# Geophysical and Geological Report

**GDD Electromagnetic / Magnetic Survey Instrumentation GDD Inc.**

**LED Mineral Claim Group**
Kamloops Mining Division
NTS: 82M002 / 82L092
Coordinates: 51° 02' N 120° 47' W

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**Owner:** Gordon Gutrath FMC 110608
**Field work by:** G. Gutrath
**Report by:** G. Gutrath P. Eng
**Date:** January 25, 2008

**BC Geological Survey Assessment Report 29599**
INTRODUCTION

The Geophysical Instrument used for this survey was built by Instrumentation GDD Inc. in Sainte-Foy, Quebec. It is referred to as a Beep Mat and is an electromagnetic instrument designed to detect conductive and/or magnetic minerals at a shallow depth. It consists of a short toboggan enclosing a probe and a reading unit attached to the operator. The operator pulls the probe over the ground to be explored with the reading unit taking continuous readings. If the probe encounters conductive and/or magnetic mineralization the reading unit produces a loud continuous series of beeps which immediately alerts the operator to the presence of an anomaly. By making many passes over the anomalous area from different directions the operator can determine the extent and trend of the anomaly. In addition, the reading unit records the intensity and nature, conductive, magnetic, or both, and the reading can then be recorded by the operator. A GPS instrument is used to record the location of an anomaly.

The purpose of this program was to test the various mineral showings on the LED Claim Group and immediate area to determine the response directly over the occurrence. Then the survey instrument (GDD) was tracked back and forth across the trend of the known mineralized zone to determine if the GDD unit could extend the mineralization under shallow overburden. In addition, the GDD unit was designed to have the probe (toboggan) pulled by the operator with the reading unit on an ATV. This allowed the roads connecting the various mineral occurrences to be surveyed very quickly.

Factors that assisted the survey was the very low level of Adams Lake in February allowing outcrop areas to be surveyed along the shoreline that would be covered by a much higher lake level during most of the year. The snow line was also unusually high, 700 to 800 m, allowing the ATV to be used, plus the majority of the outcrops in the surveyed areas were completely free of snow.

The survey was very successful in part because the GDD instrument worked flawlessly and was very rugged. In addition, this very short reconnaissance program produced some very interesting results that will assist in focusing the ongoing exploration program on the LED Claim Group.
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LOCATION AND ACCESS

The LED Claim Group is located on the east shore of Adams Lake 11 kilometres southeast from the south end of the lake. The head of Squam Bay at the mouth of Sinmax Creek is 7 kilometres northwest of the LED Claim Group.

There is no road access to the LED Claims. Present access is by boat from Woolford Point located on the east side of Adams Lake. Woolford Point is 2 kilometres north of the B.C. Government ferry that connects to the west side of Adams Lake and to the paved Holding Road. From the ferry it is 25 kilometres to Chase, a community of 2,000 people and a regional service centre.

During the early 1960s Jim Cobb, a rancher from Squam Bay, constructed a series of roads from a landing point on the shoreline within the LED 21 claims. These roads were built to allow access to a number of fields that he cleared, stretching along a wide bench from the Beca North area to LED Claim 18. Between 1978 and 1984 Cominco/Westmin built an extensive network of roads within the LED Claim Group that connect to the Cobb roads. All of these roads have been cleared by power saw and bushcutter for ATV access.

Backhoes, bulldozers and drill equipment can be moved to the property by a commercial tug service that is based at the ferry landing.

PHYSIOGRAPHY

The LED claims cover a steep, rugged area on the east side of Adams Lake from an elevation of 406 m (mean lake level) along the shoreline to 1,350 m along the east boundary of the claims. From LED 13 to LED 22 there are a number of deeply incised stream gullies. Only one of these, Beca Creek, flows a small volume of water year around.

The LED claims are on a westerly facing slope that receives much less precipitation than the west side of the lake. The predominant vegetation on the lower dry slopes is fir with a scattering of Ponderosa Pine. At the higher elevations, largely because of the 1933 forest fire that swept across the east side of the lake, second growth Jack Pine is predominant with patches of fir. Ninety percent of the Jack Pine and Ponderosa Pine have been killed by the Mountain Pine Beetle over the past five years. Every wind storm blows a number of these trees across the ATV trail resulting in a never ending job of clearing windfalls. The majority of the pine will be down over the next 5 to 10 years creating a serious forest fire hazard. Cedar is common in the stream gullies and wherever there is seepage. Cobb’s fields that were cleared for cattle grazing in the 1960s have been completed obscured by secondary fir that is now 8 m to 10 m tall.

The LED Claim Group is one of the few areas in the Adams Lake watershed that has never been logged.
PROPERTY

The LED Claim Group consists of the following legacy claims and cells.

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The Claims are outlined on LED Claim Group Map 1:5000.

The LED Claims are in the Kamloops Mining Division on Map Sheets 82M002 and 82L092.

REGIONAL GEOLOGY

The LED Claim Group lies within the Mississipian to lower Cambrian Age Eagle Bay Assemblage that is a belt approximately 100 kilometres long by 25 kilometres wide. Within the Eagle Bay Assemblage a Devonian Age formation of volcanic rocks ranging from andesites to rhyolites interbedded with sedimentary rocks starts in the North Barrier Lakes area, continues south eastward down the Squam Bay valley, crosses Adams Lake and continues through the LED claims to beyond Nikwikwai Creek. This formation has been altered to phyllites and chlorite-sericite-quartz schist plus numerous other schists of variable composition during green schist facies metamorphism and two major phases of folding. The majority of the massive sulfide mineral occurrences, including the Homestake
Mine in the Squam Bay valley, the nearby Rea deposit and the LED claim occurrences are located within this formation.

**PROPERTY GEOLOGY**

The principal guide for the regional and general property geology is Paper 1987-2 by Paul Schiarizza and V. A. Preto published by the BC Ministry of Energy and Mines. The LED Claim Area is outlined on the geology map that accompanies Paper 1987-2 and is Figure 2 in this report.

The overall trend of the Devonian age, Eagle Bay EBA formation that underlies the entire LED Claims is 135° to 145°. Starting from the north and extending south to LED claim 17 and just to the south of the Joe South Adit is EBA formation that is described by Schiarizza/Preto as follows: "Light silvery grey to medium greenish grey sericite-quartz phyllite and sericite-chlorite-quartz phyllite derived from felsic to intermediate volcanic and volcaniclastic rocks, including pyritic, feldspathic and coarsely fragmental varieties; lesser amounts of dark grey phyllite and siltstone, green chloritic phyllite, sericitic quartzite, and pyritic chert (exhalite?)."

Within this unit, starting on the shoreline to the south of the Joe North Adit and over a width of 150 m is a yellow-grey fissile sericite-quartz schist derived from rhyolite to dacite that extend southeastward to the LED 1 and 4 claims and continues into the McLeod Creek valley. It thickens going north eastward and on the LED 11 claim it forms a 350 m by 500 m yellow oxidized cliff face, 35° to vertical that is a local landmark. This same unit, over a width of 100 m to 150 m extends from the Cobb cabin area on the LED 21 claim south eastward to the north of the core racks.

On Preto et al Figure 4 Map (Paper 1987-2) starting on the shoreline approximately 1 kilometre north of the Joe South Adit is a thin orthogneiss sill of Devonian age referred to as Dgn. This sill subparallels the predominate southeasterly foliation and would exit the LED Claim Group in the area of LED 2. This sill has not been noted in outcrops along the shoreline or within the outcrop areas observed to date.

To the south, 50 m from the Joe Adit, is the footwall of EBA and the southeasterly trending contact with EBA AgM Preto et al differentiate this basal unit on Figure 2 as including granitic orthogneiss of late Devonian age. In the field this unit is distinctly different in outcrop from EBA to the north. To the south EBA AgM forms massive steep to vertical cliffs rising plus 100 m directly from the lake. There is no shoreline development for 3 kilometres to the south. The dark grey weathered outcrop is predominantly grit, rhyolites to dacites to andacite. All the units have undergone moderate to strong shearing 130° to 140°/30° to 40°NE. In the lower outcrops along the shoreline these are thin quartz veins swarms that subparallel the schistosity. The writer has done very little work in the area of this basal formation so the orthogneiss may very well be present.
GEOLOGY OF THE ADAMS PLATEAU-CLEARWATER-VAVENBY AREA

TO ACCOMPANY PAPER 1987-2
BY PAUL SCHIARRIZZA AND V.A. PRETO

GEOLOGY COMPILED BY PAUL SCHIARRIZZA BASED ON GEOLOGICAL MAPPING
PROPERTY MINERALIZATION

The majority of the mineral showings have been known since the 1920s. However, it was not until Paul J. Wojdak, a Cominco geologist, examined the area in 1977 that these occurrences were identified as having a volcanogenic origin and that the LED claims area had excellent geological potential to host volcanogenic massive sulfide ("VMS") deposits.

There are four VMS occurrences within the present LED Claim Group and two to the north of the claims. There is one sulfide occurrence that is not VMS but is a breccias quartz vein outside the LED Claim Group but is located on LED Claim 31. All the mineral occurrences are located on Map 1, Map 1A and Map 1B. Although these occurrences have not been geologically mapped in detail they are described under the section "Instrumentation GDD Electromagnetic/Magnetic Survey Results". Outside of the Yogi showing, Map 1B located and named by Cominco/Westmin the naming of the rest of the showings follow the MinFile: Joe (Glen), Beca (Tom) and the Elmoore-Wallace.

HISTORY

The first record of work in the LED Claim Group area was in 1929 on the Beca South occurrence. In 1929 a house trail starting near the Beca North was constructed to the Elmoore-Wallace property. A camp was built and underground work and the stockpiling of high-grade mineralization was carried out until 1933 when a forest fire starting in the McLeod Creek area burnt the entire east side of the valley, from the Adams Lake shoreline to the Adams Plateau to the east and to Fir Creek to the north. All the facilities at the Elmoore-Wallace property were destroyed by the fire. The underground work at the Joe mineralized area were also undertaken during this same 1929 - 1930's period.

The next important period of exploration in the LED Claim Group area was undertaken in 1966 by Buchanan Mines Limited on the Tom Claims (Beca North and South) and the Glen Claims (Joe North and South). Induced Polarization and ground magnetic surveys were carried out by Eagle Geophysics Ltd. and filed as assessment work. Buchanan also carried out a diamond drilling program but there is no record of the results. There were also a number of other exploration programs carried out during the 1960's and 1970's on claim groups adjoining and in the general area of the LED Claim Group.

In 1976 the shoreline mineral occurrences were examined by Cominco resulting in the Beca Claim Group being staked. The Beca Claims would have covered the entire LED Claim Group area. Cominco commenced a very systematic exploration program consisting of geophysical, geochemical and geological surveys as well as the construction of a very extensive road system. In 1979 Cominco completed seven drill holes. In 1982 Westmin entered into a joint venture agreement with Cominco. Between 1982 and 1984 Westmin conducted ongoing geophysical, geochemical and geological surveys and drilled 12 diamond drill holes. No further work was done by Cominco/Westmin after 1984.
In 1998 G. Gutrath began staking the LED Claims. The Cominco/Westmin road system was re-established, the Cobb Cabin refurbished for an exploration camp and a temporary tent camp erected on the LED 5 claim. Reconnaissance geological mapping and prospecting has been ongoing. The early survey grids by Buchanan Mines and Cominco/Westmin were relocated, cut out and GPS surveyed. All the diamond drill holes have been located and GPS surveyed. Considerable sampling and analytical work has been completed on a number of the mineral occurrences.

DESCRIPTION OF GEOPHYSICAL EQUIPMENT, FIELD OPERATION AND GEOLOGICAL EVALUATION

Geophysical Survey

The equipment used for the survey was an Instrumentation GDD Inc. instrument designed to detect conductive and/or magnetic mineralization at a shallow depth and radius of up to 3 metres. In addition to detecting the anomalous mineralization it also measures its intrinsic conductivity and magnetic susceptibility (magnetite content). The equipment is referred to as a Beep Mat and consists of a reading unit that is attached to the chest allowing anomalous results to be easily noted (within the reading unit are two rechargeable 6V batteries). Attached to the reading unit by a cable is a probe housed within a 3.8 kg plastic toboggan. The survey is carried out by dragging the toboggan (probe) behind the operator. If anomalous mineralization or scrap metal is detected the reading unit beeps and the more anomalous the material is, the more intense and frequent are the beeps. The toboggan can also be dragged behind an ATV and this method was used to rapidly survey, at least with one pass, all the roads below the snowline on the LED Claims. The toboggan could not be used during this survey coming down a steep hill because it would catch up with the ATV. This did not apply if the operator was walking down a steep hill and could control the toboggan. The probe is very sensitive, even being dragged at 5 to 10 km/h behind the ATV, a single flat rusty tin can will produce a very recognizable beep and alert the operator that an anomalous object has been detected. It is then necessary to get off the ATV and track the probe back and forth until the cause or at least the location of the anomaly is determined.

A factor that is important in the survey is “initialization”. Every 15 minutes during the survey it is necessary to lift the probe/toboggan with one hand over the operator’s head. There is no difficulty in doing this except it can be a challenge on steep cliffs. In addition, it was found necessary to initialize if the probe/toboggan was dragged over 0.5 to 1 m windfall and lost contact with the ground.

The anomalous results are read directly from the reading unit from a display on the top of the unit.

LFR/HFR is the low frequency and high frequency response. This reading increases near a conductor. If there is magnetite the instrument displays MAG instead of LFR.

MAG is the magnetic value and increases in the presence of magnetite.

Rt % is the Ratio value. 0% is a poor conductor and 100% an excellent conductor. If magnetite is present the R+ = xxx appears on the display.
Example reading recorded:

757 / 238 / 31\%  HFR/MAG/RI% anomalous conductor
-3700/-3500/xxx  HFR/MAG/xxx anomalous magnetic

These anomalous readings produce a very loud continuous series of 'beeps'.

-46/-26/x HFR/MAG x  reading not anomalous and there is no ‘beep’.

A total of 12 kilometres were surveyed by the GDD instrument.

More information on the GDD unit and operation is under Appendix A.

GPS Survey

The GPS used was a Garmin map 76S with an external antenna on a fiberglass mast secured in a survey vest pocket. The antenna is attached to a cable to the GPS unit that is strapped to the forearm. The GPS is kept on throughout the survey for quicker and more accurate readings.

All GDD anomalies were surveyed by the GPS and the UTM coordinates recorded. The anomalous areas were marked on the ground for future evaluation.

Geological Evaluation of GDD Anomalies

Whenever an anomaly was recorded during the survey there was an immediately attempt to evaluate the geology and related mineralization that caused the anomaly. However, all the anomalies were followed up in 2007 to determine the cause of the anomalies in greater detail and this often required hand trenching. The cause of four of the anomalies has not been determined and additional trenching will be required.

Instrumentation GDD Electromagnetic/Magnetic Survey Results and Geological Interpretation of Anomalies

There are three map sheets showing the track of the GDD Electromagnetic/Magnetic (“GDD”) survey.

Map 1  1:5000 that covers the entire LED Claim Group. The following map areas are outlined on Map 1:
Map 1A:  1:000 Joe North and Joe South mineralized area
Map 1B:  1:000 Yogi mineralized area

The areas that are GDD anomalous are numbered (for example, Area 2). The specific anomaly in the Area is located by GPS Waypoint UTM coordinates. The geological cause of the anomalies and a brief description of the mineral occurrences and general geology are covered under this section.
This anomaly was discovered by dragging the GDD instrument up the steep trail behind the ATV. The anomaly was then located by traversing the area on foot with very close loops. The anomaly was duplicated and is a strong GDD anomalous conductor 2659/1398/53°, but very localized over 0.5 m².

The ground was frozen making it impossible to trench the area by hand to determine the cause of the anomaly while still having the GDD instrument available to pinpoint the actual source of the anomaly.

In June, 2008 a shallow trench 2 m by 4 m by 0.5 m deep was dug over the anomalous area without reaching bedrock or finding anything that might cause the anomaly.

Before digging deeper the trenched material will be screened to determine if a piece of scrap metal was dug up but not noted. A small piece of metal at shallow depth could cause an anomaly of this magnitude.

The GDD probe was tracked down the road from DDH82-7 to WP97 passing through yellow-orange silicified pyritic sericite schist outcrops exposed along the southeast side of the road for over 150 m. Many prospective highly oxidized pyrite rich sections were tested directly by the GDD probe without finding any anomalies. The geology in this section is the same as surveyed in Area 3.

At WP97 a very localized (0.5 m²) GDD magnetic anomaly of -708/-648/xxx was encountered in the road. WP97 is just at the start of the steep +20° to 30° outcrop area to the east and the bench 15° to the west. There is no outcrop at the WP97 anomaly or on the bench to the west.

In order to find the cause of the anomaly a pick and shovel were brought up to the site of the anomaly from the Cobb Cabin. Fortunately, the ground was not completely frozen and at a depth of 20 cm a 35 cm diameter round basalt float boulder with a high magnetite content was encountered. This boulder was the cause of the GDD magnetic anomaly.

There are no waypoints noted on the survey track. It starts 400 m on the ATV trail south of the core racks and goes up a glacial till ridge to the claims line. The survey track follows the claim line that contours across a steep slope of +20° to +30° east, with outcrop faces that are greater than +35° to DDH82-7. There is a minimum of 50% outcrop
along this track. The outcrop is highly sheared altered rhyolite that in weathered outcrop is grey to yellow fissile sericite quartz schist with a pyrite content of 2% to 5%. Irregular quartz veins are common subparallel to the regional 130°/15° to 30° NE shearing attitude.

In outcrop it is very difficult to get fresh material from the deeply weathered surface. The GDD survey was considered a good tool to penetrate the surface weathering to see if there was any concentration of magnetic or conductive sulfides. This survey track did not locate any GDD anomalies.

A sphalerite galena float boulder is reported to have been found at approximately UTM 565700N/309630E on the side of the road. The boulder assayed 20% lead, 6% zinc and 340 ppm silver (Cominco – Paul Wojdak 1979). The GDD survey made four loops on the road from the Core Racks south to the first creek gully without finding any GDD anomalies. In addition, the survey track on the bench to the east of the float boulder location did not locate anomalies. It is possible that a high galena sphalerite assemblage with low pyrite and pyrrhotite was not conductive. This is the case with similar mineralization found at the Beca South showing, Area 5.

From the Cobb Cabin area the GDD survey tracked the shoreline to WP154, the Beca South Adit. At least 50% of this track is sericite, chlorite, quartz schist with a regional schistosity of 130° to 140°/50° - 30°NE. Pyrite is from 1% - 2% but there are a number of oxidized siliceous pyritic zones up to 4 m wide that parallel the schistosity. The pyrite can range from 5% - 15% with more massive irregular lenses. Minor amounts of galena with clots of pyrite in irregular narrow discontinuous quartz veins subparallel the schistosity. There were no GDD conductors or magnetic anomalies in the outcrop areas.

**Beca South Adit**

This portal to the adit is 5m east of WP154. The drift is caved 2 sets in from the portal. However, the mineralized zone is exposed on the south wall of the portal. The massive sulfide lens is 0.5 m wide and consists of pyrrhotite, pyrite, arsenopyrite and lesser amounts of galena and sphalerite. This lens can be traced into the drift where it lenses out over 3 - 4 m. At the portal the lens continues south for 1 m and then narrows to a 5 cm to 10 cm wide discontinuous veins that can be traced along the face of the south trending vertical cliff. To the north of the portal similar thin irregular veins continue down dip on the steep face of the cliff. The veinlets are composed of galena, sphalerite and pyrite.

The GDD probe was held against the massive sulfide lens at the portal and it is an anomalous conductor, 131/450/34%. The probe was also held against the galena/sphalerite veining on both the up dip and down dip vein extensions and they were not anomalous. Fifteen metres south of the adit near the top of the cliff is a trench exposing
the zone. Again the mineralization is galena, sphalerite with lesser pyrite. The vein is 10 cm to 20 cm wide and can be traced for 8 m in the trench. A large pile of the mineralization has been stacked next to the trench. The GDD probe was pulled along the length of the trench and over the stacked mineralization with no anomalous results.

**Beca North**

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The Beca North is located by WP180 at the west end of a trench blasted in outcrop for a distance of 12 m and over a width of 2.5 m. The east face of the trench is 4 m high. The sulfide mineralized zone can be seen on the south wall of the trench. The orange oxidized pyrite quartz zone is 0.5 m wide and within this zone is a 10 cm to 15 cm thick section consisting of galena and pyrite with minor sphalerite. This mineralized zone can be traced for the length of the trench trending 100°/17° NE subparalleling the regional shearing of 120° to 130°/15° to 30° NE. The GDD probe was held against the mineralized zone and it is an anomalous conductor of 261/104/40%. A small pile of massive sulfide mineralization at the mouth of the trench was also anomalous, 418/87/20%.

**Elmoore-Wallace**

<table>
<thead>
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<th>North</th>
<th>Elevation±</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>5</td>
<td>310701</td>
<td>5658145</td>
<td>980 m</td>
</tr>
</tbody>
</table>

WP6 is the location of the Elmoore-Wallace mineral occurrence (MinFile 082M-019). The GDD instrument and probe had been tracked up the trail by the ATV to the switchback where the burnt 1929 camp is located. At this point there was 20 cm of snow and the ATV could not go any further. The track was continued on snowshoes up to WP5 that is located at the base of the outcrop cliff where the Wallace vein is exposed in a rock cut. Galena, chalcopyrite, sphalerite and pyrite mineralization are semi-massive to banded in a quart breccia vein zone. The widest part of the vein is 1.5 m at WP5 and narrows within a few metres to the north but can be traced over 7 m to the south before it is obscured by overburden. The zone trends 185° to 95° with dip of 70° to 80° to the east. The host rock is Eagle Bay formation massive dark grey-green chloritic andesite.

The GDD probe was taken back and forth across the dump that was covered with 30 cm to 50 cm of snow. On the surface of the dump there are numerous boulders of massive sulfides from the vein breccia zone but under the snow cover they were not GDD anomalous. When the GDD probe was placed on the widest part of the vein (no snow) it gave a strong anomalous conductor of 1299/681/52% on the foot wall while the hanging wall was not anomalous. At 7 m to the south the vein gave an anomalous reading of 763/476/61%. Twenty metres north of WP5 in massive outcrop is a narrow trench across the breccia vein zone to a depth of 1 m. The breccias zone is 1 m wide and is not mineralized and was not GDD anomalous. A deep bulldozer trench with an east wall 5 m to 7 m high has been pushed south from WP5. The GDD was tracked through the trench but with no anomalous results.
Map 1A: Joe North and South Mineralized Zones

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>125</td>
<td>309171</td>
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</table>

WP125 is a 4 m patch of outcrop on the shoreline. Strongly schistose, yellow fissile sericitic shear zone envelopes 10 cm to 20 cm of highly oxidized pyrite lenses (5%-10%Py) subparalleling shearing at 130°/20° NE.

<table>
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<tbody>
<tr>
<td>127</td>
<td>309140</td>
<td>5655731</td>
<td>412 m</td>
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</table>

Two pits (1920 - 30s) 2 m by 2 m have been sunk on the south side of a prominent outcrop ridge that starts at the shoreline and extends southeasterly 30 m. The pits were sunk on a highly oxidized pyritic zone with 15% to 20% pyrite in yellow fissile sericite schists (135°/30°NE).

The outcrop at WP125 and the mineralized zone and extension of the zone at WP126 to WP129 were crossed numerous times by the survey. The pyritic zones were found not to be anomalous.

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<tr>
<td>130</td>
<td>309131</td>
<td>5655723</td>
<td>407 m</td>
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</table>

This location is at the mouth of a shallow gully representing a strong shear zone (fault?) at 148°/80° N and is not GDD anomalous. Five metres south of WP130 is a highly oxidized sulfide shear zone 0.3 m wide that gives a strong magnetic GDD anomaly: -1696/-1589/xxx to -3815/-3587/xxx.

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<tr>
<td>2</td>
<td>131</td>
<td>309098</td>
<td>5655692</td>
<td>409 m</td>
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</tbody>
</table>

WP131 marks a strong oxidized pyritic sericite shear zone enveloping a 1.5 m to 2 m (true width) dark manganese stained sulfide zone with lenses and stringers of pyrite, magnetite, pyrrhotite and quartz veinlets with minor galena. WP131 is the hanging wall of this zone that continues to the south. The 1.5 m to 2 m wide zone is GDD magnetic anomalous -610/-569 xx and -988/-937 xx.

<table>
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<tr>
<td>3</td>
<td>132</td>
<td>309086</td>
<td>5655630</td>
<td>413 m</td>
</tr>
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</table>

Area 3 is a continuation of the outcrop at Area 2. The survey track followed the highly schistose quartz veined, manganese stained face of the outcrop. WP132 is the foot wall of the zone with dark stained, pyrite-magnetite rich zones from 1 m to 3 m thick. This mineralized zone gives a strong GDD magnetic response of -646/-577/xxx and -630/-574/xxx.
Oxidized float boulders 20 cm to 0.40 cm in diameter containing 20% - 40% sulfides occur on the beach. This float gave a strong GDD conductive anomalous response of $165/180/30\%$ and $1131/213/19\%$.

Area 5 is 100 m at 120° from Area 4. The GDD survey went from the shoreline across a talus slope and steep outcrop face that marks the edge of the broad bench that extends to the east. At WP136, located on the bench in grassland with large, widely spaced fir trees, is a very localized GDD magnetic anomaly, $-614/-573/xxx$. The anomaly has not been trenched and there is no obvious reason for the anomaly on surface.

Dark orange, yellow highly oxidized manganese stained zone 1 m wide in sericite schist trending 140°/30° NE. This zone is GDD conductive at $1009/388/38\%$. Three metres to the west from WP134 and close to the waters edge is a 20 cm wide sulfide lens within the same 1.5 m oxide shear zone. The lens is GDD conductive, $1179/537/46\%$. This lens is 8 m long and pinches out to the SE and NW. The widest section is 30 cm to 40 cm.

A dark brown oxidized zone is strongly sheared pyritic sericite chlorite schist with irregular narrow subparallel quartz veinlets associated with small amounts of galena. A narrow 20 cm wide lens in the much larger 2 m wide oxidized zone is GDD conductive, $522/90/17\%$ and $130/191/12\%$. The sulfides are pyrite and pyrrhotite with minor galena.

Highly fissile, yellow, pyritic (5%-10%) sericite schist. The zone is 2 m wide and is not GDD anomalous.
This is the hanging wall of a highly sheared dark brown, manganese stained oxidized sulfide zone. Within the zone is a small sulfide lens that is GDD conductive, 316/223/71%.

This is the foot wall side of the same zone described under WP27. The zone is 2 m wide and is highly GDD conductive, 825/160/7%.

Foot wall of a dark manganese stained 0.5 m to 1 m wide sulfide zone within an outcrop of dark grey weathered massive chlorite schist with quartz veining. The sulfide zone is GDD conductive over 0.5 m, 468/249/53% and 2390/677/28%.

This is the same massive outcrop as described under WP24. Dark manganese stained lens of magnetite with lesser pyrrhotite and pyrite is strongly GDD magnetic anomalous, -1192/-1100/xxx.

Highly oxidized dark shear zone that is GDD magnetic anomalous, -621/-595/xxx. One metre to the south of this GDD reading is a narrow 20 cm sulfide lens that is a GDD anomalous conductor, 793/339/43%.

Outcrop area of pyritic sericite schist enveloping a dark brown massive sulfide zone. It is an anomalous GDD conductor, 29191/23742/81%. This is within an old shallow trenched area with numerous small diameter drill holes. A second sulfide mineralized zone in the same area is also an anomalous GDD conductor, 911/1199/22%.
This is the same oxidized pyritic sericite chlorite shear 30 cm wide as WP22 and is a GDD anomalous conductor, 1637/759/46%.

**Joe North Adit**

From WP22 and WP33 to WP34 is dump material from the Joe North Adit. The dump is GDD magnetic anomalous, -503/-471/xxx and similar magnetic readings occur over the entire dump for 15 m and continue right to the portal.

WP34 is 4 m to 5 m from the portal of the Joe North Adit. The adit is in good condition with no timbering at the portal. During the GDD survey the operator could only go 5 m to 8 m into the adit for lack of a light and concerns about the quality of the air. However, the GDD instrument was able to test the sulfide zone that is evident on the back of the tunnel. The zone is approximately 20 cm to 30 cm wide and is highly GDD magnetic anomalous -3700/-3500/xxx. The sulfides are magnetite, pyrrhotite, pyrite, minor shalerite and the occasional bleb of galena associated with quartz.

WP 35 is located at the west end of a hand dug trench in fissile, manganese stained dark weathering schist trending 135°/20° - 30° NE. Irregular lenses of massive sulfides; pyrrhotite, magnetite, pyrite with minor chalcopyrite, galena and sphalerite occur in the trench and are GDD anomalous conductors, 7800/588/75%. Readings along the bottom of the trench indicate sulfide content of 10% to 30%.

WP36 is located at the southeast end of the trench and at the end of the outcrop. The southeast strike of the sulfide zone is covered by 10 cm of moss and does indicate a moderate GDD magnetic anomaly of -161/-141/xxx. From WP36 the GDD survey crossed the southeasterly strike of the mineralized zone a number of times in an area of thin overburden and talus. There were no anomalous readings.
WP21 is located near the waters edge on an outcrop of dark manganese stained fissile schist that envelopes a lens of massive sulfides that is a GDD anomalous conductor, 757/238/31%. This appears to be the footwall of the mineralized zone described under WP36.

WP19 is at the base of a large outcrop point. It is the foot wall of a strong 0.75 m wide dark orange oxidized sulfide zone and is GDD magnetic anomalous, -341/-138/xx.

WP20 is at the top of an outcrop bluff. It is a dark manganese stained schist 135°/20° - 30° NE and is cut my narrow dark oxidized sulfide zones that subparallel the schistosity. The zones are strongly GDD anomalous conductors of 92/62/68% to 58/55/96%. One zone can be traced for 5 m and is a maximum of 25 cm wide. It lenses out to the northwest and is covered by thin overburden to the southeast.

WP17 is on a dump of highly oxidized material from a large pit/trench 6 m long, 2 m wide and ±2 m deep. The outcrop is a grey fissile schist cut by subparallel irregular quartz veins up to 25 cm wide. The dump and trench are not GDD anomalous. On the north side of the dump are a number of float boulders from 15 cm to 30 cm in diameter. They are dark manganese stained, have a high sulfide content and are GDD anomalous conductors, 1659/1275/72%, 20967/16112/76%, and 39/44/100%. This is also an area of active water seepage even in February.

WP18 locates an 8 m wide dark platy argillite bed trending 135°/30° NE. The bed has some associated graphite and fine pyrite and is not GDD anomalous.

WP16 is a highly oxidized pyritic zone 50 cm wide. It is not GDD anomalous.
Joe South Adit

<table>
<thead>
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<tr>
<td>12</td>
<td>15</td>
<td>308992</td>
<td>5655159</td>
<td>406 m</td>
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</table>

The Joe South Adit is the most obvious of the mineralized zones and associated workings. The highly oxidized orange yellow dump is at the high water mark and the mouth of the adit is readily visible from the lake.

Massive sulfide mineralization occurs as a continuous lens in the short tunnel over a width of 0.5 m to 1 m. The sulfides are associated with quartz in a chlorite sericite schist. The mineralization subparallels the shearing 130°/30° NE. By holding the GDD probe on the sulfide zone readings of 167/38/23% and 333/64/19% were obtained. At the portal is a sulfide rubble zone on the floor and the reading was 60/7/12%. In an undercut outside the portal the reading was 34/2/7%. On the foot wall of the zone along the strike of the adit zone and 5 m from the lake is a sulfide lens that is a GDD anomalous conductor, 49/19/49%. The hanging wall is dark orange manganese stained and is highly pyritic 5%–15% but not GDD anomalous.

The sulfide lens in the tunnel is massive often banded pyrite with pyrrhotite and minor chalcopyrite, galena and sphalerite.

To the south of the Joe South Adit area are massive steep +40° cliffs that are primarily chlorite quartz schist of grit to andesite origin. The cliffs rise directly from the lake at +40° and are continuous for 3 kilometres to the south.

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<td>13</td>
<td>38</td>
<td>309144</td>
<td>5655321</td>
<td>457 m</td>
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</table>

WP38 marks an old pit 1.5 m x 1.5 m x 1.5 m deep that was blasted into a quartz vein-sulfide zone trending 140°/35° NE. The sulfide zone is a GDD anomalous conductor. The hanging wall is 78/56/71% and the bottom of the pit is 390/231/59% and 747/474/63%. The hanging wall is a strongly sheared chlorite sericite schist with course feldspar phenocysts. One metre to the southeast of the pit is a dark manganese stained oxide zone that is a GDD anomalous conductor over 1.5 m, 131/1/4% to 59/20/35%. At 2 m from the pit, where outcrop is covered by shallow soil and moss in the order of 10 cm, there is no GDD conductor. The survey crosses numerous times the strike of the sulfide zone in outcrop covered by shallow, 10 cm to 30 cm, overburden going towards WP39. The GDD instrument did not detect any anomalous mineralization.

The GDD probe was tracked over the top of the drift on surface and looped back and forth across the strike of the sulfide zone to the southeast without any anomalous response.
Waypoint East North Elevation ±
39 309162 5655316 461 m

WP39 marks a sulfide zone 0.5 m to 0.7 m wide in a shallow bulldozer trench. The hanging wall of the zone is a strong GDD magnetic anomaly, -524/-425/xxx. The central part of the zone is a dark oxidized orange and is a GDD anomalous conductor, 694/299/43%.

The sulfide mineralization at WP38 and WP39 is a predominantly pyrite and pyrrhotite with lesser chalcopyrite, galena and sphalerite.

Going to the southeastern from the trench at WP39 the overburden is shallow, 10 cm to 1 m and the strike of the sulfide zone was crossed numerous times but there were no GDD anomalies.

Waypoint East North Elevation ±
51 309283 5655276 510 m

WP51 is located on the south side of a switchback on the ATV trail. The original road work exposed a massive sulfide zone very similar to the mineralization in the trench at Area 13, WP39. The sulfides are in a dark brown oxidized zone over a width of 1 m and exposed along the edge of the road for 4 m. The GDD anomalous conductive readings range along the zone from 67/1/1%, 82/21/25% to 184/195/51%.

Waypoint East North Elevation ±
50 309320 5655299 516 m

A small, massive, highly oxidized sulfide zone is poorly exposed in the middle of the road where it goes south from the forks. The zone is a GDD magnetic anomaly, -282/-260/xxx.

Waypoint East North Elevation ±
54 309299 5655223 523 m

WP54 is a very localized, moderate GDD magnetic anomaly, -125/-102/xxx 12 m west of the road and WP49 (Area 16) which is a strong GDD magnetic anomaly. WP54 is in undisturbed grassland with mature fir trees. A shallow trench 1 m x 1 m x 0.3 m deep has been dug in overburden to try and determine the course of the anomaly but without success.

Waypoint East North Elevation ±
55 309290 5655205 521 m

WP55 marks a strong very localized GDD magnetic anomaly, -175/-1688/xxx. This location is very similar to WP54 but there is more angular dark grey chlorite schist rubble on surface. A shallow trench 30 cm to 40 cm deep
and 1 m x 1.5 m has been dug on the anomalous area. However, nothing was found that would indicate the cause of the anomaly.

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<tr>
<td>16</td>
<td>47</td>
<td>309305</td>
<td>5655188</td>
<td>527 m</td>
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</table>

WP47 marks a strong GDD magnetic anomaly, -1499/-1409/xxx in the middle of the road. There was no evidence of mineralization on surface but shallow hand trenching exposed massive, dark, deeply oxidized sulfides. This sulfide zone is deeply weathered and it is very difficult to get a fresh sample. Between WP47 and WP49 (309311E 5655227N) there are magnetic dark weather sulfide fragments along the road that may have been spread by the bulldozer during the road construction from the WP47 occurrence.

Map 1B: Yogi Mineral Showings

<table>
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<td>652 m</td>
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<tr>
<td>116</td>
<td>116</td>
<td>309861</td>
<td>5653486</td>
<td>670 m</td>
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Between WP195 and WP116 on the east side of the Lower Road is a strong GDD anomalous conductor. Five GDD readings recorded over a distance of 50 m are as follows: 23/6/24%, 110/73/67%, 90/76/86%, 15/12/84 to 91% and 148/103/69%. These readings are from a massive silicified, pyritic-pyrrhotite lens with lesser chalcopyrite, galena and sphalerite. This sulfide zone was completely missed in the preliminary work on the Yogi because it is largely covered with stuff and dead timber from the steep east bank of the road.

<table>
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<tr>
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<tr>
<td>2</td>
<td>111</td>
<td>309908</td>
<td>5653338</td>
<td>695</td>
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The shallow bulldozer trench that extends across the road at WP111 is dark orange-yellow stained sericite quartz schist. In the south end of the trench is a massive sulfide lens that is exposed over 1 m and a width of 0.5 m. It is a GDD anomalous conductor, 220/33/15%. The mineralization is pyrite, pyrrhotite with lesser chalcopyrite and sphalerite and minor galena. The outcrop area to the south of WP111 was surveyed in detail with only patchy shallow overburden in the range of 4 cm to 20 cm.

<table>
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<th>Waypoint</th>
<th>East</th>
<th>North</th>
<th>Elevation ±</th>
</tr>
</thead>
<tbody>
<tr>
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<td>309911</td>
<td>5653345</td>
<td>652</td>
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</tbody>
</table>

WP113 marks a small area of dark brown oxidized sulfides over 1 m². This area is a GDD anomalous conductor, 301/3/1% to 5%.
Going south on the road from WP116 the outcrop on the east side of the road and in the very steep road/trench of continuous outcrop going to WP111 is a yellow-oxide stained silicified pyritized sericite schist. It is not GDD anomalous.

CONCLUSIONS

The GDD geophysical survey was a reconnaissance test program to determine if this survey would extend the known massive sulfide zones under shallow overburden. From the results, shallow overburden 10 cm to 20 cm deep does mask the sulfide zones that are very anomalous when completely exposed. This is a very generalized comment and applies in most cases on the LED Claim Group but a notable exception was the magnetic anomaly on Map 1, Area 2 WP97. The cause of this very localized anomaly was a 35 cm diameter magnetic rich basalt boulder at a depth of 20 cm.

The GDD survey did result in the discovery of one new massive sulfide zone on Map 1, Area 16, WP47 and WP49. This strong magnetic zone was found in the middle of the ATV trail. Erratic high readings were noted between WP47 and WP49 over a distance of 20 m. Shallow trenching uncovered highly oxidized massive sulfides at a depth of 10 cm to 20 cm.

The shoreline track of the GDD survey passed over a number of highly oxidized zones from 1 m to 5 m wide with 2% to 5% disseminated pyrite with irregular small massive pyrite lenses. These zones are not GDD conductors.

The shoreline survey did emphasize the difference between the Joe mineralized area and the Beca mineralized area. The Joe mineralized area is in a foot wall sericite-quartz schist (rhyolite) formation that is duplicated a number of times in a package of sericite-chlorite quartz schist (volcanoclastics) that extends north to the Beca North. The Beca mineralized area represents the hanging wall of this highly sheared and altered assemblage of volcanic.

The GDD survey of the Beca mineralized area located two anomalous conductors, and both were directly related to the Beca North and Beca South massive sulfide occurrences. The GDD survey of the Joe mineralized areas located ten conductors or magnetic anomalies over 400 m of shoreline and may well extend another 150 m considering anomalous float boulders in the most northerly anomalous zone. The core of these anomalies extends for 200 m and is related to the altered and sheared rhyolite formation. The true width of this zone would be in the order of 100 m.

It is concluded the Joe mineralized area extending southeast to the massive sulfide discovery at Area 16, Map 1A warrants more detailed exploration. Additional work is required on a number of the GDD anomalous mineral occurrences we well as determining the cause of the unexplained anomalies.
RECOMMENDATIONS

Fill in the existing grid with line spacing at 50 m to cross line 3E and extend the cross lines to the southwest not more than 200 m. To the northeast the lines should extend 300 m. The 50 m spaced cross lines should be extended to the northwest on a new baseline to cover as far north as Area 2, Map 1A.

Map the outcrop geology on a scale of 1:1000. Sample and analyze all mineral occurrences.

Carry out an EM16 and a magnetometer survey on the grid.

Trench and sample the massive sulfide zone Map 1A, Area 16.

Additional sampling is required for a number of the GDD anomalous mineral occurrences.

Trench the following GDD conductors:

- Map 1, Area 1, WP 140
- Map 1A, Area 5, WP136
- Map 1A, Area 15, WP 45 and WP 55

Respectfully submitted,

[Signature]

Gordon G. Gutrath, P.Eng.
ENGINEER'S CERTIFICATE

I, GORDON GUTRATH, of 4482 Quesnel Drive in the city of Vancouver in the Province of British Columbia, DO HEREBY CERTIFY:-

1. That I am a geologist with a business address of 4482 Quesnel Drive, Vancouver, BC V6L 2X6

2. That I am a graduate of the University of British Columbia where I obtained by B.Sc., in geological science in 1960.

3. That I am a Registered Professional Engineer in the Geological Section of the Association of Professional Engineers in the Province of British Columbia.

4. That I have practiced my profession as a geologist for the past forty-eight years.

Gordon C. Gutrath, B.Sc., P.Eng.

DATED at the city of Vancouver, Province of British Columbia, this 8th day of February, 2008.
APPENDIX A: INSTRUMENTATION GDD INC. SUMMARIZED MANUAL OF EQUIPMENT, OPERATION AND INTERPRETATION OF SURVEY RESULTS
1. INTRODUCTION

This manual is intended for geologists and prospectors. It concerns the Beep Mat, model BM4+. However, the general theory of the Beep Mat can be used to better understand any previous model.

1.1 Brief Description of the Beep Mat

The Beep Mat is a simple and efficient electromagnetic prospecting instrument adapted to the search of outcrops and/or boulders containing conductive and/or magnetic minerals. It basically consists of a sleigh-shaped short probe and a reading unit. For prospecting, you pull the probe on the ground to be explored. The Beep Mat takes continuous readings while you walk and sends out a distinctive audible signal when detecting a conductive or a magnetic object in a radius of up to 3 meters. The Beep Mat directly detects and signals the presence of ores, even slightly conductive, containing chalcopyrite, galena, pentlandite, bornite and chalcostite. It also detects native metals (copper, silver, gold) as well as generally barren conductive bodies (pyrite, graphite and pyrrhotite), but which may contain precious ores such as gold or zinc (sphalerite), which are themselves non-conductive. Besides detecting conductors, the Beep Mat measures their intrinsic conductivity and their magnetic susceptibility (magnetite content). This helps geologists and geophysicists better interpret others geophysical and geological surveys.

1.2 Beep Mat Components

When you receive your Beep Mat, make sure that it contains all components shown on Illustration 1. If not, please contact Instrumentation GDD Inc. Pay special attention to the terminology used on Illustration 1 since it will be used throughout this manual.

The following optional components may also be included:

* a dumping cable;
* an external beeper;
* a protective plate under the shell;
* a 17-feet cable for winter.
1.3 Specifications

Power supply: 2 rechargeable 6-V batteries
Daily autonomy: up to 10 hours
Memory capacity: 3,300 readings
Weight: Reading unit: 1.9 kg
Probe: 3.8 kg
Size: Reading unit: 18 x 20 x 6.4 cm
Probe: 30 x 91 x 7.6 cm
Operating temperature: from -20 °C to 40 °C
Humidity: can be operated on rainy, foggy or snowy days
How to use the Beep Mat

A) Connect the probe (Beep Mat) to the back of the reading unit.

B) Press and hold [ON] until the first sound signal stops, then release it. "Standby" will then appear on the display indicating that the probe is connected and warming up. If possible, it is recommended to warm up the instrument at least half an hour before beginning the survey. It is possible to use the Beep Mat without warming it. However, the probe won’t be stable and once in a while, false signals will probably occur. To avoid confusion in this case, and to confirm the presence of a real conductor, the user will have to re-initialize the Beep Mat (see C) and put the probe on the ground over the area where it might have a conductor. If it beeps, there is a real conductor; if not, the probe has given a false signal because it hasn’t been warmed up properly (standby).

C) To begin the survey, you have to put the probe away from any conductive material by lifting it vertically above your head so as to avoid ground effects. To do that, initialize the reading unit by pressing quickly on the [ON] key (pump it once). Until this moment, you will have 4 seconds to put the probe above your head. A Beep will be heard for each of the first 4 seconds. The actual initialization occurs when the two consecutive beeps are heard at the fifth second. The 5-second delay will give the operator the opportunity to pick the probe with his two hands, so as to secure a better grip.

D) After every 15 minutes of use, the instrument will signal by a repetitive beep and a visual message ("Please re-initialize") that the instrument needs to be reinitialized. The reinitialization procedure is done in order to always achieve maximum efficiency. Repeat step C before continuing the survey. It is necessary to re-initialize the Beep Mat periodically. The default re initialization time is 15 minutes. However, in some special conditions, it may be more practical to increase the re-initialization time to 30 minutes, for example when surveying with an ATV or a snowmobile. To increase the re-initialization time to 30 minutes, press on the [MODE] key twice. The following message will appear on the screen: 15 minutes. Use either [1] or [1] to change the re-initialization time from 15 to 30 minutes, and vice versa. When the 30-minute re-initialization time is chosen, the initialization time will automatically increase from 5 sec. to 20 sec. This delay during the initialization will allow the operator to move behind the ATV or snowmobile, to lift the probe or sleight vertically in the air with his two hands before the two beeps are heard.

E) To shut off the instrument, press and hold [ON] until OFF appears on the display (about 5 sec.), then release it.

NOTE: If the instrument is not used during two hours, it will automatically turn itself off.
F) The instrument should be recharged every night from a 110-V socket or a 12-V battery (depending on the model). Full charge takes between 4 to 6 hours. When not in use for a long period, do not keep the instrument on charge. The charger is to be connected to the same outlet as the cable of the probe. On demand, GDD can modify the charger to be able to plug it on a 220-V.

G) [X] key
This key will neutralize the sound signal of the unit for a period of up to 5 minutes. The sound signal will come back if you press this key again, if any other key is pressed or if the 5-minute period is over. NOTE: To indicate that the sound signal has been neutralized, a black rectangle will appear on the display, in the right corner.

H) The default alarm levels for the Beep Mat when you first turn it on are: LFR: 2 Hz, HFR: 4 Hz, MAG: 400 Hz and M.C. 99%. These default parameters should not be changed unless you are an experienced user (if you still need to change them, see section I below). Be aware that if for example you increase the HFR alarm level, it will reduce substantially the depth at which the Beep Mat is able to detect a conductor.

I) To change the value of any parameter, press on [LEVEL] until you see the value you want to change. Once there, press on the arrow keys, [↑] or [↓], to increase or decrease the value of each parameter.
NOTE: If at any time you become confused with those values, just turn the instrument off, then on again to reset all default values.

J) If the batteries become too weak after 8 to 10 hours of full work, the reading unit will emit an alarm signal and display the message "Low battery". Shortly afterwards, the readings become meaningless. Charge the batteries the same day.

K) [MODE] key
This key is used to change the reinitialization time and to adjust the auto-recording time (3,000 readings capacity with the BM4+).

L) [□] and [■] keys
These two keys are used to adjust the display brightness by pumping them several times.

Basic Beep Mat signal interpretation

LFR and HFR are respectively the Low frequency and the High frequency response. They increase near a conductor. The strength or sulphur's concentration will be proportional to the HFR/LFR response. On a conductive horizon, the user will prefer to sample where the HFR/LFR values are the highest.

The high frequency (HFR) is always displayed. The low frequency (LFR) is displayed as long as there isn't magnetite. If there is magnetite, the instrument will display MAG instead of LFR.
**MAG** is the magnetic value and increases in presence of magnetite (its value is negative). As an example, a MAG value of \(-1,000\) = 1% of magnetite (approximatively) and a MAG value of \(-10,000\) = 10% of magnetite.

**Rt** is the Ratio value. Rt is unaffected by the amount of conductive material present and qualifies the conductor (intrinsic conductivity) from 0% (poor conductor) to 100% (excellent conductor). See the annexed graph representing an equivalent of the Rt in Mhos/m at the end of the quick user's guide.

NOTE: The Rt is calculated only if no magnetite is present and if HFR is at least 10 Hz. If magnetite is present, \(Rt = ***\) will appear on the display.

**Beep Mat used with an ATV or snowmobile**

The reading unit has been modified so that an optional buzzer can be snapped to the operator's collar. Being located close to the ear, the operator will hear the alarm when a conductor is detected. Action could take place immediately. One can use an optional 12-18 foot cable to connect the probe to the reading module. This set up allows the **Beep Mat** to be pulled at up to 20-30 km per hour.

If the user prefers to use a visual signal, the "graph" option will allow to visualize on a graphic the conductive anomaly (peak toward the top of the display) or the magnetic anomaly (peak toward the bottom of the display). To change the display view from the normal view to the graph view, use the horizontal arrows. Take note that if there isn't any magnetic or conductive anomaly, there will be no peak in consequence and it is normal that there will be no graph. The user can settle the speed at which the graph moves from right to left: at each 0.1 or 0.2 or 0.3... to 10 seconds (graph time). This option will allow the snowmobile driver, as an example, to settle his display on different frequency depending of the snowmobile speed.

Make sure that the probe is not next to any metal parts, such as the ATV, the snowmobile or, in some case, the sleigh. To do so, either put the probe in a sleigh made only of wood/plastic, or drag it behind as far as possible from the vehicle. Limit the speed of the vehicle to 20-30 km/h for such a survey.

A new reading module, the BM7+, is now available. It allows the use of an incorporated GPS and an optional MAG. This combination allows to cover large areas, to localize conductors even when travelling at high speeds and to record their position and their intensity within its 400,000-reading memory (up to 10 times a second). A conductivity and susceptibility map could then be produced from the data recorded. In a second step, one can plan a field trip to explain the nature of the conductor(s) found knowing exactly where they are located.

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3. READING UNIT

This chapter describes the various physical and functional components of the reading unit as well as instructions on how to use them.

3.1 Reading Unit Elements

Illustration 4: Reading unit

Illustration 4 shows the various visible parts of the reading unit. Here is a short description of the function of each one.

- The display has two lines of 24 characters each. Values, parameters or messages generated by the Beep Mat can be read on it.
- The conductor status light lights up when the (L/H)FR value exceeds a specified threshold due to the presence of a conductor.
- The conductor beeper (low-pitched sound) is activated when the (L/H)FR value exceeds a specified threshold due to the presence of a conductor.
- The magnetite beeper (high-pitched sound) is activated when the MAG value exceeds a specified threshold. N.B.: the buzzers and the conductor status light react quicker than the display.
- The round jack links the reading unit to the probe or to the battery charger.
• The ventilation cap covers the ventilation hole. After having worked in rain or any other conditions where there was a high level of humidity, open the cap while the batteries are charging to let humidity out. If possible, do it in a warm and dry place.

• The DB9 jack links the reading unit to a computer for the transfer of memorized data.

• The keys on the keyboard are used to access the various functions of the Beep Mat, each key being identified at its center. In this manual, a word or a symbol in brackets represents the key so identified: for example, [ON], [□], or [Ⅳ]. Here are their specific functions:

  - [ON] = To turn on the Beep Mat or change its state.
  - [□] or [Ⅳ] = To increase or decrease the display brightness.
  - [LEVEL] = To activate the display of an operating parameter.
  - [MODE] = To change the initialization time from 15 to 30 minutes or to adjust the auto-recording time.
  - [X] = To neutralize the sound.
  - [MEM] = To store the data or to activate the auto-recording.
  - [?] or [Ⅳ] = To increase or reduce the value of the displayed parameters.

The expressions in bold-italic as well as the [X], [MODE] and [MEM] keys will be explained in the next sections.

3.2 Beep Mat States

The reading unit can be in one of the following four states:

- Off
- Standby (or preheating)
- Initialization
- On (in reading process)

• Off: The Beep Mat stops all functions.

• Standby: The Beep Mat warms up to stabilize its frequency. The minimal preheating period suggested before beginning a survey is 30 minutes. If possible, preheating should be done under the same temperature conditions expected during the survey.

• Initialization: During initialization, the Beep Mat adjusts its signals in order to display zero values when there are no conductors. Initialization automatically ends two seconds after [ON] has been pressed.

• On: The Beep Mat measures the probe reactions, interprets them in terms of values, then displays these values every second. However, the buzzers react instantly, in less than 0.15 second. Therefore, the buzzer might signal something while the reading unit
5. USE IN THE FIELD

This chapter describes a typical sequence for a Beep Mat survey.

5.1 Getting Ready

Prepare all the necessary field gear: Beep Mat, a GPS if possible to localize yourself and maybe a VLF (EM-16) electro magnetometer to localize airborne conductors, radio, field books, sample bags, small shovel, hammer, flag tape, maps, photos, dynamiting kit, marker, compass, etc.

Make sure that the batteries are charged. If possible, at least 30 minutes before beginning a Beep Mat survey, connect the probe cable to the round jack on the reading unit, then put the instrument in standby by keeping [ON] pressed until the end of the first sound signal (3 seconds). The message STANDBY will appear. You can carry the instrument while in standby, but it is better to keep the probe at least 6 inches away from any large metallic surfaces (i.e., the floor of a truck). In such a situation, it is recommended to put the probe upside down.

It is better that the probe be preheated before beginning a survey. However, even if the probe has not been sufficiently preheated, you can start the survey anyway, but once in the field, you will probably have to reinitialize the Beep Mat more often during the first hour of use. Put the probe on the ground, strap the reading unit to yourself and attach the strain relief ribbon to the leather case as shown on illustration 6. You can then initialize the Beep Mat (see section 5.2).

Illustration 6: Typical use of the Beep Mat
5.2 Initialization

First, make sure you are not wearing a metal helmet. Lift the probe vertically above your head, as shown on illustration 7, so that it is not affected by the ground, and initialize the Beep Mat by pressing on [ON]. Wait until the initialization is over (about 2 sec.), then put the probe on the ground. You can now pull it again. Remember that every 15 minutes, the Beep Mat will signal to the operator that it needs to be initialized again. It is possible to initialize the Beep Mat anytime by lifting the probe vertically in the air (see illustration 7).

5.3 Exploration

Cover all grounds that you think may offer an interesting potential of discovery. A distinctive signal will indicate that you just passed near a conductor or a magnetite concentration. Stop and confirm the signal position. Mark that position immediately with flag tape, posts or branches. Before digging, reinitialize the probe in the air, then use the Beep Mat to delimit the nearby surface giving abnormal readings. Dig at the place where the readings are the highest, that is where there seem to be the most sulfides in the rock. Make sure that it is not caused by scrap metal, such as cans or metal casing (near a former drilling site for example). Dig with a shovel and examine the samples. Try to find the geological cause. You can also use the Beep Mat to delimit a conductive or magnetic outcrop.

Such exploration helps making discoveries, but in order to increase chances of success, it is recommended to elaborate a strategy and use different tactics. This aspect will be treated further in this manual.
6. INTERPRETATION OF READINGS

This chapter explains how to interpret the values on a target and the profiles of these values.

6.1 Data on a Target

The (L/H)FR and MAG values are influenced by the conductivity of an object and its magnetite content. A LFR value indicates that the object is more magnetic than conductive, while a HFR value indicates the opposite. A conductive and magnetic rock could give a (L/H)FR value according to the proportion of those elements. The bigger the object is or the closer it is to the probe, the higher the value. The presence of humidity in the ground causes the addition of an offset of 0 to -100 to the MAG value (see illustration 8). For that reason, in the absence of conductors, the readings are generally LFR.

![Illustration 8: Typical reading without any anomaly](image)

The HFR corresponds to the variation of the high frequency and the LFR corresponds to the reaction of the low frequency. When approaching a magnetite rich sample (for example, a vein), the low frequency reacts more than the high frequency, so the LFR value should appear and stay at zero or very low. The MAG value increases in negative value (see illustration 9, case "b"). When approaching a conductive sulfide sample, the HFR reacts more than the LFR. Therefore, the HFR value should appear and increase while the MAG value should remain low (see illustration 9, case "a"). If the HFR value is high and the MAG value is low, it means that the conductivity of the sample is high and that the body could turn out to be metal.

Note the similarity of these reactions with those observed during the instrument testing (chapter 2). The weaker the block conductivity is, the weaker the HFR value will be. By approaching a conductive block that also contains magnetite, the LFR will increase and the MAG will diminish in negative value (see illustration 9, case "c").
Illustration 9: Examples of Beep Mat readings in presence of:

a) a conductor, b) magnetite, c) a conductive body containing magnetite.

6.2 Profiles on Targets

It is possible to draw a profile of the values displayed by the Beep Mat along a traverse, but it is rather suggested to just make an image of it in your mind. Illustration 10 shows two simplified but typical examples. Compare it to illustrations 8, 9 and 11. By studying these illustrations, you should be able to interpret the profiles.
Here is how to interpret illustration 10:

- Anomaly "A" is strong and wide, and the ratio (Rt) is high. It indicates the presence of a good wide conductor. Compare with illustration 9.
- Anomaly "B", however, is weak and uniform, and the ratio (Rt) is low; it is a typical sign of the effect of a clayey ground.
- Examine anomalies "C" and "D" of example 2 above. These two anomalies forming a doublet are both caused by the effect of an almost vertical veinlet. Compare with cases "a" and "b" of illustration 11. There are no anomaly above the veinlet because the induction lines (see chapter 4) do not cross it (illustration 11, case "b"). For more explanations, see also illustration 14, at section 7.3.
- Anomaly "E" is rather narrow and reacts mostly in HFR. In this example, it is due to the presence of a boulder in the till.
Do not attach too much importance to the exact shape of these profiles. When you will pull the *Beep Mat* again, the profile should change in its details. This is due to one or several of the following factors:

- the probe has not been pulled exactly on the same line;
- the surface is bumpy;
- the surface condition has changed (for example, before and after rain).

The *Beep Mat* is adapted for quick jobs. Experience will make you able to visualize these profiles by memory while delimiting an interesting target. It is faster and more efficient to pass the *Beep Mat* again and delimit the target with flag tape, then dig and sample, than to draw a survey profile on paper once back at the office.

Illustration 11: Explanation of typical *Beep Mat* anomalies
APPENDIX B: COSTS: PERSONAL, GDD EQUIPMENT RENTAL, FIELD SUPPORT AND REPORT SCHEDULES: GEOPHYSICAL SURVEY, GEOLOGICAL EXAMINATION, HAND TRENCHING AND REPORT

Geophysical Electromagnet/Magnetic Survey GDD Instrumentation Model BM4 + Beep Mat

Geophysical survey and preliminary examination of field results

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<td>Transportation to claims by boat (Adams Lake), transportation on claims by ATV and camp costs:</td>
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$6,062

April 15 to October 11, 2007: follow up field evaluation of geophysical survey anomalies. G. Gutrath, P.Eng. Geologist

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3,000

Data compilation and report by G. Gutrach, P.Eng. Geologist

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$11,562
APPENDIX C: REFERENCES

Assessment Work Reports:


265 0  Geophysical, Geochemical and Geological Survey on the VIC Claims by D.K. Bragg, August 1970

711 2  Horizontal Loop EM and Magnetic Survey Beca South Grid, Alan Scott for Cominco Mines Ltd., January, 1979

732 6  Horizontal Loop EM and Magnetic Survey Beca Claims, Cominco Mines Ltd., May 1979

772 6  Diamond Drill Report, Paul Wojdak, Cominco Mines Ltd, November 1979


1987-2  and V.A. Preto.

Numerous references from the BC Ministry of Mines on the exploration work in the LED Claims Group Area starting in 1929