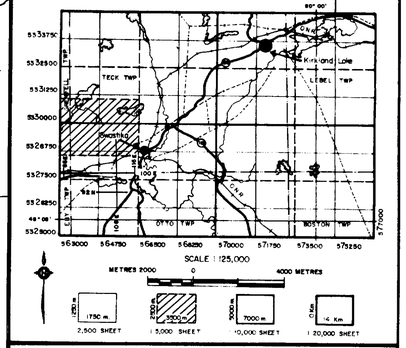
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 6501 — 1600 PPB AU — LOCATION — 1.6 g/t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pitted	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS PROPERTY
(GEOLOGY PLAN)

PROJECT No. 75-JV-28	DATA BY W. Benham
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. GL-017 (North Sheet)	DATE November 1990
SCALE 1:5000	

100 0 100 200
METRES

563000 E

566500 E

5328500 N

5326500 N

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 63 Carbonate ± Chlorite Fuschite ± Quartz
  - 633 Weak
  - 634 Moderate
  - 635 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 41a Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 46a Augite Syenite
  - 46b Mela Syenite
  - 46c Meso Syenite
  - 46d Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 24 Siltstone
- 25 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

Bedding, dipping, vertical (facing unknown)
Bedding, dipping, vertical, overturned (facing known)
Pillow, Tuff, Graded, dipping, vertical, overturned
Foliation (Slab, dipping, vertical dip unknown
Foliation (Ab or Slab), dipping, vertical, dip unknown
Joint, dipping, vertical
Fault, dipping, vertical
Shear zone, defined, inferred
Stoping elongation strike and plunge
Minor fold showing plunge
Geological contact, known, inferred
Diamond Drill Hole
Outcrop Area
Limit of deep cuberop
Historic trench
Pit or trench outline
Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
d - pebble
e - cobble
f - boulder
g - grit

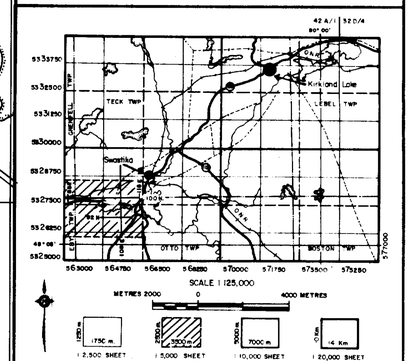
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatite

SAMPLE NO. 6501 LOCATION 1600 PPB AU 1.6 g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein	
amg. - amygdaloidal	fep - feldspathic	ser. - sericitic	
amp. - ampibolite	gf. - graphitic	sil. - silicic	
ank. - ankerite	hem. - hematite	sp. - sphalerite	
bx. - breccia	lam. - laminated	spx. - spinifex	
cg. - calcite	m. - massive	sh. - sheared	
cb. - carbonate	mag. - magnetite	trc. - trachoidal	
ch. - chlorite	p. - pillowed	var. - variolitic	
cpy - chalcopyrite	pb. - galena	ves. - vesicular	
fc. - fractured	py. - pyrite		



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS PROPERTY
(GEOLOGY PLAN)

PROJECT No. 75-JV-28	DATA BY W Benham
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech
DRAWING No. GL-018 (South Sheet)	DATE November 1990

SCALE 1:5000
100 0 100 200
METRES

42A01NE0100 63.6825 EBY

283

564750E

566500E

5330000N

5328750N

SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 15 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical dip unknown
- Foliation (S2 or S3b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
c - cobble
b - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

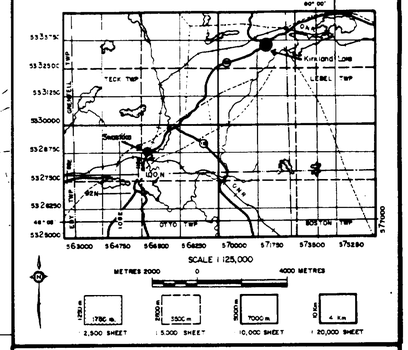
IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatite

SAMPLE NO. 650N LOCATION 1600 PPB AU 1.6 g/t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 564750E / 5328750N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L., V.S., K.B.
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GA-012	DATE: October 1990
SCALE 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.6025 EBY

564750 E 50 55 60 566500 E

564750 E.

566500 E.

5328750 N.

5327500 N.

SHEET ALIGNMENT POINT

108 N TIE LINE

100 N BASE LINE

TECK TWP

OTTO TWP

BLANCHE RIVER FAULT

LARDER LAKE FAULT

ONR

N.G.P.L. R.O.W.

SHIELD ZONE

VIGRASS LAKE

OTTO LAKE

Swastika

LOT 10

LOT 11

LOT 19

10200 E

10300 E

10400 E

10500 E

10600 E

10700 E

10800 E

10900 E

11000 E

11100 E

11300 E

11400 E

11500 E

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite ± Fuchite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sis), dipping, vertical dip unknown
- Foliation (Ss or Sis), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep cover
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

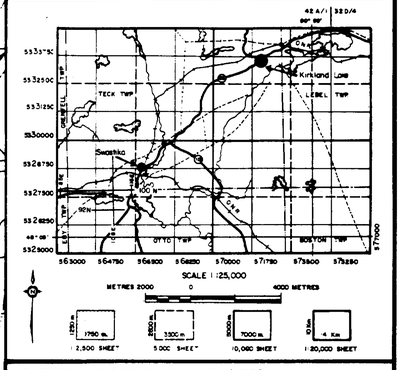
IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU
LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracheloid
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	vsb. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No.: 564750E / 5327500N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GA-013	DATE: October 1990

SCALE: 1:2,500

50 0 50 100 METRES

42A01NE0199 83.0425 SIBY

285

SHEET ALIGNMENT POINT

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Monzo Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1a), dipping, vertical, dip unknown
- Foliation (S2 or S1b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

VOLCANIC ROCKS

a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

IGNEOUS ROCKS

a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — LOCATION — 1600 PPB AU — 1.6 oz./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	

42A/1 | 32D/4

Kirkland Lake | Larder Lake | Swastika | Teck Twp | Otto Twp | Boston Twp

SCALE 1:125,000

METRES 2000 0 4000 METRES

1780 m. 1:5,000 SHEET | 3300 m. 1:5,000 SHEET | 7000 m. 1:10,000 SHEET | 4 Km 1:20,000 SHEET

BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)
showing
GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 863000E / 8327800N	CHECKED BY: W. Benham
PROJECT No. 75-JV-28	DATA BY H.D-L, V.S., K.B.
NTS 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No. GA-014	DATE October 1990
SCALE 1:2,500	

50 0 50 100 METRES

863000 E — 564750 E — 8327800 N — 8325000 N

SHEET ALIGNMENT POINT

563000 E

564750 E

5326250 N

5327450 N

SHEET ALIGNMENT POINT

13m,f,ank
13f
13m,f
13f,var
13m,f
13m,f
13f,var,py
13m,f,qx
13m,f
13b,m,f
13m,f
13b,m,f
13b,f
13f,cb
13f,ch
13f,cb
13f,amg
462, 1%py
454
13f,ser.
13
46
320
310
320
+333
70
65
TIE LINE 92 N.
LOT 12
LOT 11
EBY TWP.
OTTO TWP.
8500 E
8600 E
8700 E
8800 E
8900 E
9000 E
9100 E
9200 E
9300 E
9400 E
9500 E
9600 E
9700 E
9800 E
9900 E
10000 E
V88-10
72765
70ppb
8207
13 sil, 1% py
8208
35ppb
13cb
13cb,sil
13a
+326
13f,m, 1% py.
13m, 1% py.
13f,m
13cb
44
+325
287
42A01NE0100 63.0825 EBY
35
40
45

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 66 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
- 461 Augite Syenite
- 462 Melo Syenite
- 463 Meso Syenite
- 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
- 18f Flows
- 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sis), dipping, vertical
- dip unknown
- Foliation (Sb2 or Sib), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pebble
a - cobble
e - boulder
g - grit

VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbr - flow breccia

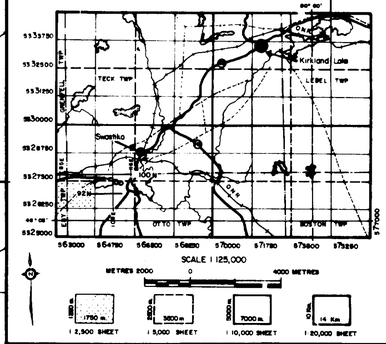
IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp. - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	vas. - vesicular
fc. - fractured	py. - pyrite	

42A/1 & 32D/4



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

VIGRASS LAKE PROPERTY

(GEOLOGY PLAN)

showing

GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: 563000 E / 5326250 N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S. 42A/1 & 32D/4	DRAWN BY: B.H. Madill, Tech.
DRAWING No.: GA-015	DATE: October 1990

SCALE: 1:2,500

50 0 50 100 METRES

564750E

566500E

5327450 N

5326250 N

SHEET ALIGNMENT POINT

VIGRASS LAKE

OTTO LAKE

LOT 10

LOT 9

92 N. TIE LINE

OLD BASELINE

VA90-1 (-50°)

VA90-2 (-50°)

V88-6 (-45°)

V88-7 (-45°)

V88-8 (-45°)

V88-9 (-45°)

V88-11 (-45°)

V88-6A (-45°)

R85-1 (-60°)

VA-1

VA-2

VA-3

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ±Carbonate ±Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ±Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 186 Tuffs

SYMBOLS

Bedding, dipping, vertical (facing unknown)
Bedding, dipping, vertical, overturned (facing known)
Pillow facing direction, dipping, vertical, overturned
Foliation (65a), dipping, vertical dip unknown
Foliation (62 or 63b), dipping, vertical, dip unknown
Joint, dipping, vertical
Fault, dipping, vertical
Shear zone, defined, inferred
Mineral elongation strike and plunge
Minor fold showing plunge
Geological contact, known, inferred
Diamond Drill Hole
Outcrop Area
Limit of deep subcrop
Historic trench
Pit or trench outline
Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
d - pebble
e - cobble
f - boulder
g - grit

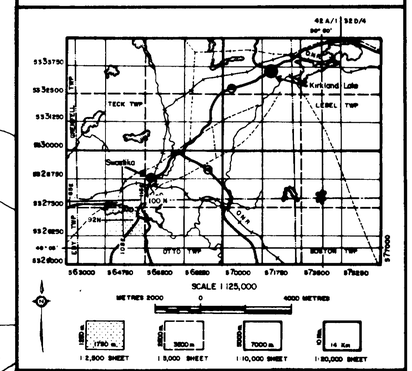
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
d - flow
fbx - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatite

SAMPLE NO. 8501 — 1600 PPB AU; 1.6 g/t. AU
LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein	
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic	
amp. - amphibolite	gf. - graphitic	sil. - silicic	
ank. - ankerite	hem. - hematite	sp. - sphalerite	
bx. - breccia	lam. - laminated	spx. - spinifex	
ca. - calcite	m. - massive	sh. - sheared	
cb. - carbonate	mag. - magnetite	trc. - trachoidal	
ch. - chlorite	p. - pillowed	var. - variolitic	
cp. - chalcopyrite	pb. - galena	ves. - vesicular	
fc. - fractured	py. - pyrite		



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT

Queenston Mining Inc.

ONTARIO

VIGRASS LAKE PROPERTY

(GEOLOGY PLAN)

showing GRAB SAMPLE LOCATIONS and ASSAYS

SHEET No: s564750E / s32s250N	CHECKED BY: W. Benham
PROJECT No.: 75-JV-28	DATA BY: H.D-L., V.S., K.B.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: B.H. Modill, Tech.
DRAWING No.: GA-016	DATE: October 1990
SCALE: 1:2,500	

50 0 50 100 METRES

42A01NE0100 63.6625 SBY

288

10500 E

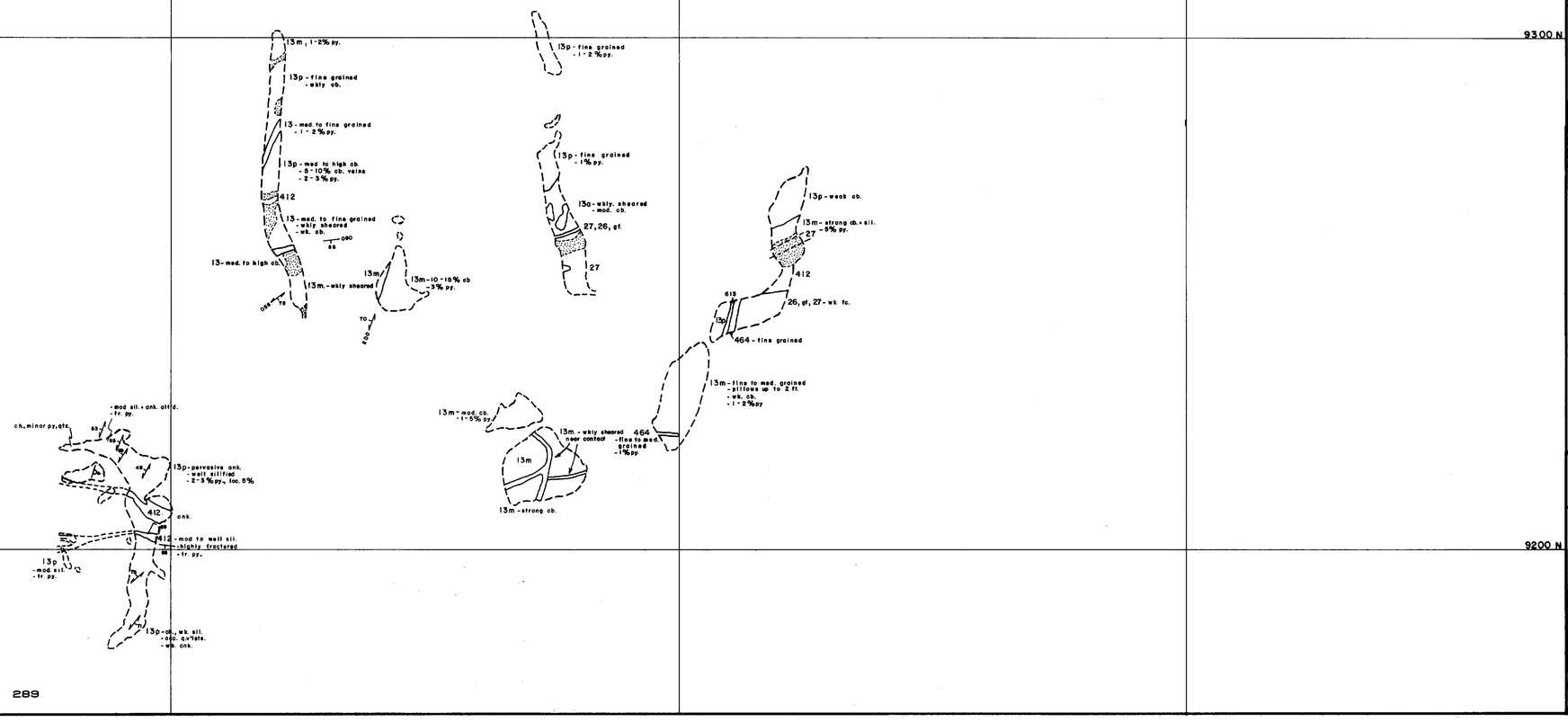
10600 E

10700 E

9400 N

9300 N

9200 N



289

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
  - 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 181 Flows
  - 184 Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sfol), dipping, vertical dip unknown
- Foliation (Sfol or Slb), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

VOLCANIC ROCKS

- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbc - flow breccia

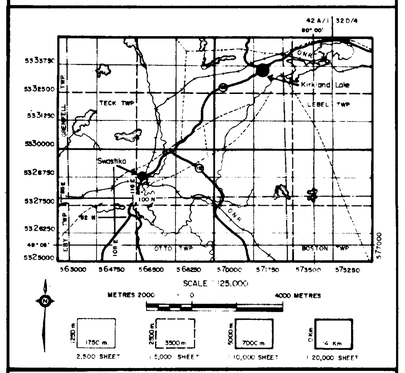
IGNEOUS ROCKS

- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 6501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

VIGRASS LAKE PROPERTY

(GEOLOGY PLAN)

TRENCHES 10500E and 10600E

PROJECT No. 75-JV-28	DATA BY
N.T.S. 42A/1 & 32D/4	DRAWN BY B.H. Modill, Tech.
DRAWING No TG-032	DATE November 1990

SCALE 1:500
0 5 10 15 20 40
metres

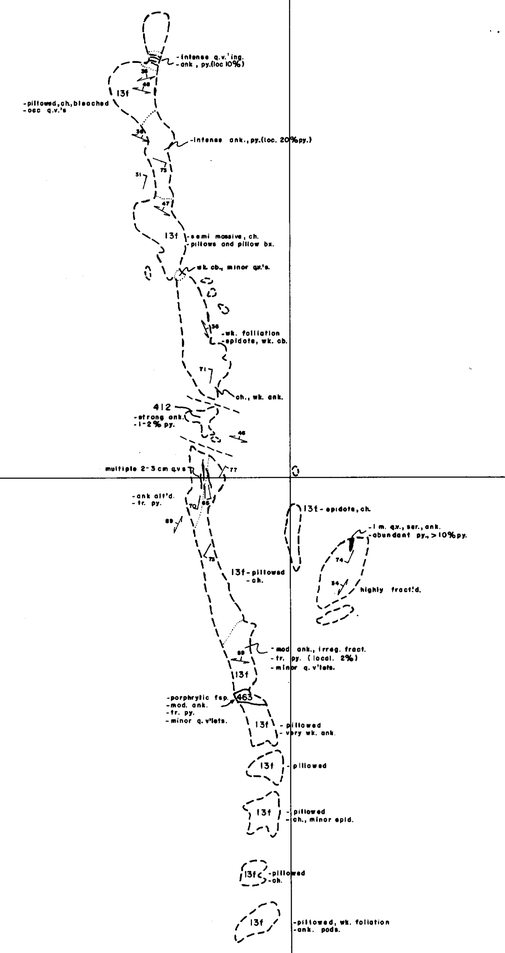
10500E

10600E

10700E

9100N

9000N



LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 66 Carbonate ± Chlorite Fuschite ± Quartz
  - 662 Weak
  - 663 Moderate
  - 664 Strong
- 68 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Melo Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 12 Basalts
- 16 Trachytes
  - 16f Flows
  - 16a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (Sx), dipping, vertical dip unknown
- Foliation (S2 or S3d), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pebble
d - cobble
e - boulder
g - grit

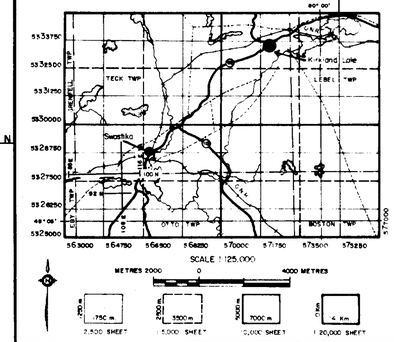
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbx - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 6501 — 1600 PPB AU — 1.6 g/t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracturing
ch. - chlorite	p. - pillowed	var. - variolitic
sp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

VIGRASS LAKE PROPERTY
(GEOLOGY PLAN)
TRENCH 10700 E

PROJECT No. 75 - JV - 28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H. Modill, Tech.
DRAWING No TG - 033 (North Sheet)	DATE November 1990

SCALE 1:500
0 5 10 15 20 40
metres

42A01NE0100 63.6025 EBY

10500E

10600E

10700E

8900N

8800N

8700N

-weak-strong ank.

131

412

q.vns, py.

qtz. in stockwork, ank.

-poor foliation
-weak ank.

131-pillowed, ch.
-wk. ank.

131-massive

131 Quartz feldspar porphyry - weak ank. - tr. py.

412 - fine grained

fract'd., ch., tr. py.

412 - maroon, tr py.

11b - green, talc, weak ch.

var., pillowed

412

131, 11 - green

var., pillowed

BLAST PIT - 30 cm. q.v.
- minor py, actinolite with 2% py.

- spinifex, long fibres
- highly fract'd.
- tr py., ch.

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 66 Carbonate ± Chlorite Fuschite ± Quartz
  - 662 Weak
  - 663 Moderate
  - 664 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 412 Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 45 Diorite
- 46 Syenite
- 461 Augite Syenite
- 462 Mela Syenite
- 463 Meso Syenite
- 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
- 23 Arenite
- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 16 Trachytes
- 161 Flows
- 164 Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, overturned (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1), dipping, vertical dip unknown
- Foliation (S2 or S3), dipping, vertical, dip unknown.
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of deep subcrop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- d - cobble
- e - boulder
- g - grit

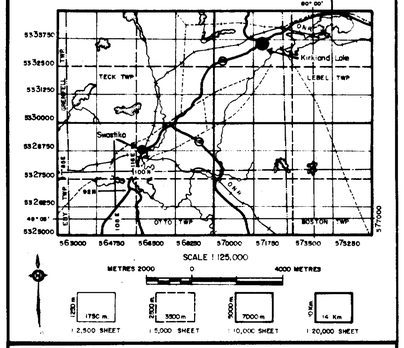
VOLCANIC ROCKS
- a - ash tuff
- b - lapilli tuff
- c - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatite

SAMPLE NO. 8501 — 1600 PPB AU — 1.6 g./t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	q.v. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - sphalerite
bx. - breccia	lam. - laminated	spx. - spinifex
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracture(d)
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

VIGRASS LAKE PROPERTY

(GEOLOGY PLAN)

TRENCH 10700E

PROJECT No. 75 - JV - 28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech
DRAWING No. TG - 034 (South Sheet)	DATE: November 1990

SCALE: 1:500
0 5 10 15 20 40
metres

42A01NE0100 63.6025 EBY

10500E

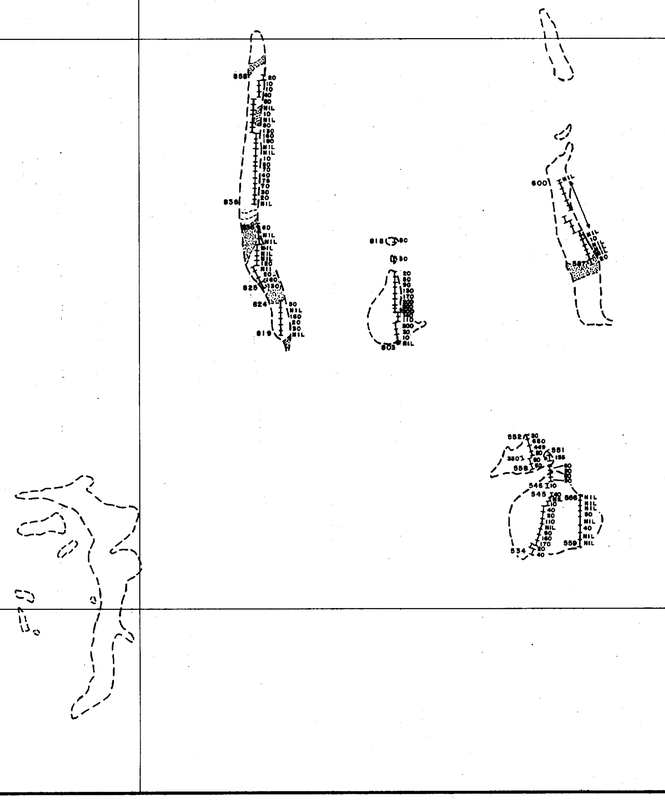
10600E

10700E

9400N

9300N

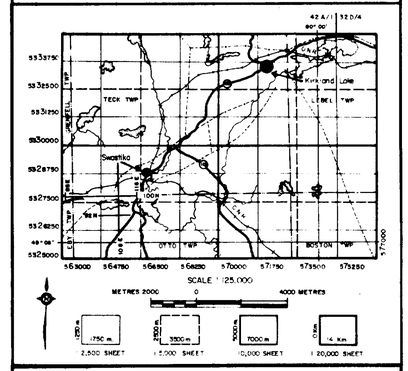
9200N



LEGEND

SAMPLE NUMBER	ASSAY VALUE
11080	1.65 g./t. AU
	177 ppb AU

- < 100 ppb
- ≥ 100 ppb
- ≥ 1.00 g./t.
- ≥ 3.50 g./t.
- ≥ 8.50 g./t.
- ≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCHES 10500E and 10600E

PROJECT No. 75-JV-28	DATA BY
N.T.S. 42A/11 & 32D/4	DRAWN BY B.H. Macill, Tech.
DRAWING No TA-032	DATE November 1990

SCALE: 1:500
0 5 10 15 20 40
metres

42A01NE0100 63.6825 EBY

10500E

10600E

10700E

9100N

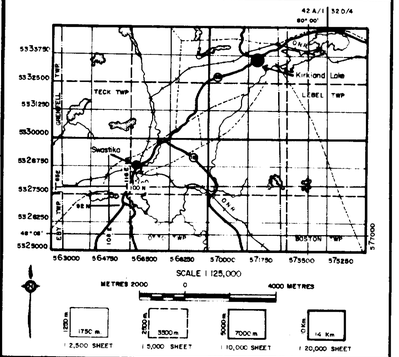
9000N



LEGEND

SAMPLE NUMBER	ASSAY VALUE
11080	1.65 g./t. AU
	177 ppb AU

- < 100 ppb
- ≥ 100 ppb
- ≥ 1.00 g./t.
- ≥ 3.50 g./t.
- ≥ 8.50 g./t.
- ≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
TRENCH 10700E

PROJECT No. 75-JV-28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. TA-033	DATE: November 1990

SCALE: 1:500
0 5 10 15 20 40
metres

42A01NE0100 63.0025 EBY

11000E

11100E

11200E

9900 N

9800 N

VIGRASS LAKE

189.96m.

V1.87-3B
(-45°)

65.73m.

86.87m

106.66m.

146.30m.

512

520

521

538

80/0.91
110/0.30
4.41/0.30
50/0.30
40/0.30
140/0.30
80/0.30
130/0.30

150/0.30
170/0.30
175/0.30
NIL/0.30
70/0.30
70/0.30
150/0.30
40/0.30
80/0.30
80/0.30
80/0.30

550ppb/3.02m.

70.71m.

V1.87-1
(-45°)

V1.87-2
(-72°)

V1.87-3
(-45°)

V1.88-4
(-47°)

V1.88-5
(-75°)

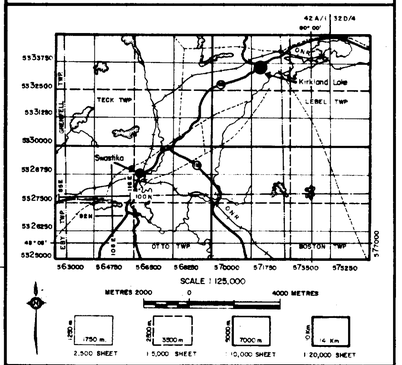
294

42A81NE0100 63.0825 EBY

LEGEND

SAMPLE NUMBER	ASSAY VALUE
11080	1.65 g./t. AU / metre
	177 ppb AU / metre

- < 100 ppb
- ≥ 100 ppb
- ≥ 1.00 g./t.
- ≥ 3.50 g./t.
- ≥ 8.50 g./t.
- ≥ 17.00 g./t.



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(ASSAY PLAN)
CHANNEL SAMPLING
HIGHWAY SHOWING

PROJECT No. 75-JV-28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H Madill, Tech.
DRAWING No TA-035	DATE November 1990

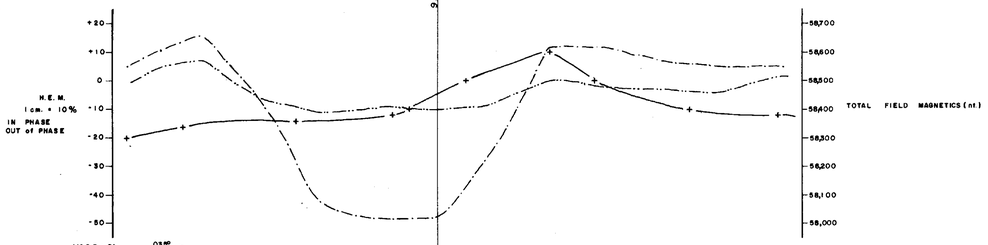
SCALE: 1:500
0 5 10 15 20 40
metres

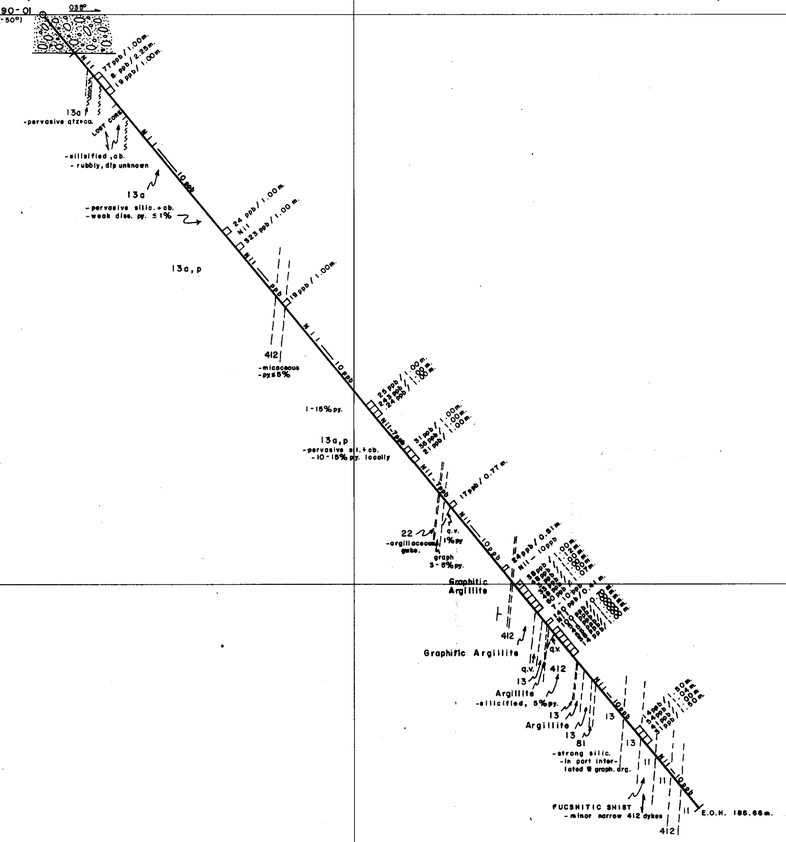
9000 N. | 9100 N. | 9200 N. | 9300 N.

00 DATUM | 00 DATUM

-100 m.

-200 m.





LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
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20 SEDIMENTS

- 21 Conglomerate
- 22 Graywacke
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- 25 Siltstone
- 26 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
- 18f Flows
- 18a Tuffs

SYMBOLS

Bedding, dipping, vertical (facing unknown)
Bedding, dipping, vertical, overturned (facing known)
Pillow facing direction, dipping, vertical, overturned
Foliation (Sfol), dipping, vertical dip unknown
Foliation (Sfol or Sfol), dipping, vertical, dip unknown.
Joint, dipping, vertical
Fault, dipping, vertical
Shear zone, defined, inferred
Mineral elongation strike and plunge
Minor fold showing plunge
Geological contact, known, inferred
Diamond Drill Hole
Outcrop Area
Limit of deep subcrop
Historic trench
Pit or trench outline
Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
a - fine grained
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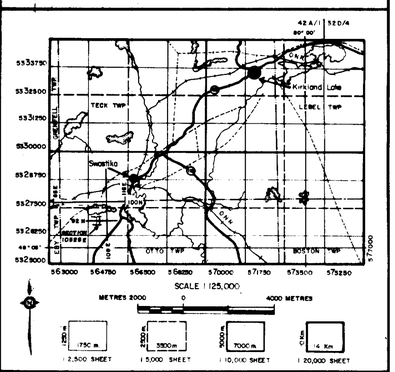
VOLCANIC ROCKS
a - ash tuff
b - lapilli tuff
c - block tuff
f - flow
fbr - flow breccia

IGNEOUS ROCKS
a - fine grained
b - medium grained
c - coarse grained
p - pegmatitic

SAMPLE NO. 8501 — LOCATION — 1600 PPB AU — 1.6 g./t. AU

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amg. - amygdaloidal	fsp - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bx. - breccia	lam. - laminated	sps. - spherulitic
ca. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	trc. - trachoidal
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO
VIGRASS LAKE PROPERTY
(SECTION 10525E)
LOOKING 305°

PROJECT No. 75-JV-28	DATA BY
NTS 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No. DC-001	DATE November 1990

SCALE: 1:500
0 5 10 15 20 40
metres

42A01NE0108 63.6825 EBY

8600 N

8700 N

8800 N

8900 N

00 DATUM

00 DATUM

N.E.M. 1 cm. = 10%
IN PHASE
OUT of PHASE

+30
+20
+10
0
-10
-20
-30

58,600
58,500
58,400
58,300
58,200
58,100
58,000

TOTAL FIELD MAGNETICS (nt.)

VA90-02
(-50°)

015°

412
poor contacts

11
- pervasive weak ch.+talc+ca.
- sps.

50m

weakly magnetic

412
- weak to mod. ch.+ca.+talc
20 cm. contact zone

5 sps/1.00m.

87 sps/1.00m.

Nil
7 sps / 1.50m.
7 sps / 1.50m.
3 sps / 1.50m.
1 sps / 1.50m.
Nil
3 sps / 1.50m.
Nil
1 sps / 1.50m.
Nil
1 sps / 0.88m.

13p
- weak ca+qtz.+epic.
- qtz.+ca. vlets. throughout

100m

412,464

13p
- weak ca+qtz.
- intercalated narrow syenitic dykes

E.O.H. 120.70m.

-100 m.

-200 m.

42A01NE0100 63.0825 EBY

LEGEND

60 ALTERATION

- 61 Chlorite ± Talc ± Carbonate ± Quartz
  - 612 Weak
  - 613 Moderate
  - 614 Strong
- 62 Sericite ± Carbonate ± Chlorite ± Quartz
  - 622 Weak
  - 623 Moderate
  - 624 Strong
- 65 Carbonate ± Chlorite Fuschite ± Quartz
  - 652 Weak
  - 653 Moderate
  - 654 Strong
- 69 Carbonatized Syenite

40 INTRUSIVES

- 41 Diabase
- 41B Lamprophyre
- 42 Peridotite
- 43 Pyroxenite
- 44 Gabbro
- 49 Diorite
- 46 Syenite
  - 461 Augite Syenite
  - 462 Mela Syenite
  - 463 Meso Syenite
  - 464 Leuco Syenite

20 SEDIMENTS

- 21 Conglomerate
- 22 Greywacke
- 23 Arenite
- 26 Siltstone
- 25 Mudstone
- 27 Iron Formation

10 VOLCANICS

- 11 Komatiites
- 13 Basalts
- 18 Trachytes
  - 18f Flows
  - 18a Tuffs

SYMBOLS

- Bedding, dipping, vertical (facing unknown)
- Bedding, dipping, vertical, younging unknown (facing known)
- Pillow facing direction, dipping, vertical, overturned
- Foliation (S1) or S1b), dipping, vertical, dip unknown
- Foliation (S2) or S2b), dipping, vertical, dip unknown
- Joint, dipping, vertical
- Fault, dipping, vertical
- Shear zone, defined, inferred
- Mineral elongation strike and plunge
- Minor fold showing plunge
- Geological contact, known, inferred
- Diamond Drill Hole
- Outcrop Area
- Limit of depo suborop
- Historic trench
- Pit or trench outline
- Shaft

GRAIN/CLAST SIZE

SEDIMENTARY ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pebble
- c - cobble
- b - boulder
- g - grit

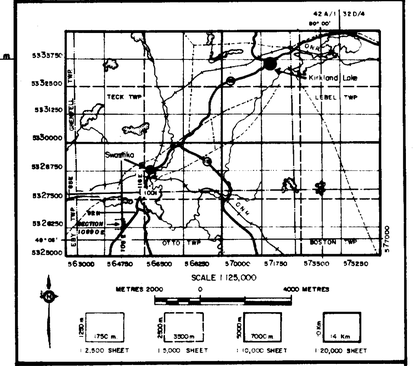
VOLCANIC ROCKS
- a - ash tuff
- l - lapilli tuff
- b - block tuff
- f - flow
- fbx - flow breccia

IGNEOUS ROCKS
- a - fine grained
- b - medium grained
- c - coarse grained
- p - pegmatitic

SAMPLE NO. 850N — 1600 PPB AU / 1.6 g/t. AU — LOCATION

ABBREVIATIONS

agp. - augite porphyritic	fp. - feldspar porphyritic	qv. - quartz vein
amy. - amygdaloidal	fap. - feldspathic	ser. - sericitic
amp. - amphibolite	gf. - graphitic	sil. - silicic
ank. - ankerite	hem. - hematite	sp. - spherulite
bk. - breccia	ism. - ismigated	sps. - syngenetic
cc. - calcite	m. - massive	sh. - sheared
cb. - carbonate	mag. - magnetite	frc. - fracture
ch. - chlorite	p. - pillowed	var. - variolitic
cp. - chalcopyrite	pb. - galena	ves. - vesicular
fc. - fractured	py. - pyrite	



BATTLE MOUNTAIN (CANADA) INC.

BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
Queenston Mining Inc.
ONTARIO

VIGRASS LAKE PROPERTY

(SECTION 10890E)

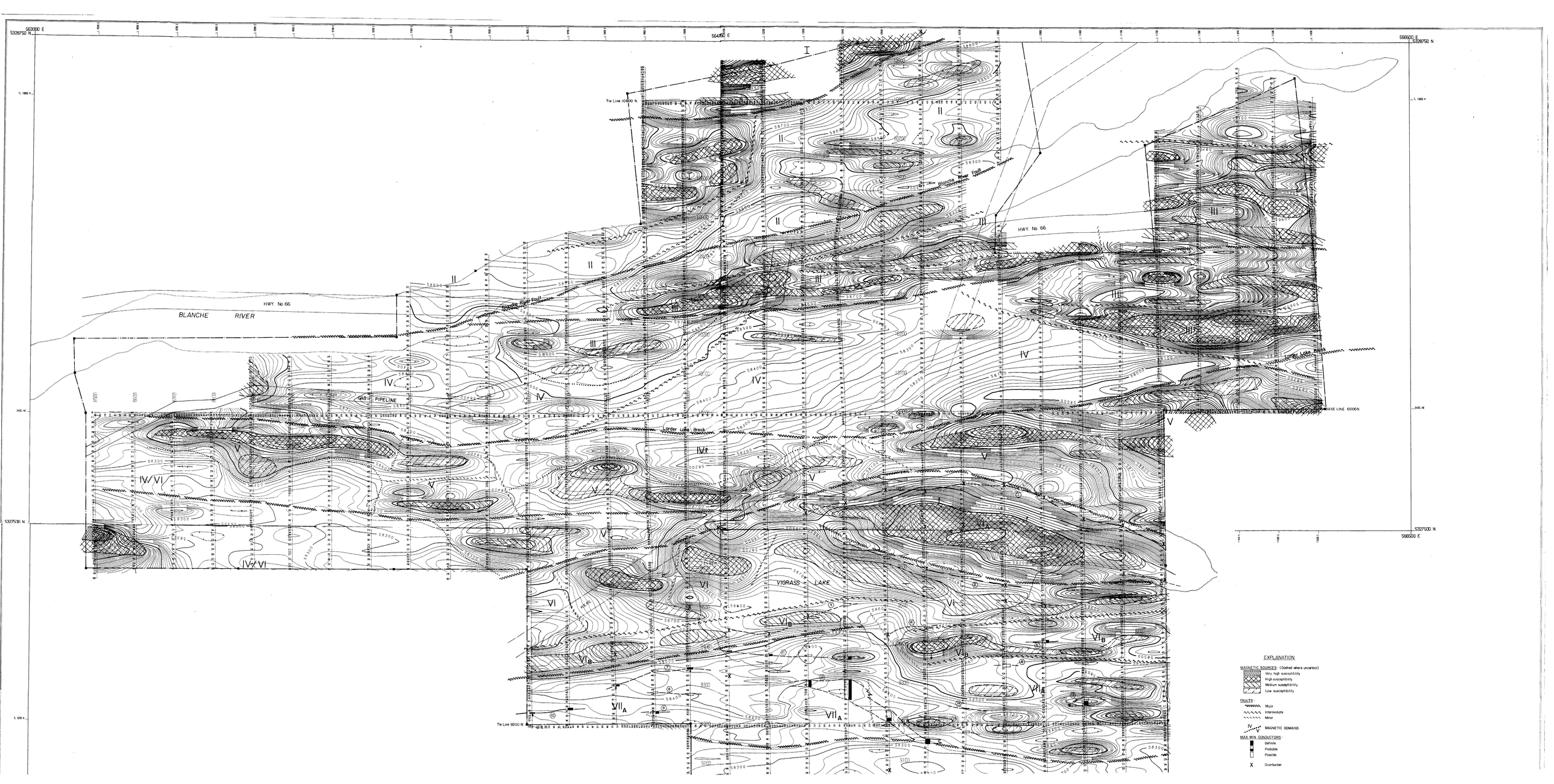
LOOKING 285°

PROJECT No. 75-JV-28	DATA BY
NTS: 42A/1 & 32D/4	DRAWN BY B.H. Madill, Tech.
DRAWING No.: DC-002	DATE: November 1990

SCALE: 1:500

0 5 10 15 20 40

metres


563000 E
5328750 N
564750 E
566500 E
5327500 N
Tie Line 10600 N
Tie Line 9200 N
HWY. No. 66
BLANCHE RIVER
GAS PIPELINE
Bloncho River Fault
Lower Lake Brook
VIGRASS LAKE
BASE LINE 10000N.
EXPLANATION
MAGNETIC SOURCES (Dashed where uncertain)
Very high susceptibility
High susceptibility
Medium susceptibility
Low susceptibility
FAULTS
Major
Intermediate
Minor
MAGNETIC DOMAINS
MAX MIN CONDUCTORS
Definite
Probable
Possible
Overburden

563000 E
5328750 N
564750 E
5327500 N
5326250 N
563000 E
564750 E
TL 10500 N
TL 9250 N
EBY TWP
OTTO TWP
BLANCHE RIVER
O.N.R.
NATURAL GAS LINE
HWY No. 66
H.E.P.C.
LAKE
8500
8600
8700
8800
10700
10600
10500
10400
10300
10200
10100
9900
9800
9700
9600
9500
9400
9300
9100
9000
8900
8800
42A81NE0108 63.0825 EBY
298

564750 E
5330000 N

566500 E
5330000 N

L 10500 L 10600 L 10700 L 10800 L 10900 L 11000 L 11100 L 11200

TL 11200 N

11300
11200
11100
11000

NATURAL GAS LINE

H.E.P.C.

5328750 N
564750 E

566500 E
5328750 N

42A01NE0100 63.0825 EBY

299

LEGEND

MAGNETIC PROFILES.

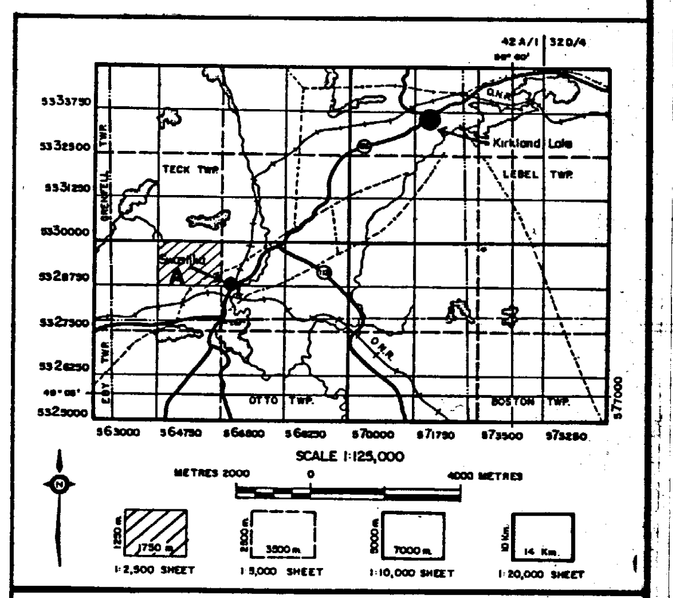
Total Field — 1 cm. = 500 gamma

Vertical Gradient — 1 cm. = 50 gamma/metre

Relative zero for Total Field = 58600 gamma

Reading = Total Field - 58000 gamma

Instrument EDA OMNI PLUS MAGNETOMETER



BATTLE MOUNTAIN (CANADA) INC.

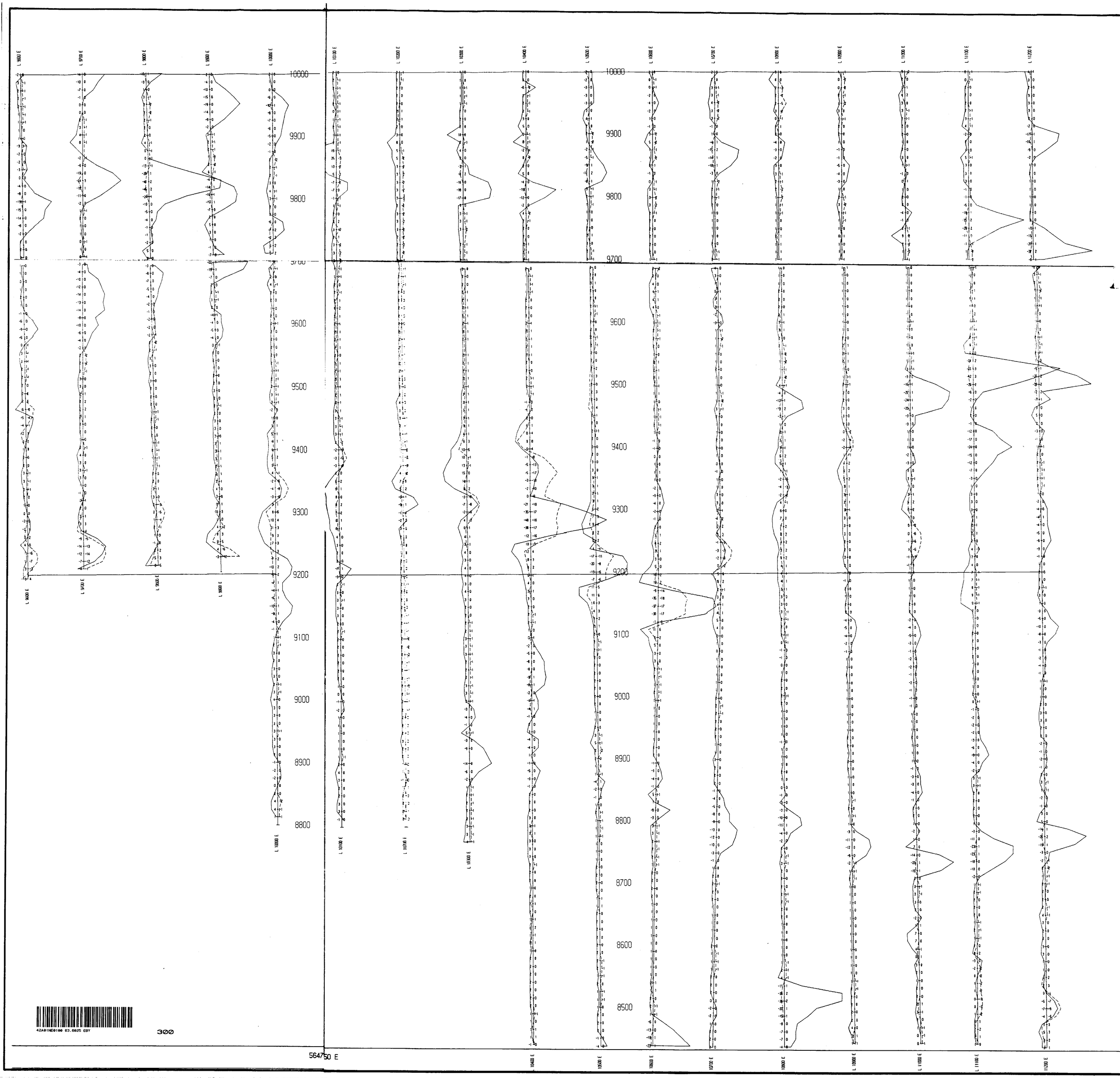
BATTLE MOUNTAIN GOLD COMPANY

KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO

VIGRASS LAKE PROPERTY

MAGNETIC SURVEY
TOTAL FIELD & GRADIENT PROFILES

PROJECT No.: 75-JV-28	DATA BY: Val d'Or Géophysique Ltée.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: C.-B. Moreau
DRAWING No.: A / 1.2 MAP V-2N	DATE: May 1990
SCALE: 1:2500 (50 0 50 100 metres)	VAL D'OR Géophysique



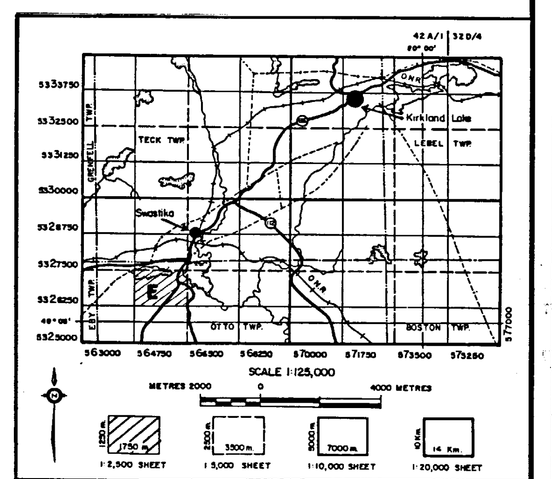
LEGEND

ELECTROMAGNETIC PROFILES.

—— In-phase 1 cm. = 10 Z
----- Out-of-phase 1 cm. = 10 Z

Frequency 444 Hz
Cable length 50 m

Instrument APEX MAXMIN I



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO

VIGRASS LAKE PROPERTY

H.E.M. SURVEY

FREQUENCY = 444 Hz CABLE = 50 m

PROJECT No.: 75-JV-28	DATA BY: Val d'Or Géophysique Ltée.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: C. - B. Moreau
DRAWING No.: E / 2.1 MAP V-3	DATE: May 1990
SCALE: 1:2500 (metres)	VALDOR GEOPHYSIQUE

42A/NE0100 03.0025 EBY

301

S6500 E

S6450 E

S32625O N

TL 9200 N

BASELINE

L 10000 E L 9900 E L 9800 E L 9700 E L 9600 E L 9500 E L 9400 E L 9300 E L 9200 E L 9100 E L 9000 E L 8900 E L 8800 E L 8700 E L 8600 E L 8500 E

10000 9900 9800 9700 9600 9500 9400 9300 9200 9100 9000 8900 8800 8700 8600 8500

E

W

ELECTROMAGNETIC PROFILES.

LEGEND

In-phase ——— 1 cm. = 10 %

Out-of-phase ----- 1 cm. = 10 %

Frequency 1777 Hz

Cable length 50 m

Instrument APEX MARK II

PROJECT No.: 73 - JV - 28	DATA BY: Val d'Or Geophysique Ltée.
N.T.S.: 42A/1 & 32D/4	DRAWN BY: C. B. Moreau
DRAWING No.: E / Z.Z MAP V-4	DATE: May 1990

SCALE: 1:2500

50 0 50 100 (metres)

VAL D'OR GÉOPHYSIQUE

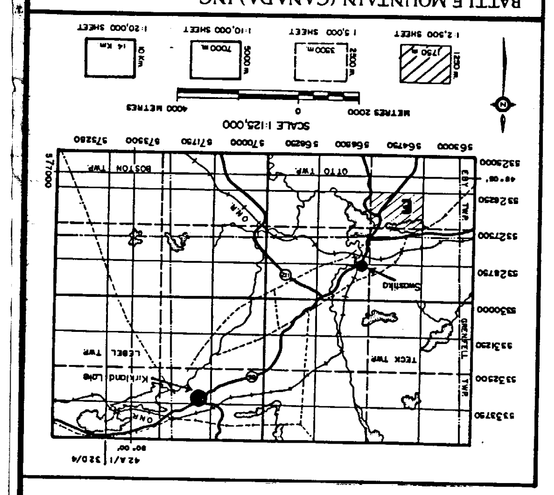
H. E. M. SURVEY

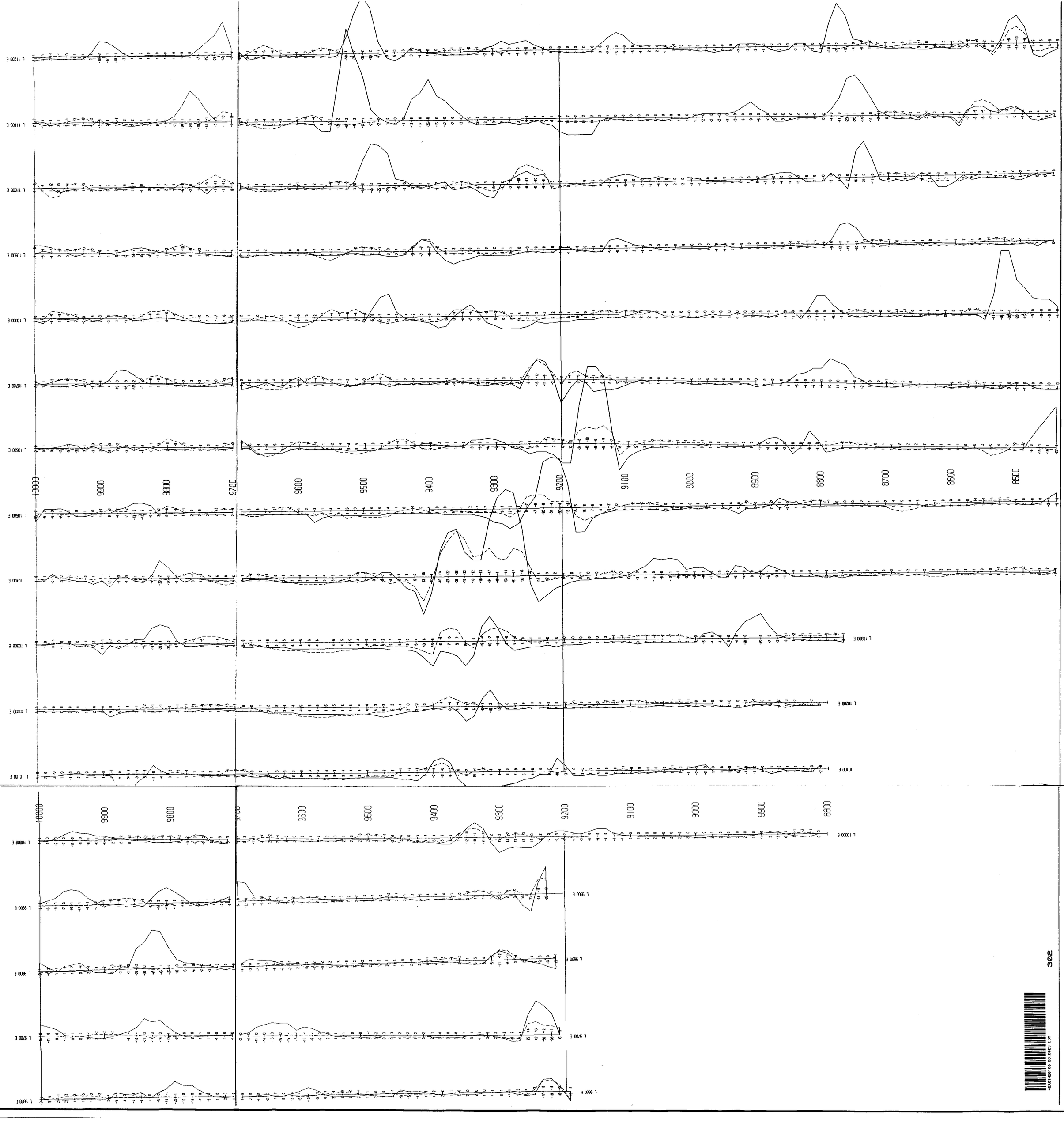
VIGRASS LAKE PROPERTY

FREQUENCY - 1777 HZ CABLE - 50 m

KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO

BATTLE MOUNTAIN (CANADA) INC.




10000
9900
9800
9700
9600
9500
9400
9300
9200
9100
9000
8900
8800
8700
8600
8500
L 11200 E
L 11100 E
L 11000 E
L 10900 E
L 10800 E
L 10700 E
L 10600 E
L 10500 E
L 10400 E
L 10300 E
L 10200 E
L 10100 E
L 10000 E
L 9900 E
L 9800 E
L 9700 E
L 9600 E
564730 E
302

KIRKLAND LAKE (CANADA) INC.

KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO

H.E.M. SURVEY & INTERPRETATION
VIGRASS LAKE PROPERTY

FREQUENCY = Corrected 3555 Hz. CABLE = 50m.

Compiled by : STRATAGEX LTD.
October, 1990.

N

EXPLANATION

MAX MIN CONDUCTORS :
- Definite
- Probable
- Possible

CONTINUITY :
- X Overburden
- Definite
- Probable
- Possible

564750 E

537500 N

566500 E

BASELINE

VIGRASS LAKE

H.E.P.C.

HWY No. 66

GAS LINE

O.N.R.

BLANCHE RIVER

SCALE 1:2,500

METRES

50 0 50 100

Claim(s) No. V-6 Date: MAY, 1990

Grid No. 75 - JV - 28 Val D'Or Geophysique

Y = 624/18 S.D/A Drawn By:

Scale: 1:2,500

BATTELLE MOLYNAS (CANADA) INC.

SCALE 1:25,000

METRES 1000 0 4000 METRES

1:2,500 SHEET 1:5,000 SHEET 1:10,000 SHEET 1:20,000 SHEET

KIRKLAND LAKE PROJECT
HSK Minerals Limited
VIGRASS LAKE PROPERTY
TOTAL FIELD MAGNETICS
GEOPHYSICAL INTERPRETATION
BATTLE MOUNTAIN (CANADA) INC.
Scale 1:2,500
METRES
EXPLANATION
MAGNETIC DOMAINS
MAG MIN. CONDUCTORS
CONTINUITY
Compiled by STRATAGEX LTD.
October, 1990
VIGRASS LAKE
BLANCHE RIVER
HWY. No 66
ESE PIPELINE
TRANS CANADA PIPELINE
BASE LINE 10000N
TIE LINE 09200 N
TIE LINE 09200 N
287

564750 E

566500 E

5328750 N

5327500 N

LAKE

LINE

NATURAL GAS

BLANCHE

RIVER

O.N.R.

H.E.R.C.

HWY. No. 66

E.P.C.

VIGRASS

LAKE

VIGRASS

LAKE

BASELINE

10700

10600

10500

10400

10300

10200

10100

9900

9800

9700

9600

9500

9400

9300

9100

9000

8900

8800

9200

8700

8600

8500

LEGEND

MAGNETIC PROFILES.

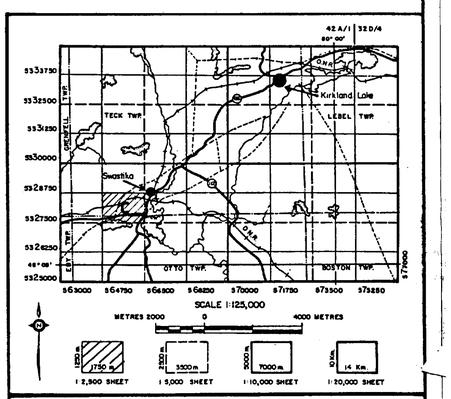
_____ Total Field — 1 cm. = 500 gamma

– – – – Vertical Gradient — 1 cm. = 50 gamma/metre

Relative zero for Total Field = 58000 gamma

Reading = Total Field - 58000 gamma

Instrument EDA OMNI PLUS MAGNETOMETER



BATTLE MOUNTAIN (CANADA) INC.

KIRKLAND LAKE PROJECT
HSK Minerals Limited
ONTARIO

VIGRASS LAKE PROPERTY

MAGNETIC SURVEY

TOTAL FIELD & GRADIENT PROFILES

PROJECT No.: 75 - JV - 28	DATA BY: Val d'Or Géophysique Ltée.
N.T.S.: 42A/1 B 32D/4	DRAWN BY: C. - B. Moreau
DRAWING No.: C / 1.2 MAP V-2	DATE: May 1990

SCALE: 1:2500

50 0 50 100 (metres)

VAL D'OR GÉOPHYSIQUE