AURORA GEOSCIENCIES LTD.

COPPER RIDGE EXPLORATIONS INC.

GRAVITY SURVEY OF THE HEM PROPERTY, NORTHERN YUKON TERRITORY

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ymip 02-027
ymip 02-029

Location: 65° 04' N 138° 12' W
NTS: 116 G/1
Mining District: Dawson, YT
Date: November 25, 2002

SUMMARY

A gravity survey were conducted on the HEM Property for Copper Ridge Explorations Inc. between July 15 and August 3, 2002. The survey was conducted to locate iron oxide copper gold mineralization similar to that found in breccias outcropping near the Dempster Highway on the Property. A total of 261 points were surveyed in an area of approximately 20 km (E-W) by 10 km (N-S). Topographic elevations and station locations were surveyed with differential GPS receivers working from a central base station. Elevations are considered accurate to $\pm$ 61 cm and overall Bouguer anomaly measurements are considered accurate to $\pm$ 0.220 mGal. The data has been corrected for drift, latitude, Free Air, Bouguer Slab, Bullard B and terrain effects. Terrain effects were removed using direct elevation measurements within 200 m of the survey station and through the use of a 1 km digital terrain model to a distance of 60 km from the centre of the grid. The survey identified a large Bouguer anomaly adjacent to a magnetic field anomaly which merits additional investigation.

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1.0 INTRODUCTION

This report describes a gravity survey conducted on the HEM Property in the Dawson Mining District, Yukon Territory. The HEM Property hosts hematite-sulphide bearing breccias similar in style to those hosting economic mineralization at the Olympic Dam Deposit. The purpose of the surveys was to locate a large scale target hosting similar mineralization. The surveys were conducted by a two-man party from July 16, 2002 to August 3, 2002.

2.0 LOCATION AND ACCESS

The HEM Property is centred at 65° 04' N 138° 12' W in the northern Yukon Territory (Figure 1). The property is 130 km NNE of Dawson City. The property straddles the Dempster Highway and is 190 km from Dawson City by road. There is a fixed wing airstrip adjacent to the highway in the northwestern corner of the survey area.

3.0 PROPERTY DESCRIPTION

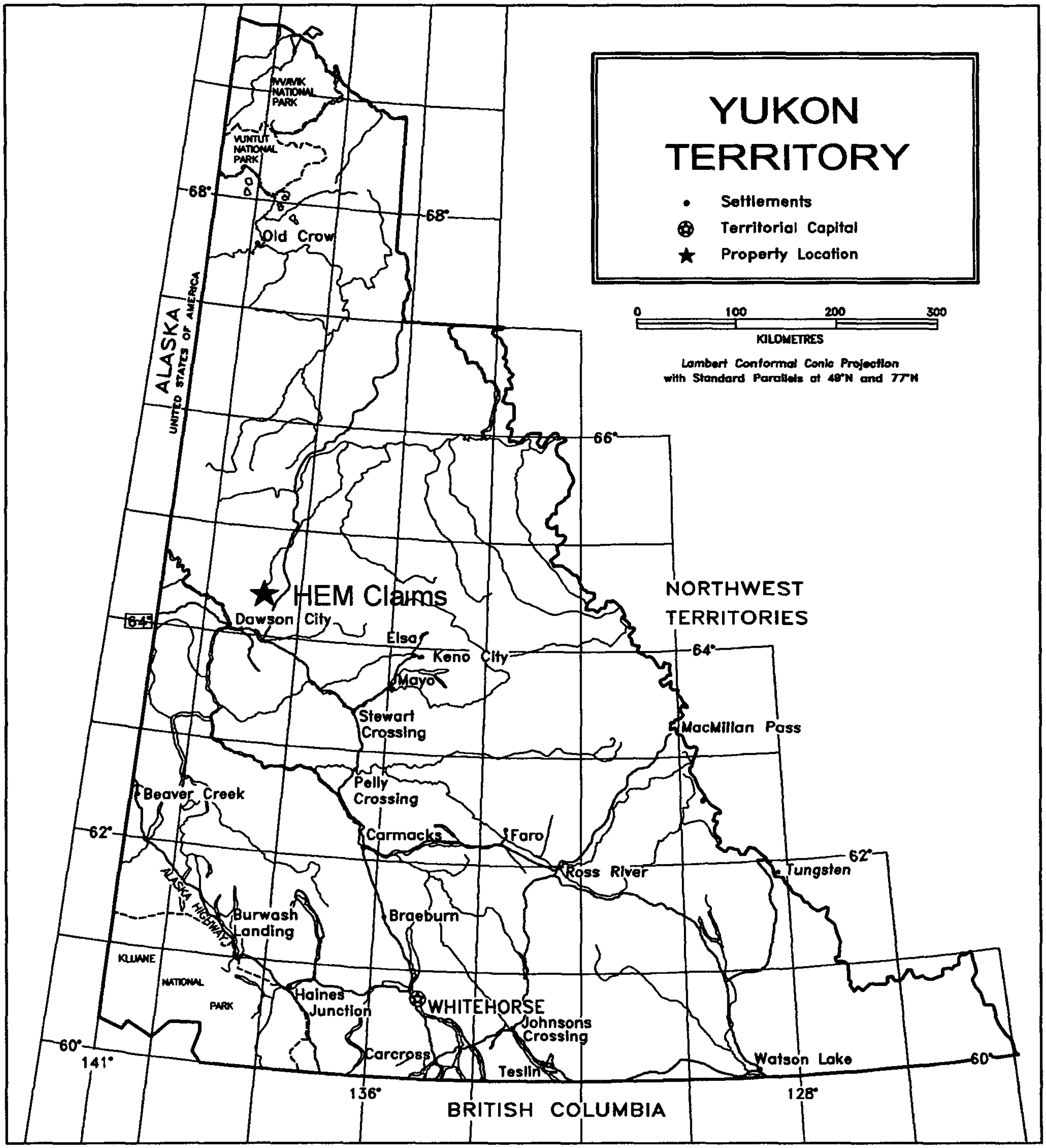
The HEM Property consists of 352 Claims (HEM 1-335 / with duplicates) staked under the Yukon Quartz Mining Act in the Dawson Mining District. Figure 2 shows the location of the claims and of the area in which the gravity survey was conducted.

4.0 PHYSIOGRAPHY

The HEM Property is located in the Ogilvie Mountains on the height of land between the Blackstone and Ogilvie Rivers. Elevations on the property range from 900 to 1600 m. The property covers a steep walled plateau dissected by steep and narrow ravines. The climate in the area is subarctic with long cold winters from October through May and a short, cool summer. Precipitation in the area is reportedly light to moderate.

5.0 REGIONAL AND PROPERTY GEOLOGY

The following discussion is based on Gordey and Makepiece (1999). The HEM Property is located in the northern Ogilvie Mountains and is underlain by the following geological formations (*ibid.*):



COPPER RIDGE EXPLORATIONS INC	HEM PROPERTY
	NTS 116 G/1 — Datum N/A
HEM CLAIMS PROPERTY LOCATION MAP FIGURE 1	Mining District DAWSON
	Job KRX-02-001 YT — Date 25 Nov 02
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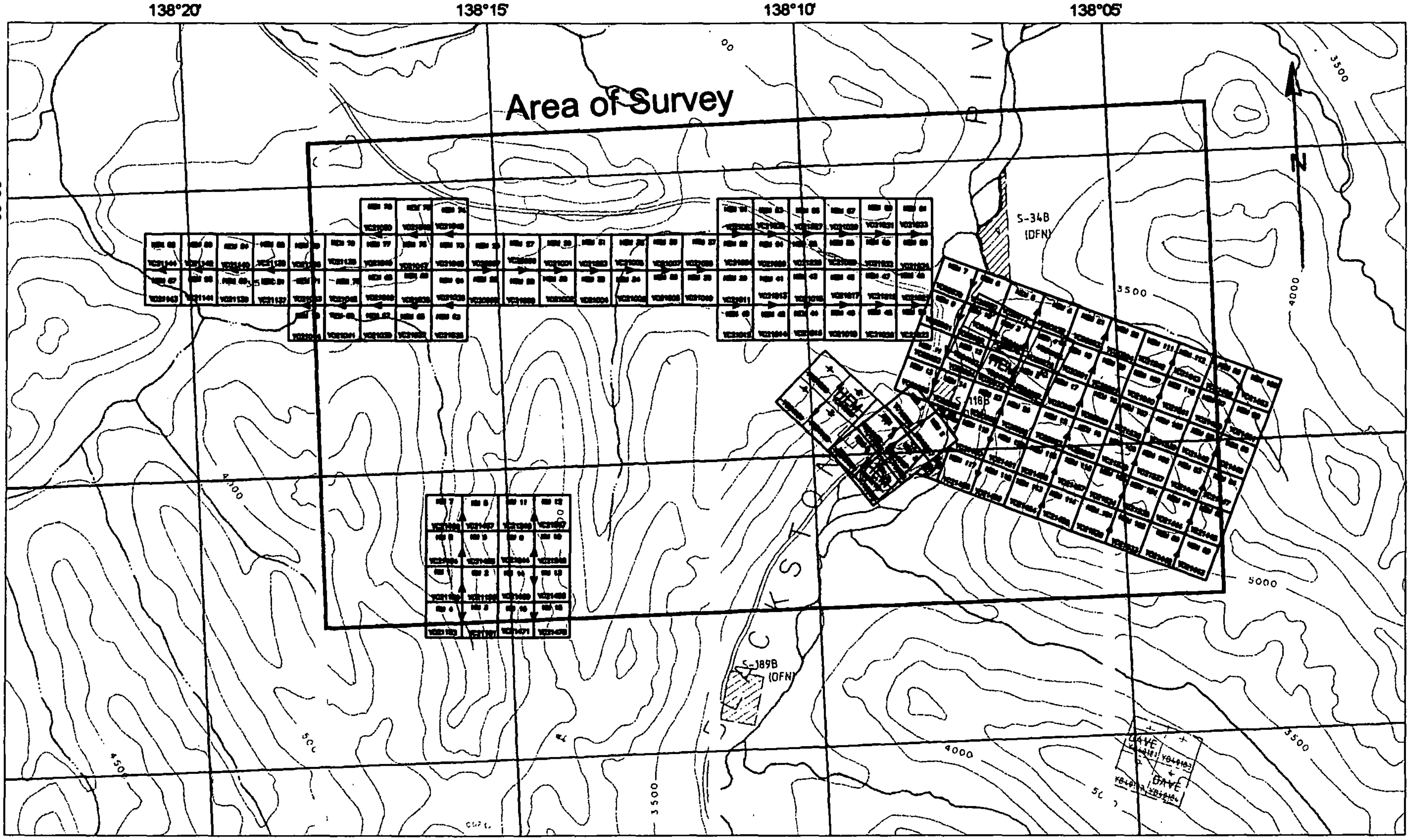

COPPER RIDGE EXPLORATIONS INC.	HEM PROPERTY	
	NTS: 116 G/1	Datum: N/A
HEM CLAIMS CLAIM LOCATION MAP FIGURE 2.	Mining District: DAWSON	
	Job: KRX-02-001-YT	Date: 25 Nov 02
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Formation	Description
Ford Lake (U. Devonian - Permian)	generally fine to coarse grained clastic succession equivalent to Canol, Imperial and(?) Tuttle assemblages
Bouvette (U. Cambrian - L. Devonian)	grey-and buff-weathering dolomite and limestone, medium to thick bedded; white to light grey weathering, massive dolomite; minor platy black argillaceous limestone, limestone conglomerate, and black shale; massive bluish-grey weathering dolostone
Road River Group (Cambrian - Devonian)	black graptolitic shale, limestone and minor chert with mappable subdivisions
Quartet (L. Proterozoic)	black weathering shale, finely laminated dark grey weathering siltstone, and thin to thickly interbedded planar to cross laminated light grey weathering siltstone and fine grained sandstone; minor interbeds of orange weathering dolostone in upper part.

Economic mineralization on the property consists of hematite - chalcopyrite bearing breccias which outcrop near the Dempster Highway in the eastern portion of the property. This style of mineralization is similar to that found in the Olympic Dam deposity in Australia, the type model for iron oxide copper gold deposits.

Olympic dam style iron oxide copper gold mineralization is often associated with positive Bouguer gravity anomalies adjacent to positive magnetic field anomalies. The recent Minotaur Resources (2002) discovery in Australia serves as an example of this deposit type. The Prominent Hill Prospect consists of a 2000 long by 800 m wide Bouguer gravity high adjacent to a linear aeromagnetic high. The total magnetic field high has a strike length in excess of 4 km. The gravity and magnetic anomalies have similar strike directions but are offset by approximately 300 m.

6.0 GEOPHYSICAL SURVEY GRID

Gravity surveys were conducted in the area shown in Figure 2. Stations were sited roughly 500 m apart along traverse lines in accessible topography. Stations were marked with flagging in the field.

7.0 PERSONNEL AND EQUIPMENT

The gravity survey was conducted by the following personnel:

Person	Position
Felix Gagne	Technician

He was assisted by helpers provided by Copper Ridge Explorations Inc. Addresses and periods of work are summarized in Appendix B. The crew was equipped with the following instruments and equipment:

Gravimeter:	1 -	Scintrex CG-3 automated gravimeter S/N 711413
GPS receivers:	1 -	Trimble 4700 series dual frequency GPS receiver (base station) S/N 220146652
	1 -	Trimble Pro-XRS dual frequency GPS receiver (rover) S/N 224005367
Other survey equipment:	1 -	Impulse laser rangefinder
	1 -	P866 laptop computer
	1 -	colour printer

Other equipment:	1 -	Repair tools (electrical / light mechanical)
	1 -	SAT phone
	1 -	camp gear

Instrument specifications are included in Appendix D.

8.0 GRAVITY SURVEY THEORY

Gravity survey theory is well summarized in Telford *et. al.* (1990). This section describes aspects of gravity survey theory pertinent to the project described in this report.

Gravity surveys measure gravitational acceleration. The force of gravity on between two objects is:

$$F = \frac{GM_1M_2}{r^2}$$

where **F** is the force, G is the universal gravitational constant, M_1 and M_2 are the masses of the two objects and **r** is the distance between them. When the force is normalized against a test mass, the result is the gravitational acceleration (a) due to the second mass:

$$a = \frac{F}{M_1} = \frac{GM_2}{r^2}$$

The acceleration of the test mass is then due to the distribution of the second mass. In the case of a gravity survey, the second mass is the earth and the distribution of mass therein. Explicitly:

$$a = G\int \frac{d \bullet r}{r^3} dv$$

where d is the density, **r** is the radial vector to the mass element and **a** is the acceleration. Gravitational acceleration is measured in Galileos (Gals) where 1 Gal is an acceleration of 1.0 cm/s^2. Average overall gravitational acceleration is 980 Gals and the gravitational acceleration due to targets of interest in the earth's crust are in the order of 10^{-3} (1 milliGal (mGal)) to 10^{-6} (1 microGal (μGal)). Thus a high precision gravity survey measures gravitational acceleration to approximately 1 part in 1 billion.

8.1 Gravity meter function

Specifications for instruments used in this survey are contained in Appendix C. The Scintrex CG-3 Autograv gravimeter contains a small test mass suspended by a zero-length fused quartz spring. An electrostatic system is used to maintain a test mass in a constant position where the spring response is linear. Charges are placed on a pair of plates to maintain the test mass in a constant location and the size of this charge (voltage on the plates) will vary with the gravitational force on the test mass. The voltage is converted into a measure of the gravitational acceleration by normalizing the force by the mass of the test mass.

The spring response is a function of force, temperature, air pressure, the inclination of the spring relative to the earth's gravitational field and a slow change in spring constant (instrument drift). Since the force of gravity on the test mass is the quantity to be measured, the remaining influences must be mitigated. The temperature in the spring housing is maintained at a constant value in excess of 45^0 C by a thermostatically controlled heating element. This avoids drift due to changes in temperature. The effect of air pressure is minimal provided the instrument is not operated over a wide range of elevations and changes due to weather are not significant. Instrument inclination varies because the instrument tripod slowly settles during a measurement. As the housing moves off true vertical, the component of the earth's gravitation field action on the test mass is reduced. At angles near the vertical, this effect is small and linear, and electronic compensation using a sensitive tilt sensor is used to correct the gravity data for this effect. Instrument drift cannot be totally removed through instrument design but the CG-3 eliminates much of the instrument drift by using a correction algorithm. Repeated measurements over a minimum 24 hour period are used to determine an average linear daily drift and this value is extrapolated to determine the drift at any measurement time within 90 days of the last calibration. This drift value may change over time and the remnant instrument drift is removed by a procedure discussed in a following section.

The gravitational acceleration measured by the gravimeter is not a direct measure of true local gravitational acceleration but is relative to an instrument constant and to the range of acceleration in which the measurement was taken. Gravitational acceleration measured by the gravimeter can be converted to true gravitational acceleration by the addition or subtraction of an instrument specific constant. This constant can be determined in the field by taking a gravity reading at a GSC control point and computing a static shift required to correct the observed data to agree with the GSC control point value. This procedure was followed in this survey.

8.2 Factors affecting gravity readings

The gravitational acceleration at any point is a function of the earth's mass distribution relative to the gravimeter, the distribution of other solar masses and the earth's centrifugal force. The sun and moon exert gravitational forces on the earth evident in the tides and the acceleration due to these sources must be removed to yield the gravitational acceleration due to the earth alone. The elevation of the instrument above the ground surface exerts a strong control on the gravitational acceleration. The closer the gravimeter is to masses within the earth, the greater the gravitational acceleration. If mass lies above the gravimeter, however, this will tend to reduce the gravitational acceleration by exerting a slight upwards force on the test mass. Both effects must be considered. Finally, the centrifugal force of the earth's rotation exerts an upwards force on the test mass in a gravimeter, thereby reducing the earth's gravitational acceleration. This effect varies with latitude and must be removed from gravitational acceleration data. A number of standard corrections are performed to eliminate external sources of acceleration, thereby producing measurements of gravitational acceleration due solely to sources within the earth's crust. The following corrections were applied to the raw measurements of gravitational acceleration (gravity data) measured in this survey:

1. Drift correction
2. Latitude correction
3. Elevation correction
4. Terrain corrections

These are discussed in turn.

8.3 Drift correction

Solar and lunar gravity (tides), instrument drift and atmospheric pressure variations shift the base level of the gravimeter throughout the survey day. Tidal variations are in the order of 30 to 300 μGal per day. In addition, gravimeters occasionally suffer *tares* or large shifts in base level due to mechanical shock. These are normally identified by sudden and large changes in base station readings between tie-ins. The CG-3 calculates tidal drift using the input station latitude by applying Longman's (1959) formula for calculating gravitational effects of earth tides at various latitudes. Instrument drift is calculated internally by the gravimeter using drift constants determined by repeated measurements over a minimum 24 hour period. Despite this, some remnant drift must be removed. This is performed by taking measurements at control stations with known reference values prior to, during and after the survey period on each survey day. Remnant drift is calculated by linear interpolation, using the field record times, and the drifts and record times measured at the control stations. A minimum of three reference measurements are required during a long survey day but a reference reading before and after the field readings will suffice on a short day.

8.4 Latitude correction

Variation in gravitational acceleration due to latitude arises from flattening of the geoid (ie. an increase in distance from the centre of the earth moving towards the equator) and from the effect of centrifugal force when approaching the equator. Both tend to reduce the gravitational acceleration when moving from the poles to the equator. The latitude effect in mGal per km is given by:

$$\Delta G_{Lat} = 0.813\sin 2\theta - 1.78x10^{-3}\sin 4\theta$$

The latitude effect is greatest at mid-latitudes and least at both the poles and the equator. On small grids, latitude effect is removed by calculating the latitude effect at the centre of the grid and correcting the gravity readings by a variable amount based on their north-south distance from the central station.

8.5 Elevation correction

Three elevation corrections are required. The Free Air effect compensates for the decrease in gravitational attraction resulting from an increase in elevation or, equivalently, an increase in distance from the centre of the earth. Gravity data are normally reduced to an elevation datum below that of the survey. In this case, the Free Air corrected gravity (ΔG_{FA}) is given by:

$$\Delta G_{FA} = 0.3086 * z$$

where z is the elevation of the gravity station above the survey datum. The Bouguer slab correction is next applied to compensate for the upward correction of the material above the gravity survey elevation datum. Were the gravity readings taken on this datum, the material above it would attract the test mass and reduce the measured gravity. The correction is applied by calculating the gravitational effect of an infinite horizontal slab with a thickness equal to the elevation of the gravity station above the datum. Explicitly, this correction (ΔG_B) is:

$$\Delta G_B = -0.0419\rho z$$

where ρ is the Bouguer density and z is the station elevation. The average crustal density of 2.67 g/cm^3 is normally used in the Bouguer corrected. Finally, an additional correction is necessary to account for the finite nature of the crustal slab used in the Bouguer correction. Obviously a correction based on an infinite horizontal slab valid only for small elevations above the survey datum and in cases where there is a large variation in topography, the Bouguer correction must itself be corrected for the effect of a finite, curved slab. This correction, the Bullard B correction, is well described by

Whitman (1991) and LaFehr(1991b). It is applied to correct the gradient in the Bouguer gravity for the effect of the earth's curvature. The method is applied by using look up tables and applying Bullard-B corrections appropriate to the elevation of the gravity station above mean sea level (LaFehr 1991b). The combined Free Air, Bouguer and Bullard B corrections are combined in a single elevation correction during data processing.

Some controversy exists concerning the selection of Bouguer density values for the elevation corrections. It has been common practice to adjust the density value away from the average crustal density value in order to minimize effects apparently caused by topography. If an incorrect density were used, the gravity profiles should either follow topography (in the case where the density is too low) or show a negative correlation with topography where the density selected were too high. LaFehr (1991a) recommends the use of the average crustal density (2.67 g/cm^3) in all reductions and the examination of the gravity data to determine the significance of anomalies which are associated with topographic anomalies. This procedure has been followed in performing the elevation corrections described in this report.

8.6 Terrain corrections

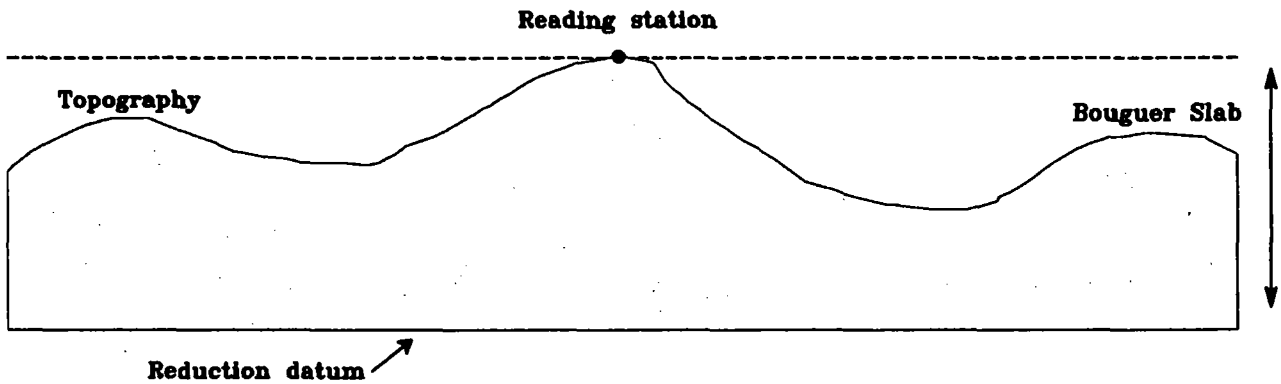
Terrain corrections are applied to correct the Bouguer gravity for the upwards gravitational attraction of masses above the station elevation and for the reduction in gravitational acceleration due to an absence of mass in a depression or valley extending below the station elevation. Both of these corrections reduce the elevation corrected gravity. Terrain corrections are applied by calculating the effect of a pie shaped slice of topography defined by inner and outer radii ($\mathbf{r}_i$ and $\mathbf{r}_o$) and the angle subtended by the slice θ. If ρ is the density, the gravitational effect of that slice $\mathbf{g}_i$ is given by:

$$g_i = \gamma\rho\theta\left\{(r_o - r_i) + \left(\Delta z^2 + r_i^2\right)^{0.5} - \left(\Delta z^2 + r_o^2\right)^{0.5}\right\}$$

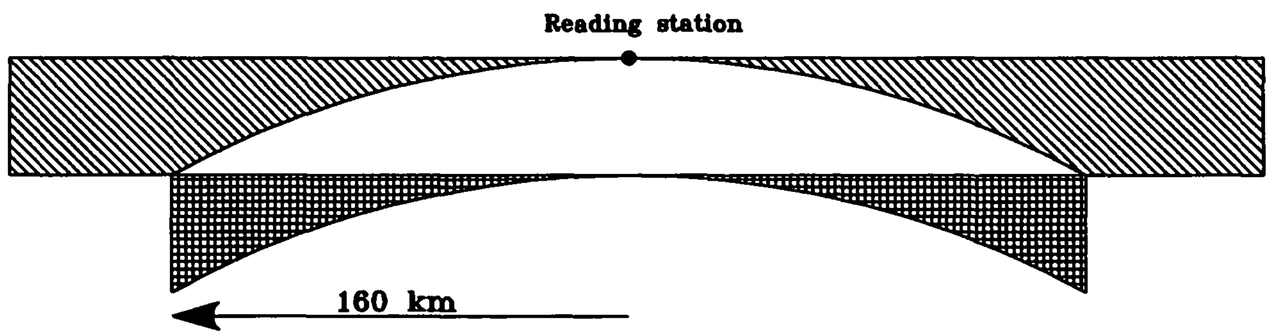
where γ is the universal gravitational constant and $\mathbf{\Delta z}$ is the difference in elevation between that of the sector and that of the station. The terrain effect is the sum of individual terrain corrections. Terrain corrections are always added to the gravity data.

Two corrections are made. In this survey, the near station correction uses elevation difference directly measured by the operator in six 60° sectors surrounding the station. Each sector was further divided into three range limits: 2 to 20 m, 20 to 50 m and 50 to 200 m. The cumulative near-station terrain effect is the summation of the individual sector contributions. The terrain effect at distances beyond 200 m from the station are calculated using a digital terrain model (DTM). It is customary to use a DTM with a small (200 m) node size in the area of the grid and then use a second DTM with a

(a) Bouguer slab and Free Air corrections.



(b) Bullard B Correction. Finite slab dimensions and curvature are accounted for by this correction. Additional attraction from region below Bouguer slab and reduced attraction from absent region beyond 160 km.



(c) Terrain corrections. Nearby hills above Bouguer datum pull up test mass in gravimeter. Nearby valleys lack a gravity contribution added during the Bouguer correction. Terrain corrections are added to the gravity reading to remove the effect of nearby topography.

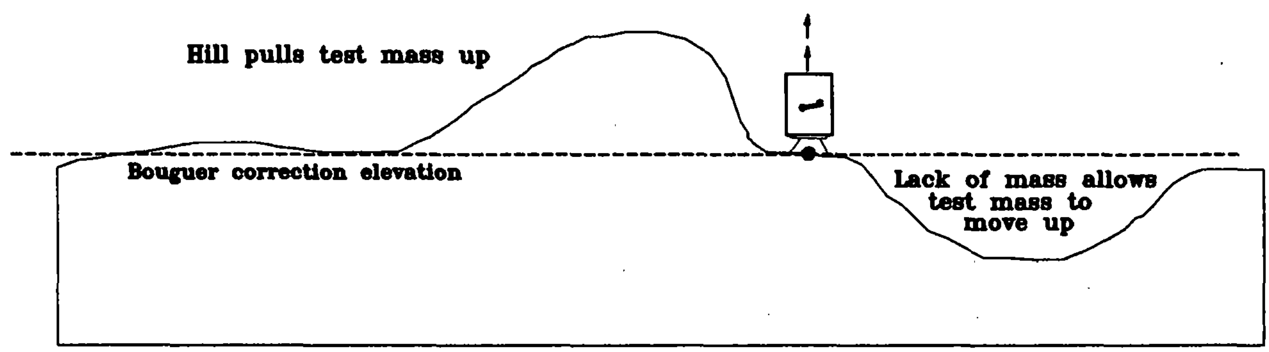


Figure GR-1. Gravity reductions and corrections.

coarser node size to cover the area at greater distances from the grid. The elevation difference between the gravity station and the elevation of the grid node is used as input to the sector equation. The raw gravity data corrected for instrument height, drift, latitude, elevation and terrain effects is commonly referred to as the Bouguer anomaly data or Bouguer data.

9.0 GPS THEORY

Gravity station elevations must be surveyed in to at least ± 10 cm in order to produce gravity data accurate to ± 20 μGal. This can be achieved through spirit level, total station or global position system (GPS) surveys. GPS survey methods were used to determine the elevation of the survey stations in the survey described in this report and this section summarizes the measurement method.

The Navstar Global Positioning System consists of 26 low altitude satellites, a master controlling station in Colorado Springs, CO and three uplink stations in Hawaii, Ascension Island, Diego Garcia and Kwajalein in the western Pacific Ocean. The satellites circle the earth at an altitude of 20,200 km with 4 satellites (space vehicles of Svs) in each of 6 planes inclined at 55° to the equator. Two SV's are spares. Each SV contains an atomic clock and transceiver.

The GPS signal quite complicated and occupies a wide bandwidth in order to nullify attempts at jamming. The system fundamental frequency (f_o)is 10.23 MHz. Satellites transmit messages on two carrier frequencies:

L1 carrier	-	1575.42 MHz (154 f_o) with a wavelength of 19 cm
L2 carrier	-	1227.60 MHz (120 f_o) with a wavelength of 24 cm

Several signals are impressed on the carrier frequencies by amplitude modulation:

Name	Carrier (freq)	Description
Navigation message	L1 & L2 (1500 Hz)	Satellite status, ephemeris and clock corrections
P-Code	L1 (10.23 MHz)	Precision Code: Encrypted pseudorandom noise signal containing clock time signal (time of transmission). The encryption is unclassified and available for civilian use. Pseudorange accuracies with this code are in the order of 30 m.

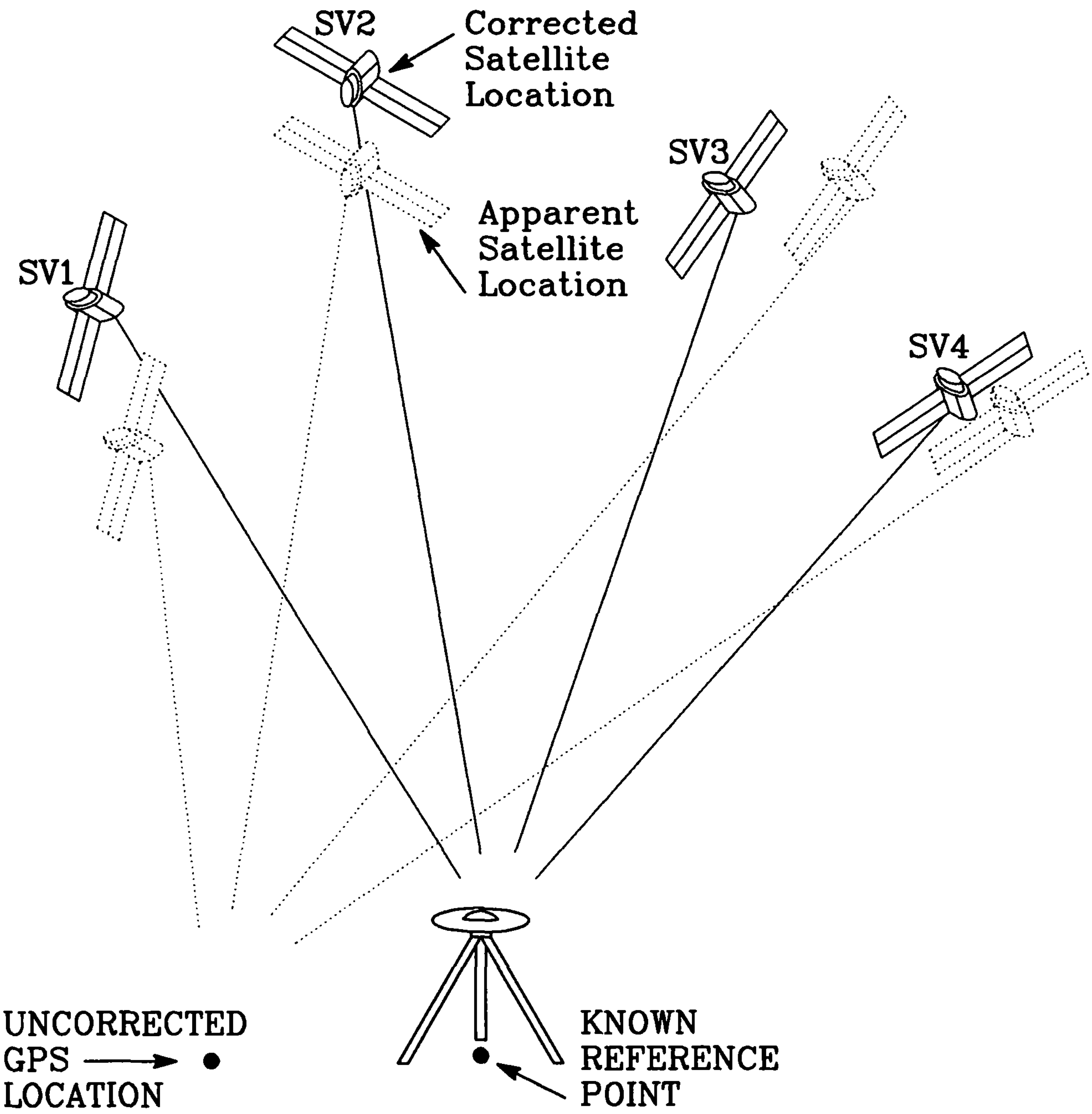


Figure GPSD-1. Principles of differential GPS corrections.
The base station GPS is located over a known point. The difference between the known satellite locations calculated from the satellite ephemerides and the base station location, and the apparent locations calculated from the ephemerides and the satellite clock is used to calculate individual pseudorange corrections for each satellite.

Y-Code	L1 (10.23 MHz)	Encrypted P or Anti-spoofing (AS) Code: Encrypted pseudorandom noise signal containing clock time signal (time of transmission). The encryption is classified and this signal is for military use. Accuracy of the GPS system with this code is degraded to 100 m but military users can achieve psuedorange accuracies of better than 30 m by removing the encryption.
C/A-code	L1 and L2 (1.023 MHz)	Clear acquisition code: Non-encrypted clock time signal with pseudoranges accurate to $\pm$100 m.

9.1 Positioning

GPS receivers contain an internal clock (oscillator) which is synchronized to GPS time. GPS time is the absolute time standard used for the entire GPS system and is expressed in coordinated universal time (UTC). Each SV has a clock synchronized to GPS time and transmitted clock errors contained in the navigation message. The C/A and P or Y code transmissions contain the time of transmission from the satellite. Once the GPS receiver has 4 satellites in view, it can come up with a unique solution for the four variables in the position equation: x,y,z and t (time). The receiver generates a best-fit solution to GPS time and synchronizes the receiver clock to GPS time. The phase shift in time between the code signal picked up by the receiver and the internal receiver clock yields the transit time (time of receipt less time of transmission). This time, together with the known propagation velocity of the radio wave yields a pseudorange. The satellite navigation message transmits the satellite ephemeris - a precise description of the satellite's orbit and thus, its position. Using the ephemeris and pseudoranges, the location of the receiver can be calculated to an accuracy limited by the psuedorange accuracy and the relative geometry of the satellites. GPS positions are accurate to $\pm$ 30 m with P-Code and to $\pm$ 100 m with C/A Code.

9.2 Differential corrections

The accuracy of GPS positions can be improved by differential processing. A base station GPS is placed on a point whose geographic coordinates are accurately known. The base receiver then tracks the same satellites that are used by a nearby receiver (rover) which is being used to determine an unknown position. The base receiver computes the error in pseudoranges by comparing the apparent pseudorange from the SV's P or C/A code with the known pseudorange from the satellite message. The errors in satellite pseudoranges are then used in either real-time (via radio link) or post-acquisition processing of the rover's position. Differential correction yields positions accurate to 0.5 m in x, y and z. Errors of this magnitude are acceptable for regional surveys for high amplitude anomalies but are not suitable for targets with responses less than about 1.0 mGal.

9.3 Carrier phase processing

GPS positions can be refined further by GPS survey techniques. These aim to measure the distance between two points (base lines or vectors) using both the positioning signal (P or C/A code) and the carrier phase of the GPS signal (L1 and L2). In simplified terms, the method is as follows. A base receiver is set up at a known point and a rover is set up at the point whose position is to be determined. The two receivers then record data from at least 5 SV's in common view for periods of time which depend upon the method being used. Three techniques are in common use:

Static survey	Receivers record each base line for at least 45 minutes. Post processing uses the C/A code and the carrier phase shift to calculate base lines.
Fast static survey	Receivers record each base line for at least 5 minutes and use the P-Code and carrier phase shift to calculate base lines.
Kinematic survey	Both the base station and the rover are set up over a known point and, after a short initialization period, the rover is moved from point to point and base lines are measured for period of 30 to 60 seconds. Both receivers must maintain a lock on the same receivers.

Static surveys can achieve accuracies of 5 mm $\pm$ 5 ppm while Fast Static and kinematic surveys can achieve accuracies of 5 mm $\pm$ 10 ppm. Carrier phase processing requires that the receiver be capable of recording at least 1 carrier phase (single frequency receiver) but better results under a wider variety of operating conditions are possible using receivers capable of receiving both L1 and L2 carriers (dual frequency receivers).

Carrier phase processing uses several techniques to measure base lines. Differentially corrected GPS positions are used to narrow down a range within which possible solutions to the base line equation may be found. Under optimum conditions this would involve a preliminary determination of distance to within 4 to 10 m. To improve the accuracy of the determination, the carrier phase difference between the two receivers is considered. The fraction of a wavelength phase difference between the two receivers can be determined very rapidly but the integer number of full wavelengths phase difference between the receiver cannot be readily determined with a single phase difference. In addition, the method has to be able to correct itself if one of the receivers loses contact with one of the satellites and "loses its place" in the signal (cycle-slip). Finally, the processing must account for propagation error caused by unknown velocity variations within the ionosphere. Several methods are used together to remove external sources of error, resolve the integer ambiguity and correct for cycle-slip:

Single difference	Difference in phase between 2 receivers measuring the same satellite over the same interval (epoch). This removes the effect of satellite clock, orbital and atmospheric delays.
Double difference	Difference between 2 single differences. This removes the effect of receiver and satellite clock drift.
Triple difference	Difference over time between 2 double differences. This removes integer ambiguity and resolves cycle-slips.

Combinations of the differences for a large number of readings are solved for a best-fit solution using least-squares methods. Carrier phase processing generates one of several possible types of solutions depending upon the data available:

Float solution	Poor solution as the processor is unable to resolve the integer ambiguity. Errors in the order of 1 wavelength are possible.
Fixed solution	Good solution; one solution yields integer values significantly better than others. Errors less than 1 wavelength are possible.

Fixed solutions for dual frequency receivers fall into one of three types:

Wide Lane Fixed	Uses L1 and L2 differences, generating a base line solution using a wavelength of 86 2 cm This is used in long base line surveys
Narrow Lane Fixed	Uses combinations of L1 and L2 solutions generating a base line solution using a wavelength of 10 2 cm This solution effectively removes ionospheric effects
Ionospheric free solution	Best possible solution generated using L1 and L2 to achieve maximum possible accuracy

9 4 Factors affecting GPS survey accuracy

The relative satellite geometry, signal status and elevation of the satellites above the horizon control the accuracy of a base line determination or of a position fix Selective Availability (SA) is the military term for the deliberate dithering of the clock signals from the GPS satellites to degrade positional accuracy A slow variation in position is caused by the introduction of error into the satellite ephemeris in the navigation message and a smaller and much more rapid position error is introduced into the code transmission This latter effect causes significant errors in velocity determinations The encryption of P-Code to Y-Code can affect Fast Static surveys since these use the P-Code to determine the starting position for a base line solution The user range accuracy (URA) is a measure of the accuracy of a pseudorange If this number is greater than 30 m, selective availability is probably in effect

The signal to noise ratio (SNR) is a measure of the strength of the signal relative to background noise An SNR of at least 6 is required for a decent positional fix or base line solution, common ranges are from 12 to 20

A minimum of 5 visible (ie detectable) satellites are required for carrier phase processing and for an accurate differential GPS position A minimum of 4 SV's is required for routine positioning A solution with more than 4 satellites is referred to as an over-determined 3D (OD3D) solution

The relative geometry of the satellites exerts a strong influence on the accuracy of a solution If all SV's are directly overhead, the generated position solution is relatively insensitive to horizontal error whereas a much tighter solution is possible if the satellites are spread across the sky The point dilution of precision (PDOP) is a measure of the error in location caused by geometry Values of 4 or less are good, 5 to 7 are acceptable and greater than 7 is considered very poor

Multi-path errors are caused by SV signals reflecting off surfaces near the receiving antenna. Multipath errors are a major concern in both differential and carrier phase surveys where reflections near a base station receiver can significantly degrade the quality of the positions and base line solutions. Fortunately they are largely avoidable through care and attention in the field.

10.0 GRAVITY SURVEY SPECIFICATIONS AND FIELD PROCEDURE

The following survey specifications and field procedures were employed for the gravity survey:

Station locations:	Gravity stations were spaced 300 to 500 m apart along traverse lines sited along ridges, drainages and other favourable access routes. Some stations were reached by helicopter. Stations were located in the field with a non-differential GPS. Stations were sited in locations where the topography was flat for at least 2.0 m surrounding the stations.
Station marking:	Gravity stations were flagged by the crew in the field. Station names in the digital data include a Line (survey day (1 to 17)) and Station (station number from 1 to n for each survey day).
GPS base station location:	The GPS base station was installed near camp and moved twice (July 18 and 19) to a final fixed location on July 19 from whence all subsequent surveying was conducted. The GPS base station was not located over a fixed geodetic survey marker as no readily accessible and secure marker could be found in the survey area.
GPS base station settings:	Default elevation mask of 17^0. Antenna heights recorded and checked daily. A 10s reading epoch was used throughout.

GPS rover settings	10 s reading epoch, elevation mask of 20^0, signal to noise ratio threshold - 6 0, PDOP threshold - 6 0 Each position measurement consisted of 10 readings Three position measurements were take at each station Antenna height was fixed throughout the survey and was incorporated into the data processing
Survey datum	NAD1927 (Canada / Yukon) All coordinates in UTM Zone 7N All elevations were processed as geoid elevations (above mean sea level)
Drift calibration	The gravimeter was warmed up for a period of 48 hours prior to drift calibration Thereafter, the instrument was cycled for a 24 hour period, taking 120 s readings every 10 minutes in cycling mode The data was analysed to determine the apparent remnant linear instrument drift and the gravimeter drift constant was reset to compensate for this drift
Gravity drift control	Daily check-in was performed at a single fixed point near camp (Station 99 in records) prior to and after each day's survey Readings were repeated 3 times at the control station and averaged to calculate the check-in value
Gravity measurements	Gravity readings were made with the seismic filter, tidal effect and auto tilt corrections engaged The latitude and longitude of the centre of the survey area (65 07 N 138 02 W) were set for the tidal correction Readings were stacked for 60 seconds and repeated if standard deviations exceeded 50 μGal

Near station terrain correction	Topography surrounding the station was measured in 6 - 60^0 sectors in each of three zones surrounding the station Zone limits were 2-20 m, 20-50 m, and 50-200 m Terrain was measured by taking an average terrain elevation reading with the laser range finder All readings were subsequently corrected for operator height Where terrain was not visible, the operator measured the estimated slope and calculated the elevation using the distance to the zone centre radius and the estimated terrain slope

The survey log is attached in Appendix B

11 0 DATA PROCESSING

This section describes data processing and quality assurance and quality control (QA/QC) measures All data was processed in the field and was subsequently checked by the author in Whitehorse GPS data processing was performed with Trimble Pathfinder Office (Ver 2 70) Gravity data processing was performed with GRAVRED, a proprietary program developed by Amerok Geosciences Ltd This software automates the standard gravity reduction procedures described below

1 *Drift correction* Drift corrections were calculated by linear interpolation of the instrument drift determined from the check-in measurements

2 *Latitude correction* The latitude correction was calculated by determining the gravity gradient with latitude at the centre of the survey area and by calculating the latitude effect at each point from the north-south distance from the measurement station to the centre of the grid The following parameters were used in the correction

Grid centre 629500E 7218500N
Latitude 65 07^0 N
Azimuth of UTM to Celestial North 2 5^0 E

3 *GPS differential corrections* Differential GPS corrections were performed with Smart Code and carrier phase processing using the masks and thresholds described in the previous section

4. Elevation corrections: The Free Air, Bouguer and Bullard B corrections were made in a single step. A density of 2.67 g/cm^3 was used in the elevation corrections. All input elevations were in metres above mean sea level (geoid elevations). The Bullard B correction was made using a lookup table incorporating the correction coefficients compiled by Whitman (1991)[1].

5. Near station terrain corrections: The topography near each station to a distance of 200 m was surveyed by the operator according to the specifications described in the previous section. The near station terrain correction (NSTC) was calculated using the analytical relation for the gravity of a segment of a cylindrical terrain slice defined by inner and outer radii (**r_i** and **r_o**) and the angle subtended by the slice θ. If ρ is the density, the gravitational effect of that slice **g_i** is given by:

$$g_i = \gamma\rho\theta\left\{(r_o - r_i) + \left(\Delta z^2 + r_i^2\right)^{0.5} - \left(\Delta z^2 + r_o^2\right)^{0.5}\right\}$$

where γ is the universal gravitational constant and **Δz** is the difference in elevation between that of the sector and that of the station. The terrain effect is the sum of individual terrain corrections for each slice (ie. each sector within each zone).

6. Far station terrain corrections: Far station terrain corrections were made by applying the above relation for the gravitational effect of a terrain element to each node in two digital terrain models (DTMs). An inner DTM covered the area of the survey and extended to the N, S and W by an additional 3 km. An outer DTM extended to a radius of 80 km from the center of the survey area and excluded the area of the inner DTM. The inner DTM was constructed from digital topographic maps (ie. NTS topographic maps in AutoCADD format). The coordinates of the end points of each contour segment (UTME, UTMN, elevation) were extracted from DXF files. The coordinates of these points were initially registered to the NAD83 (Canada) datum and were reregistered to the NAD27 (Canada / Yukon) datum using Geocalc (MADTRANS algorithm). These extracted points were then assembled in a data base and gridded using minimum curvature to generate a digital terrain model with a 30 m cell size. This grid was then exported as the inner DTM. The inner DTM covered the entire survey area with lower left corner at 614000E 7209000N and the upper right corner at 641000E 7227000N. The outer DTM was extracted from a 1.0 arc-second digital elevation model for northern Canada. The outer DTM cell size is

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[1] Whitman, W.W. (1991) A microgal approximation for the Bullard B - earth's curvature - gravity correction. Geophysics Vol.56 No. 12 pp 1980-1985.

1.0 km.

The terrain correction treats each node in the DTM as the centre of a terrain slice with dimensions defined by the node size (ie. 30 m for the inner DTM and 1000 m for the outer DTM). The radial distances and subtended angles are calculated from the distance to the node centre and the node size. The gravitational contribution of each node is summed to calculate the terrain correction for the station. Nodes within 200 m of the station are excluded.

12.0 ERROR ESTIMATE

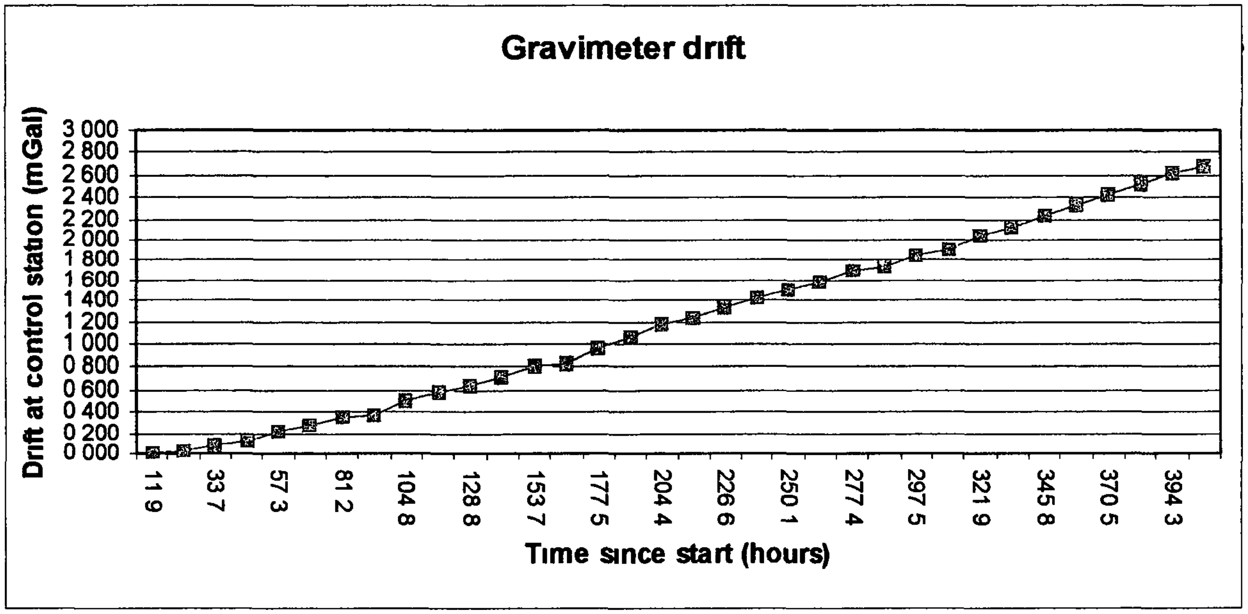
The following is an estimate of the total measurement error.

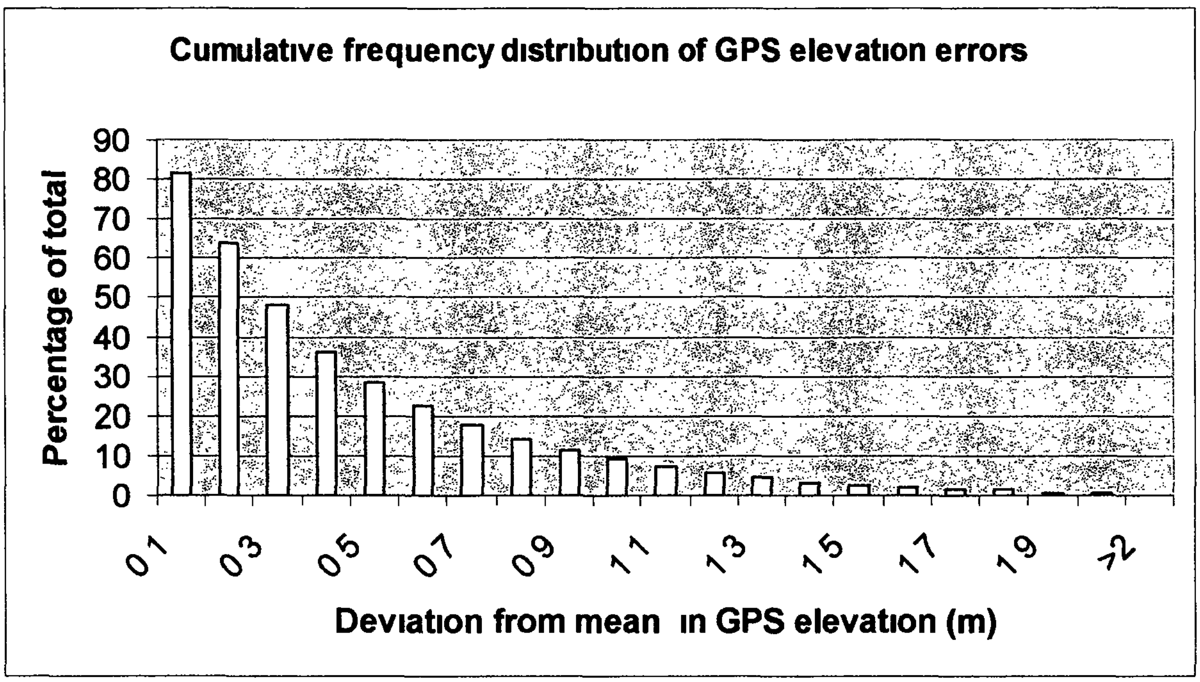
1. Gravimeter drift. The graph below shows the daily gravimeter drift over the duration of the project. Over the duration of the project, the average drift rate was 6.64 μGal per hour and the drift rate was essentially linear with no significant tares. A liberal estimate of measurement error due to drift would be ±5 μGal.

2. Gravity measurement error. Most of the gravity readings were taken on soft ground where stability of the gravimeter was occasionally a problem. An indication of the severity of the problem is apparent when examining the measurement tilts. The effect of the tilt on the measurement is compensated by the instrument as it is linear for small deviations. The soft ground also contributed to measurement error by introducing high standard deviations - occasionally in the order of 500 μGal. Despite this, the measurements generally repeated quite well - typically within 10 μGal. A generous assessment of measurement error would be ±30 μGal.

3. Variation in hub to height elevation. The height of the gravimeter base above the ground varied from reading to reading by up to 5 cm. This would introduce a maximum error of ± 15 μGal into the gravity measurements.

4. GPS elevation errors. Each GPS station location measurement was repeated 3 times and the deviation of each of these measurements from the mean is an indication of the likely error in elevation. The cumulative frequency distribution of 769 GPS elevation errors is shown below. The average deviation from the mean for the entire data set was 0.417 m and 77% of all errors were less than 0.600 m. If the latter is taken as an estimate of the average real error in GPS elevations, this would translate into an average gravity measurement error of ±120 μGal.





5 *Near station terrain correction error* The near station terrain correction is prone to errors by incorrectly averaging the terrain elevation in a sector and by incorrectly estimating the slope for portions of the topography not visible to the operator at the station If errors in the order of ± 2 m are assumed for the two inner zones and errors of ± 5 m are assumed for the outer zone (50-200 m), the terrain correction error would

be about ±50 μGal.

6. Far station terrain correction error. The error introduced by the far station terrain correction is created by errors in the base topographic maps, by errors introduced by gridding and by errors in station location. Error in station location should introduce minimal error because the near station terrain correction covers the 200 m surrounding the station and error in station location is in the order of 1 - 2 m at a maximum. The influence of the other factors cannot be reliably estimated.

7. Summary. The overall gravity measurement error is the sum of the errors:

Source of error	**Error (μGal)**
Gravimeter drift	±5
Gravity measurement error	±30
Hub elevation error	±15
GPS elevation error	±120
Near station terrain correction error	±50
Estimate of overall gravity measurement error	***±220***

13.0 RESULTS

Appendix E contains a listing of the gravity and topographic survey data showing all corrections in sequential order. The gravity data is posted and colour contoured in Figure 3 (back pocket). This plot shows the data overlain on topography (black line contours). A CD-ROM is appended to this report with the following digital data products:

Summary spreadsheet	**HEM Gravity.xls** (Excel 2000). Summary showing the DGPS corrected locations, raw gravity with SD's, and all corrections applied to the gravity. Separate worksheets contain summaries of repeat gravity and GPS readings and of correction parameters.

GPS data	**HEM GPS zip** (WinZip) Base and rover SSF files as collected and unedited Base files are in GPS day/hour (Trimble) name format Rover file names are LRS ssf (L-line, R-repeat (one of A,B,C), S-station number)
Raw gravity	**HEM raw grav zip** (WinZip) Unedited dump files The Line in each file is the survey day numbered from day 1 (July 17) Stations are numbered from the beginning of the day
Digital terrain models	**DTMs zip** Outer and Inner digital terrain models in NAD27 UTM coordinates DTM models are in ASCII XYZ format
Near station terrain measurements	**HEM near terrain xls** - spread sheet containing the relative terrain elevations in the following format Line Station Zone 1 (2-20m) (6 readings - Δz in metres) Zone 2 (20-50m) (6 readings - Δz in metres) Zone 3 (50-200m) (6 readings - Δz in metres)

The Bouguer gravity consists of a broad regional arcuate high which trends east-west across the length of the survey area and has an amplitude of 2 5 mGal above background Superimposed on the axis of this regional feature is a local Bouguer high with a maximum amplitude of 6 0 mGal above background, a strike length of 8 2 km and a half-amplitude width of 2 4 km The local high consists of a large western peak and a subsidiary eastern high Ground magnetic data currently extends across only the eastern gravity high In this area, the magnetic response consists of a broad 160 nT high, trending east-west along an axis centred approximately 500 m south of the gravity anomaly

14 0 CONCLUSIONS

The gravity and magnetic field responses at the HEM Property are broadly similar to those at the Minotaur Resources discovery and to the Olympic Dam deposit The total magnetic field anomaly is 500 m south of the Bouguer gravity high and both the gravity and total magnetic field anomalies are parallel, following the same regional trend The gravity and magnetic field surveys have thus identified a target with a geophysical setting similar to that expected from an iron oxide copper gold deposit

Both the gravity and total magnetic field data set in the target area are incomplete. The gravity data set requires supplemental measurements on the axis of the anomaly and along the flanks of the peak gravitational response. In addition, it would be useful to collect a few more data points in the surrounding area to better define the regional trend and the survey should be tied into the GSC regional gravity network. The total magnetic field survey grid should be expanded to cover the entire strike length of the Bouguer anomaly.

15.0 RECOMMENDATIONS

The conclusions lead to the following recommendations:

a. The total magnetic field and Bouguer gravity coverage should be extended and the density of gravity station coverage should be increased to better define the extent of the geophysical anomalies.

b. A complete data set would merit comprehensive three dimensional modeling in order to define an optimum drill target. This is particularly necessary in view of the fact that testing may occur in an area where the target is covered by Paleozoic limestone.

c. The gravity anomaly defined by the survey should be tested by drilling at a location where the combined total magnetic field and gravity survey results indicate the most likely location for shallow iron oxide copper gold mineralization.

Respectfully submitted,
AURORA GEOSCIENCES LTD.

M.A. Power M.Sc. P.Geoph.(NT)
Geophysicist

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APPENDIX A. CERTIFICATE

I, Michael Allan Power, M.Sc. P.Geo., P.Geoph., with business and residence addresses in Whitehorse, Yukon Territory do hereby certify that:

1. I am a member of the Association of Professional Engineers and Geoscientists of British Columbia (registration number 21131) and a professional geophysicist registered by the Northwest Territories Association of Professional Engineers, Geologists and Geophysicists (licensee L942).

2. I am a graduate of the University of Alberta with a B.Sc. (Honours) degree in Geology obtained in 1986 and a M.Sc. in Geophysics obtained in 1988.

3. I have been actively involved in mineral exploration the Northern Cordillera since 1988.

4. I have no interest, direct or indirect, nor do I hope to receive any interest, direct or indirect, in Copper Ridge Explorations Ltd. or any of its properties.

Dated this 25th of November, 2002 in Whitehorse, Yukon.

Respectfully submitted,

REGISTERED PROFESSIONAL GEOPHYSICIST

LICENSEE

28Nov02

N.W.T.

Michael A. Power M.Sc. P. Geoph.

APPENDIX B. SURVEY LOG

AURORA GEOSCIENCES LTD.

GRAVITY SURVEY LOG
JOB KRX-02-001-YT
COPPER RIDGE EXPLORATIONS INC.

Period:	July 16th, 2002 - August 3rd, 2002
Personnel:	Felix Gagne
Tue 16 Jul 02	Mobe Drove from Whitehorse to Dawson. Arrived in camp late in the evening.
Wed 17 Jul 02	Survey Late start and slow going because terrain is really soft in the valleys and gravimeter hard to level. Production : 9 stations.
Thur 18 Jul 02	Survey Production : 17 stations.
Fri 19 Jul 02	Survey Problems with the GPS, 5 consecutive points not corrected. Tomorrow, elevation mask on rover at 20° rather than 15° as before. Production : 18 stations.
Sat 20 Jul 02	Survey Helper had to leave at noon for Dawson. Production : 6 stations.
Sun 21 Jul 02	Survey Production : 15 stations.

Mon 22 Jul 02	Survey Production : 26 stations.
Tue 23 Jul 02	Survey Production : 16 stations.
Wed 24 Jul 02	Survey DTM registered to NAD83; will be changed tomorrow. Production : 16 stations.
Thur 25 Jul 02	Survey DTM transformed to NAD27; data re-corrected. Production : 17 stations.
Fri 26 Jul 02	Survey Production : 13 stations.
Sat 27 Jul 02	Survey Problems with the GPS base station again, last 3 points not corrected. Tested GPS during the evening; works fine. Production : 18 stations.
Sun 28 Jul 02	Survey Production : 5 stations.
Mon 29 Jul 02	Survey Production : 17 stations.
Tue 30 Jul 02	Survey Production : 26 stations.
Wed 31 Jul 02	Survey Production : 18 stations.
Thur 01 Aug 02	Survey Production : 14 stations.
Fri 02 Aug 02	Survey GPS resurvey of stations 11-16, 11-17 & 11-18. Production : 11 stations.

Sat 03 Aug 02	Demobe Drive from Dawson to Whitehorse
Summary:	

Survey Days	17
Gravity Stations	261

APPENDIX C. INSTRUMENT SPECIFICATIONS

GPS Pathfinder Systems

GPS systems for better data management and decision-making

Key features and benefits

- **Fast map display**
- **Easy to use graphical interface**
- **High-performance DGPS receivers**
- **Better accuracy with postprocessing**
- **Rugged and field proven**

Trimble's GPS Pathfinder® Systems are effective tools for data collection, update, and processing. This versatile family offers a variety of software, data collector, and GPS receiver options that are powerful, easy to use, and integrate seamlessly with industry-standard GIS databases. With a GPS Pathfinder System, you'll have the most accurate, current, and reliable data you need to make the best decisions.

Trimble GPS Pathfinder Systems are rugged and field-proven

Productive field software

Timesaving field software is essential for productive GIS data collection and data maintenance.

With Trimble's field software options, you can quickly and easily collect point, line, and area features, along with customized attribute information. Our field software makes it easy to take existing data from your GIS into the field for verification and update. In the field, your productivity will be enhanced by better graphics. A fast map display allows you to display background data and imagery, to ensure you're working in the right location, with the right data. And flexible map symbology enables you to tailor your data display to match your GIS.

Trimble offers two field software solutions for collecting and maintaining quality data:

TerraSync™ software operates on Trimble's rugged GIS TSCe™ field device, or any Windows field computer.

Asset Surveyor® software runs on Trimble's rugged, field-proven TSC1™ data collector.

Accurate and reliable data

Trimble's GPS Pathfinder System receivers offer real-time differential GPS (DGPS) and postprocessing options. Real-time DGPS provides you with immediate results in the field—great for navigation, and relocation of existing assets. Postprocessing enables you to improve the reliability and accuracy of your data when you're back in the office.

The GPS Pathfinder Power receiver integrates GPS, real-time satellite differential, and Wide Area Augmentation System (WAAS) capabilities into a single, lightweight unit.

The GPS Pathfinder Pro XR system integrates GPS, real-time beacon, and WAAS capabilities.

The GPS Pathfinder Pro XRS system integrates GPS, real-time beacon, satellite differential, and WAAS capabilities.

The best data for your GIS

The GPS Pathfinder Office software gives you the tools to manage your GPS projects from start to finish. With it, you can define your field data collection requirements and control the quality of your data. The result is more consistent, reliable, and accurate data for your GIS.

The GPS Pathfinder Systems family offers you a variety of software, data collector, and GPS receiver options. Choose the solution that meets your requirements, and realize the benefits of better decisions based on better data.

Trimble

GPS Pathfinder Systems

Versatile GIS data collection and maintenance

FEATURES AND OPTIONS

GPS Pathfinder Systems Standard Features

- GPS Pathfinder Office software
- Choice of GPS receiver
- Choice of field software
- Ergonomic backpack carrying system
- Rechargeable system batteries (provide 8 hours of field use)
- Battery charger and AC power supply

Optional Receiver Accessories

- Vehicle kit: includes cigarette lighter power adapter, quick release, 2 quick-release adapters, and magnetic mount
- GPS Pathfinder Centimeter Processing option

Available Receivers and Standard Features

- GPS Pathfinder Pro XRS receiver
- GPS Pathfinder Pro XR receiver
- GPS Pathfinder Power receiver

- 12-channel GPS receiver
- EVEREST™ multipath rejection technology
- WAAS differential correction capabilities

Available Field Software

- Asset Surveyor software for Trimble TSC1 data collector
- TerraSync software for Trimble GIS TSCe field device, and Windows field computers

GPS PATHFINDER POWER RECEIVER/ANTENNA SPECIFICATIONS

- Integrated GPS/Satellite Differential receiver and antenna
- RTCM input

General:	12 channel, L1/CA code tracking with carrier phase filtered measurements.
Update rate:	1 Hz
Power:	3.1 Watts, 9 to 32 VDC
Accuracy (RMS) (Note A):	
MCORR400 differential correction:	Submeter + 1 ppm on a second-by-second basis (horizontal)
	Submeter + 2 ppm on a second-by-second basis (vertical)
Carrier phase processing:	30 cm + 5 ppm with 5 minutes tracking satellites
	20 cm + 5 ppm with 10 minutes tracking satellites
	10 cm + 5 ppm with 20 minutes tracking satellites
	1 cm + 5 ppm with 45 minutes tracking satellites (with Centimeter Processing option)
RTCM satellite differential correction:	Better than 1 meter (Note B)
Time to first fix:	30 seconds (typical)
Size:	15.2 cm diameter x 12.7 cm high (6" x 5")
Weight:	0.625 kg (1.38 lbs)
Temperature:	−30°C to +60°C (−22°F to +140°F) (operating)
	−40°C to +80°C (−40°F to +176°F) (storage)
Humidity:	100% fully sealed
Casing:	Fully sealed, dustproof, waterproof, shock resistant

GPS PATHFINDER PRO XR AND PRO XRS RECEIVER & ANTENNA SPECIFICATIONS

GPS Pathfinder Pro XR

- Integrated GPS/Beacon receiver
- Integrated GPS/Beacon antenna
- RTCM input/output
- 3 meter antenna cable
- Base datalogging mode

GPS Pathfinder Pro XRS

- Integrated GPS/Beacon/Satellite Differential receiver
- Integrated GPS/Beacon/Satellite Differential antenna
- RTCM input/output
- 3 meter antenna cable
- Base datalogging mode

TRIMBLE TSC1 DATA COLLECTOR SPECIFICATIONS

Screen	240 x 200 extended temperature graphics STN LCD monochrome display
Size:	26 7 cm x 11 7 cm x 4 2 cm (10 5" x 4 6 x 1 65)
Weight.	0 85 kg including internal battery
Temperature:	-30°C to +65°C (-22°F to +149°F) (operating)
	-30°C to +80°C (-22°F to +176°F) (storage)
Environmental	100% fully sealed against sand dust and moisture buoyant waterproof against accidental immersion
COM ports:	Two RS232 7 pin lemo ports
Memory	2 MB (storage) memory extension through user accessible Type II ATA PC card slot (Note E)
Batteries:	The internal Li-ion battery will last for at least 10 hours In the field the TSC1 will draw power from the GPS receiver's power source when possible

(footnotes)

Note A At least 5 satellites PDOP ≤6 signal to noise ratio ≥6 satellite elevation mask at 15 degrees.

Note B RTCM SC 104 standard format broadcast from a Trimble reference station

Note C Frontlight has an operation temperature of >0°C

Note D 30 hours of operation is achievable without using the frontlight.

Note E. Memory extension through user accessible Type II PC card slot 16 MB PCMCIA Data Cards are available (33050 16)

Trimble follows a policy of continuous product improvement Specifications are therefore subject to change without prior notice

For further information contact your nearest Trimble Authorized Distributor or Trimble Office Please visit our web site at www trimble com

Trimble

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Singapore
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011-65 348-2232 Fax

TRIMBLE AUTHORIZED DEALER

GPS Pathfinder Pro XR receiver

General	12 channel L1/CA code tracking with carrier phase filtered measurements and multibit digitizer
Update rate	1 Hz
Power	6 Watts (maximum) 10 to 32 VDC
Accuracy (RMS) (Note A)	
MCORR400 differential correction:	50 cm + 1 ppm on a second-by-second basis (horizontal)
	Submeter + 2 ppm on a second-by-second basis (vertical)
Carrier phase processing:	30 cm + 5 ppm with 5 minutes tracking satellites
	20 cm + 5 ppm with 10 minutes tracking satellites
	10 cm + 5 ppm with 20 minutes tracking satellites
	1 cm + 5 ppm with 45 minutes tracking satellites (with Centimeter Processing option)
RTCM beacon radio transmissions:	Better than 1 meter (Note B)
Time to first fix:	30 seconds (typical)
Size:	11 1 cm × 5 1 cm × 19 5 cm (4 4 × 2 0 × 7 7)
Weight.	0 76 kg (1 68 lbs)
Temperature:	-30°C to +65°C (-22°F to +149°F) (operating)
	-40°C to +85°C (-40°F to +185°F) (storage)
Humidity	100% fully sealed
Casing:	Dustproof splashproof shock resistant sealed to 5 psi

GPS Pathfinder Pro XRS receiver

Specifications for the Pro XRS receiver are the same as for the Pro XR receiver with the following exceptions

Power	7 Watts (maximum) 10 to 32 VDC
Accuracy (RMS) (Note A)	
RTCM satellite differential correction:	Better than 1 meter (Note B)

GPS Pathfinder Pro XR antenna

General	Right-hand circular polarized omnidirectional hemispherical coverage
Size:	15 5 cm diameter × 10 8 cm high (6 1" × 4 2")
Weight.	0 49 kg (1 08 lbs)
Temperature:	-30 C to +65°C (-22°F to +149 F) (operating)
	-40°C to +85°C (-40°F to +185°F) (storage)
Humidity	100% fully sealed
Casing:	Dustproof waterproof shock resistant

GPS Pathfinder Pro XRS antenna

Specifications for the Pro XRS antenna are the same as for the Pro XR antenna with the following exceptions

Size:	15 5 cm diameter × 14 cm high (6 1 × 5 5)
Weight:	0 55 kg (1 2 lbs)

TRIMBLE GIS TSCe FIELD DEVICE SPECIFICATIONS

Screen.	320 x 240 color touch screen 1/4 VGA reflective color TFT
Size:	25 8 cm x 13 cm x 5 2 cm (10 2" x 5 1" x 2 1)
Weight:	0 99 kg including internal battery
Temperature:	-20°C to +60°C (+14°F to +140°F) (operating) (Note C)
	-30°C to +60°C (-22°F to +140°F) (storage)
Environmental	Meets IEC 68 EN61000 MIL STD-810E standards for temperature moisture and immersion dust and sand drop test shock vibration and altitude IP 67 sealed against temporary immersion
COM ports:	9-Pin serial port RS232 (COM 1)
	26 Pin MultiPort (COM 2 Ethernet USB client power in/out and audio in/out)
	Infrared IrDA Type 1 (COM 3)
Memory	128 MB (storage)
	64 MB (RAM)
Batteries:	NiMH rechargeable pack 3800 mAh gives continuous operation for over 30 hours recharges to 90% of capacity in 1 hour (Note D)

REFERENCE INFORMATION

AUTOGRAV SPECIFICATIONS

Reading Resolution:	CG-3: 0.005 milligal CG-3M: 0.001 milligal
Minimum Operating Range:	7000 milligals, without resetting.
Residual Long-term Drift:	Less than 0.02 milligal/day.
Typical Repeatability in field use:	CG-3: less than 0.01 mGal standard deviation. CG-3M: less than 0.05 mGal standard deviation
Range of Automatic Tilt correction:	±200 arc sec.
Dimensions:	240mm x 310mm x 320mm.
Weight:	11 kg, including standard battery.
Power Consumption:	5 W at +25°C.
Operating Temperature Range:	-40°C to +45°C. Optionally high temp. to +55°C.
Interval Between Readings in CYCLING Mode:	Adjustable from 6 to 99999 seconds
Standard Memory:	48K RAM internal solid-state memory records up to 1290 gravity observations. .

Optional Accessories

Carrying Bag:	
Communications:	RS-232 cable, adaptor and IDUMP software
RS-232C Cable and Adaptor:	Includes a special RS-232C data transfer cable and adaptor. Used for communicating with peripheral devices.
Display Heater:	Required for cold weather operation. Powered by main batteries, thermostatically controlled to turn off above -20°C
Minor Spare Parts Kit:	
Operations Manual:	

Optional Accessories

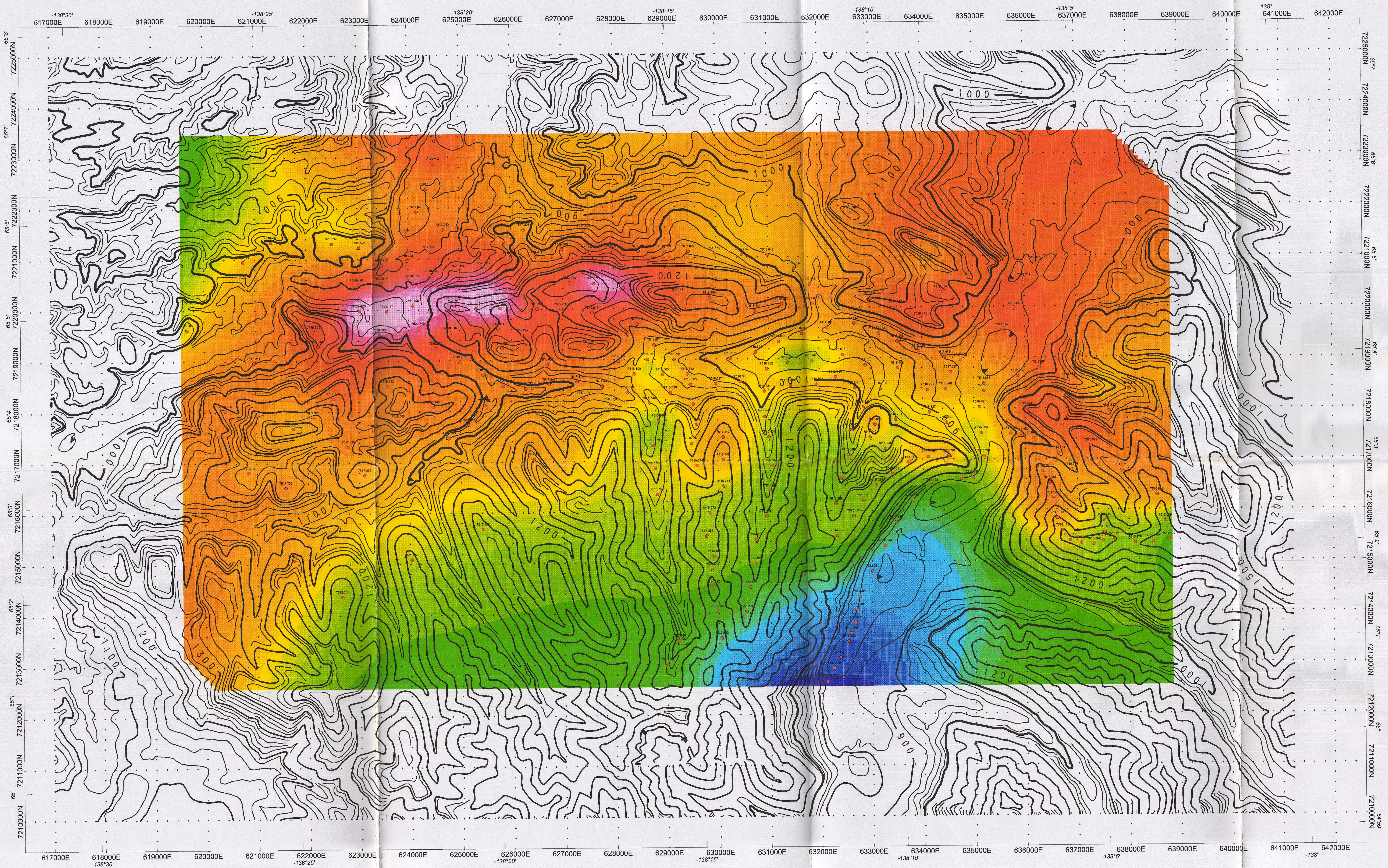
Belt Battery Pack:	The operator wears the Belt Battery Pack inside their coat during cold weather to keep rechargeable batteries warm. This extends the lifetime of the batteries.
Chart Recorder Cable:	This cable interfaces with any standard chart recorder
External Power Cable:	Required for operation of the instrument from an external 12V DC power supply or battery
Backpack:	For transporting the CG-3 over long distances or in difficult terrain.
High Temperature Option:	Fo operating up to +55°C
Elevation Options:	Scintrex can provide a variety of devices for elevation and positional control.
Peripheral Devices:	Scintrex can recommend and supply suitable digital printers, microcomputers, modems and other peripherals.

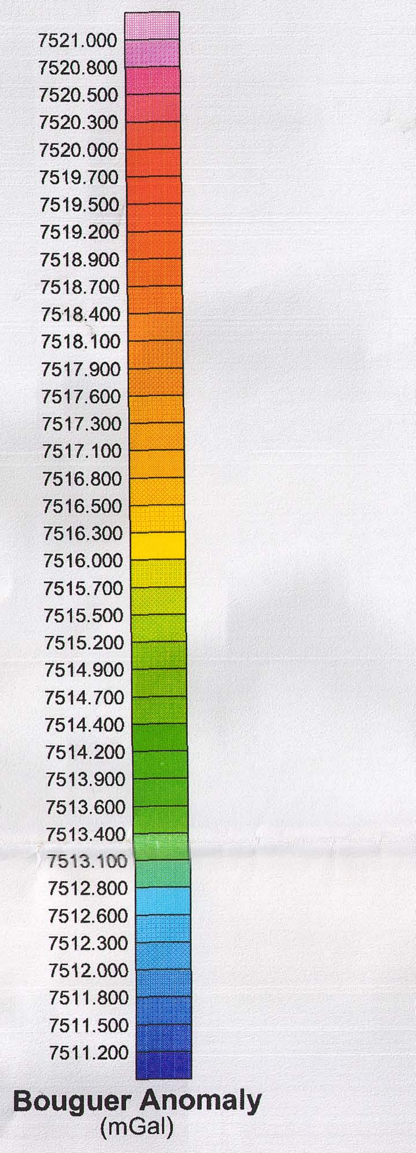
Noise Rejection:	Samples of more than 4 standard deviations from the average are rejected, if this feature is selected upon initialization of the instrument.
Displayed and Recorded Data:	Corrected Gravity, Standard Deviation, Tilt about the X-axis, Tilt about the Y-axis, Gravity Sensor Temperature, Tidal Correction, Duration of Measurement, Time at start of measurement and Header Information (including date and initialization constants).
Digital Display:	80 character, 4 line LCD display.
Keypad Input:	14 keys for entering all commands, co-ordinates, header and ancillary information
Real Time Clock:	Day, month, year, hour, minute and second. One second resolution, one second stability over 24 hours over the operating temperature range.
Digital Data Output:	RS-232C serial interface. Data outputs in 7 or 8 bit ASCII, one start, two stop bits, no parity format. Baud rate is selectable at 110, 300, 600, 1200 and 2400 baud. Carriage return delay is keyboard selectable in increments of one from 0 to 999. X-ON/X-OFF handshaking protocol.

STANDARD ACCESSORIES

Tripod:	Gravity meter tripod with built-in bubble level — 1.0 kg. 0.5 m leg extensions —1.0 kg.
Battery:	Two 7.2 Ah; 2.2 kg.
Battery Charger:	115/230V AC; 50/60 Hz

APPENDIX D. GRAVITY SURVEY DATA COMPILATION





REGISTERED PROFESSIONAL GEOPHYSICIST
M. A. POWER
LICENSEE
25 NOV 02
N.W.T.

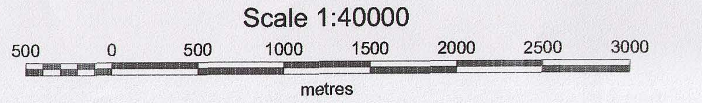
Gravity survey

Gridding: Minimum curvature
Cell size: 100 m
Colour contour interval: 0.100 mGal
Illumination: N0E / -45
Postings: Final Bouguer gravity
Measurement station at circle centre

Topographic data

Digital terrain model
NAD1927 / Yukon
Elevations in metres ASL
Contour intervals: 20, 100, 1000 m

Scale 1:40000



NAD27 / UTM zone 7N

COPPER RIDGE EXPLORATIONS INC.

Bouguer Anomaly Map
Figure 3.

NTS: 116G 1/2
Mining District: Dawson

Datum: NAD27 (Yukon)
Date: 25 Nov 02

AURORA GEOSCIENCES LTD.

→ Shawn Ryan

AURORA GEOSCIENCES LTD.
GEOLOGY & GEOPHYSICS

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INVOICE

GST No.: RT886365816
File: KRX-02-001-YT

Invoice #001
August 8, 2002

In account with: **Copper Ridge Explorations Inc.**
Suite 500 - 625 Howe Street
Vancouver, B.C.
V6C 2T6

Re: HEM Gravity Survey

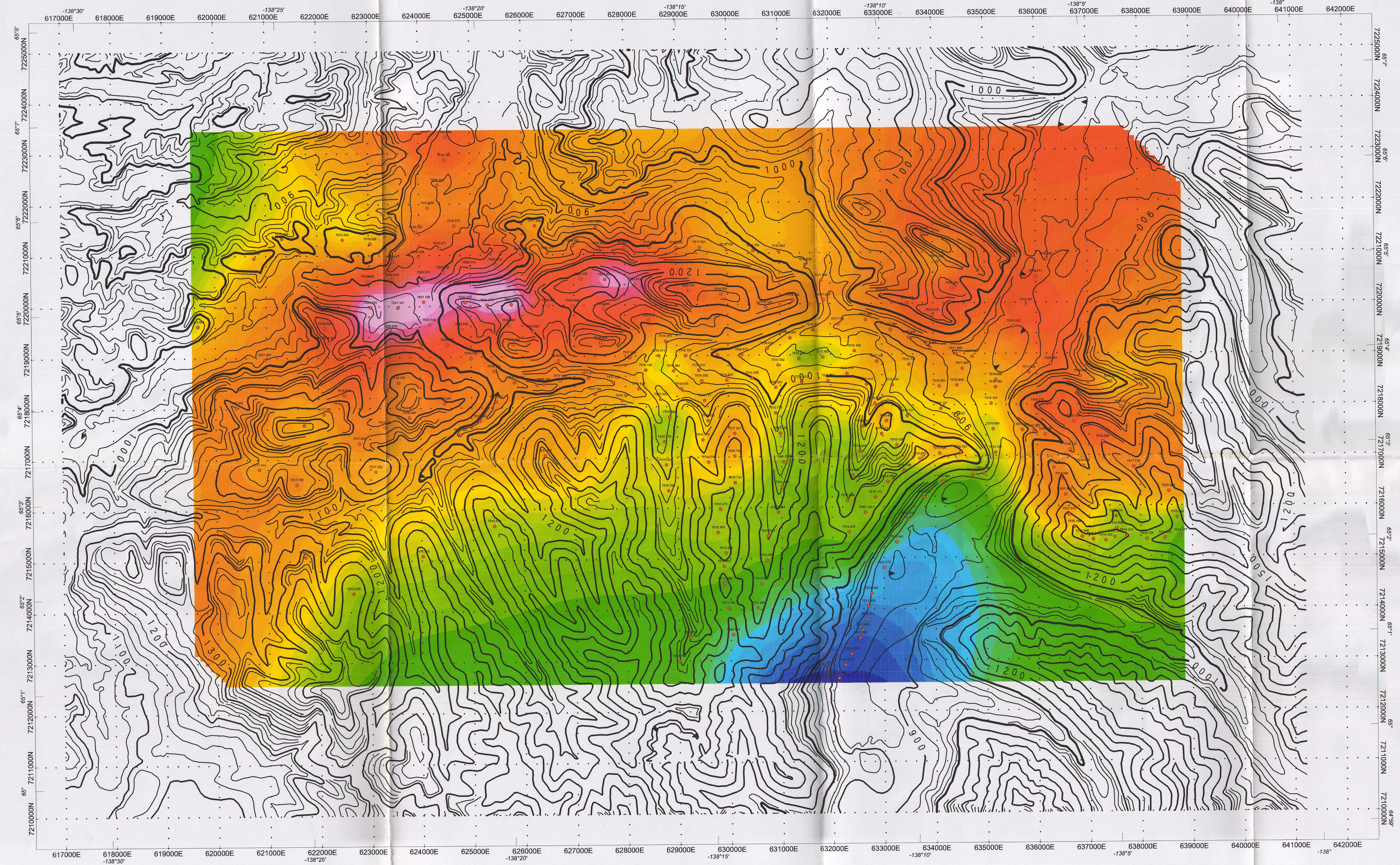
Professional Services

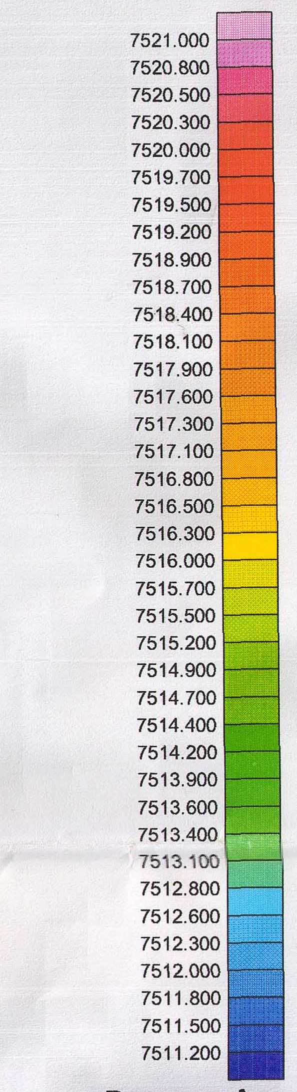
Mobe/Demobe		
Fixed price as per contract		$1,500.00
Gravity Survey		
17 days @ $870.00/day		$14,790.00
	Subtotal	$16,290.00
	Federal GST	$1,140.30
	Subtotal	$17,430.30
	Less Advance	-$4,000.00
	Total Owing	**$13,430.30**

HEM Project
Flow-through account.

POSTED
2453

Terms: Net 15 days. Interest charged at 2% per month on overdue accounts





Bouguer Anomaly
(mGal)

REGISTERED PROFESSIONAL GEOPHYSICIST
M. A. POWER
LICENSEE
25 NOV 02
N.W.T.

Gravity survey

Gridding: Minimum curvature
Cell size: 100 m
Colour contour interval: 0.100 mGal
Illumination: N0E / -45
Postings: Final Bouguer gravity
Measurement station at circle centre

Topographic data

Digital terrain model
NAD1927 / Yukon
Elevations in metres ASL
Contour intervals: 20, 100, 1000 m

Scale 1:40000

500 0 500 1000 1500 2000 2500 3000

metres

NAD27 / UTM zone 7N

COPPER RIDGE EXPLORATIONS INC.

Bouguer Anomaly Map
Figure 3.

NTS: 116G 1/2
Mining District: Dawson

Datum: NAD27 (Yukon)
Date: 25 Nov 02

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