ASSESSMENT REPORT
YUKON OLYMPIC PROJECT

HEM 1-78 and HEM 79-88 Claims

Dawson Mining District, Yukon
NTS 116 G/1
65° 04' N; 138 ° 12' W

2002 Field Program

For
Copper Ridge Explorations Inc.
500-625 Howe Street
Vancouver, B.C. V6C 2T6

RECEIVED
MAR 0 3 2003
MINING RECORDER'S OFFICE
DAWSON, Y.T.

Work dates:
24 June -6 August 2002

By

Gerald G. Carlson, Ph.D., P.Eng.
Copper Ridge Explorations Inc.
February 20, 2003

094403

Costs associated with this report have been
approved in the amount of $ 44,000
for assessment credit under Certificate of
Work No. 200419, x2000438

K. Perry
Mining Recorder
Dawson City Mining District

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Introduction

The target at Yukon Olympic (formerly HEM) is an iron oxide copper-gold ("IOCG") deposit, similar to Olympic Dam in Australia (2,000 million tonnes of 1.6% Cu, 0.06% U_3O_8, 0.6 gpt Au, 3.5 gpt Ag). Mineralization at Yukon Olympic consists of an extensive area of hematite-rich breccia, associated intrusive rocks of intermediate to mafic composition and a variety of feldspar, silica and carbonate alteration. Copper mineralization occurs as disseminated blebs of chalcopyrite within intrusive rocks and with specular hematite in the breccias. Many exposures are stained with secondary copper minerals. Breccias and associated copper mineralization have now been shown to occur intermittently over at least six kilometers. Very limited sampling has shown that the breccia is also enriched in rare earth elements, barium, fluorine and zinc. Further sampling is required to more accurately assess the chemistry of this intrusive-breccia complex.

The Yukon Olympic breccia occurs at a flexure along a regional, east-west trending structure as defined by aeromagnetics. The breccia itself is related to aeromagnetic and gravity highs that are elongated parallel to this trend, in the central part of the property. The 2002 field program defined a +4.5 mGal gravity anomaly that is in excess of 8 km in length and over 1 km wide, believed to reflect hematitic breccia below a thin cover of Paleozoic sediments. The gravity anomaly has a large western peak and a subsidiary eastern high. The anomaly is related to, but not coincident with, the regional magnetic anomaly. A preliminary review of the data suggests that the gravity anomaly may reflect hematite-rich breccias, while the magnetic anomaly may be caused by magnetite-bearing intrusive rocks at depth. This interpretation is strengthened by the fact that the easternmost portion of the gravity anomaly trends into the Spectacular Creek breccia occurrence that locally contains copper mineralization. The pattern at Yukon Olympic with the gravity anomaly being displaced from the magnetic anomaly also conforms to the Olympic Dam model. Within the area of the main gravity anomaly, a thin veneer of younger limestone covers the target rocks.

Accessibility and Physiography

The Yukon Olympic property is located 130 km north-northeast of Dawson in the north central Yukon in the Dawson Mining District (see Figure 1).

Access to the property is by the Dempster Highway or by helicopter from Dawson. By road, the Dempster Highway turn-off is 50 km from Dawson and the property an additional 105 km north along the highway.

The Yukon Olympic claim group is transected by the Blackstone River and the Dempster Highway. Elevations range from 850 m at river level to 1600 m on the highest ridges. The majority of the claim area is above tree line.

Most of the property can be accessed by foot. Helicopter and a small tracked personnel carrier have been used for more remote access within the property and canoe has been used for crossing the Blackstone River to access the eastern part of the claim group.

Climate is typical for northern Yukon, with long cold winters, but minimal snow cover. Summers are warm and typically dry. The field season usually runs from early June until mid-September, although for drilling and for geophysical surveys, this season can be extended significantly, from March to October.

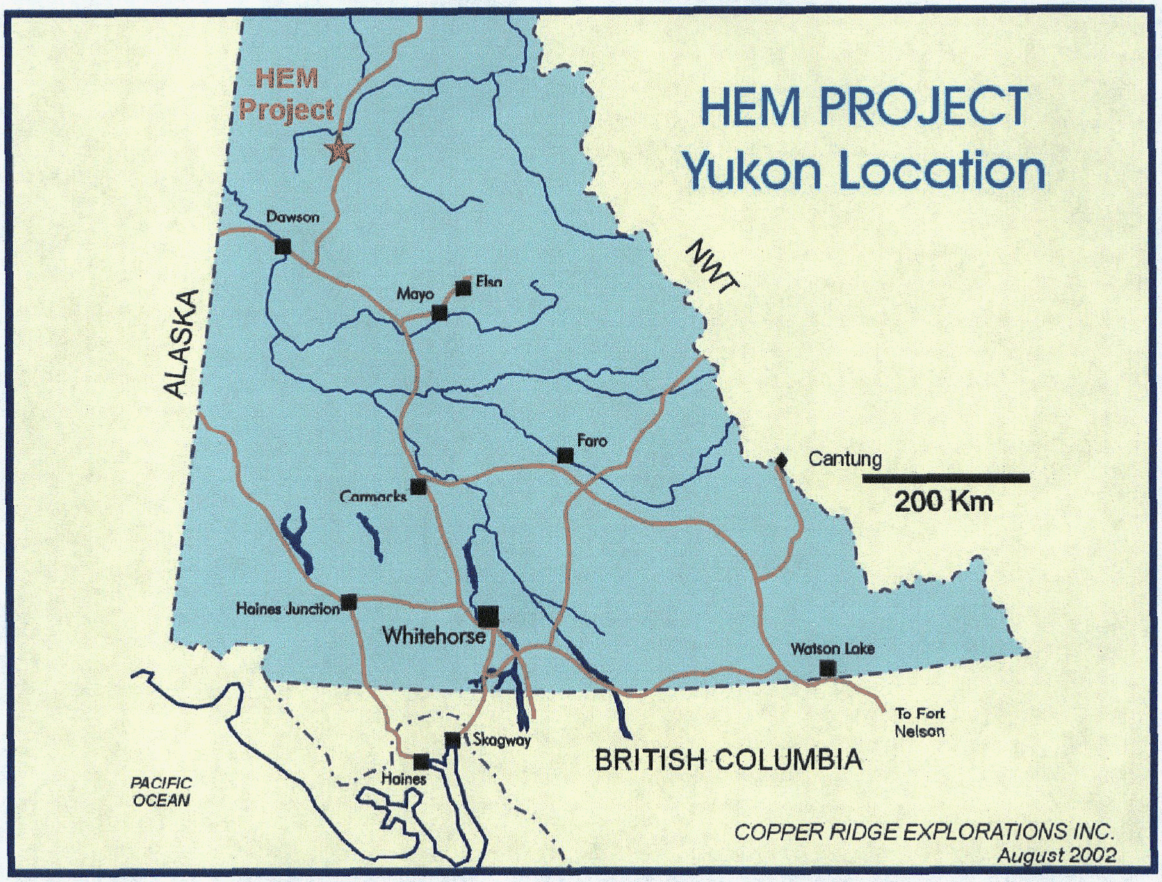


Figure 1. Yukon Location Sketch.

Property Description and Location

The Yukon Olympic property consists of 377 claims (see Appendix A) with a total area of approximately 8,300 hectares located along the Dempster Highway, north of Dawson City, Yukon (see Figure 2).

Pursuant to an arm's length agreement between Copper Ridge and the vendor, Copper Ridge has the right to acquire a 100% interest in the 98 unpatented quartz claims, plus 279 additional claims staked subsequently, comprising the Yukon Olympic property. The Company must spend $600,000 over five years and make cash payments of $105,000 over three years. In addition, Copper Ridge must issue 800,000 additional shares to the vendor upon reaching certain advanced exploration and development benchmarks on the property. The vendor retains a 1.5% net smelter return royalty, of which 0.75% can be purchased for $2,000,000.

On September 25, 2002, the Company announced that it had reached agreement with Canadian Empire Exploration Corp. whereby Canadian Empire can earn a 51% interest in the Yukon Olympic property by making staged exploration expenditures totaling $1.5 million and staged share payments totaling 900,000 shares to Copper Ridge by December 31, 2005. Upon earn-in, a joint venture will be formed with Canadian Empire contributing to 51% and Copper Ridge contributing to 49% through completion of a preliminary feasibility study after which Teck Cominco will have the right to earn a 51% interest in the project by incurring 200% of prior exploration expenditures and completing a final feasibility on the project. Should Teck Cominco earn 51%, Canadian Empire would hold 25% and Copper Ridge 24% assuming that each party had maintained their interests through preliminary feasibility. Western Prospector facilitated the acquisition of the Yukon Olympic property by completing initial due diligence and securing the property in consideration of 100,000 shares to be paid to Copper Ridge. In consideration for assignment of the agreement to Canadian Empire, Western Prospector will be paid 200,000 units of Canadian Empire and will have the future right to purchase 50% of an NSR royalty held by an underlying vendor. Copper Ridge has agreed to pay a 100,000 share finder's fee for the introduction to Western Prospector. Copper Ridge has the right to earn a 100% interest in the property subject to a 1.5% NSR. The agreements will be subject to regulatory approval.

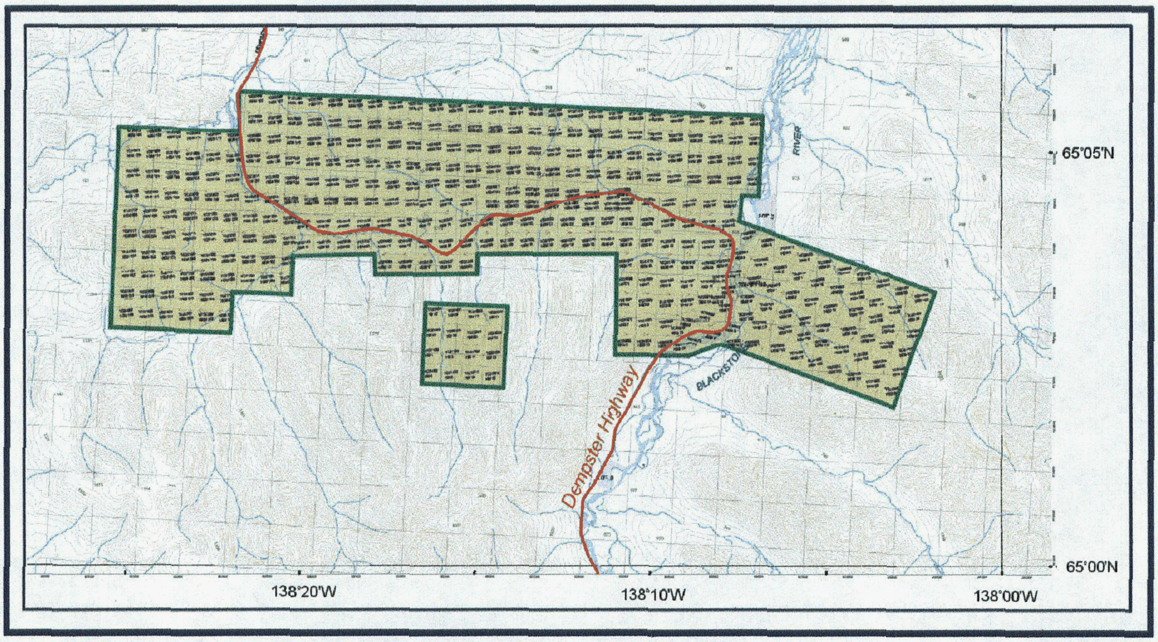


Figure 2 Yukon Olympic claim group.

History

A small part of what is now the Yukon Olympic property was staked and briefly evaluated by a junior exploration company in 1993 and was allowed to lapse the following year. The current Yukon Olympic property was staked by prospector Shawn Ryan in 2000 and 2001. Ryan carried out prospecting and rock sampling during 2001 and early 2002 and located several new copper occurrences.

Geological Setting

Recent studies have suggested that the Stuart Shelf area of Australia that hosts Olympic Dam and the Ogilvie-Wernecke trend in the Yukon were a part of the same land mass, 1.6 billion years ago at the time of breccia formation. This work also suggests that the breccias and mineralization in both areas formed in response to extensional tectonics and related intrusive activity that affected the entire belt.

The property lies along a regional structure as indicated by regional aeromagnetics. The Yukon Olympic property occurs at a large magnetic high on this trend, possibly reflecting a buried intrusive centre, and it also occurs at a flexure point along the structure.

The property (Figure 3) is underlain by Proterozoic Quartet Group shale and siltstone. These rocks have been intruded by a variety of gabbroic intrusives and related hematitic breccia bodies. The main breccia mass, east of the Blackstone River, covers an area of approximately 1.5 km by 1 km, with an additional occurrence noted six km to the west. The breccias are of Proterozoic age and correlate with many known hematitic breccias elsewhere in the Ogilvie Mountains and in the Wernecke Mountains further to the east.

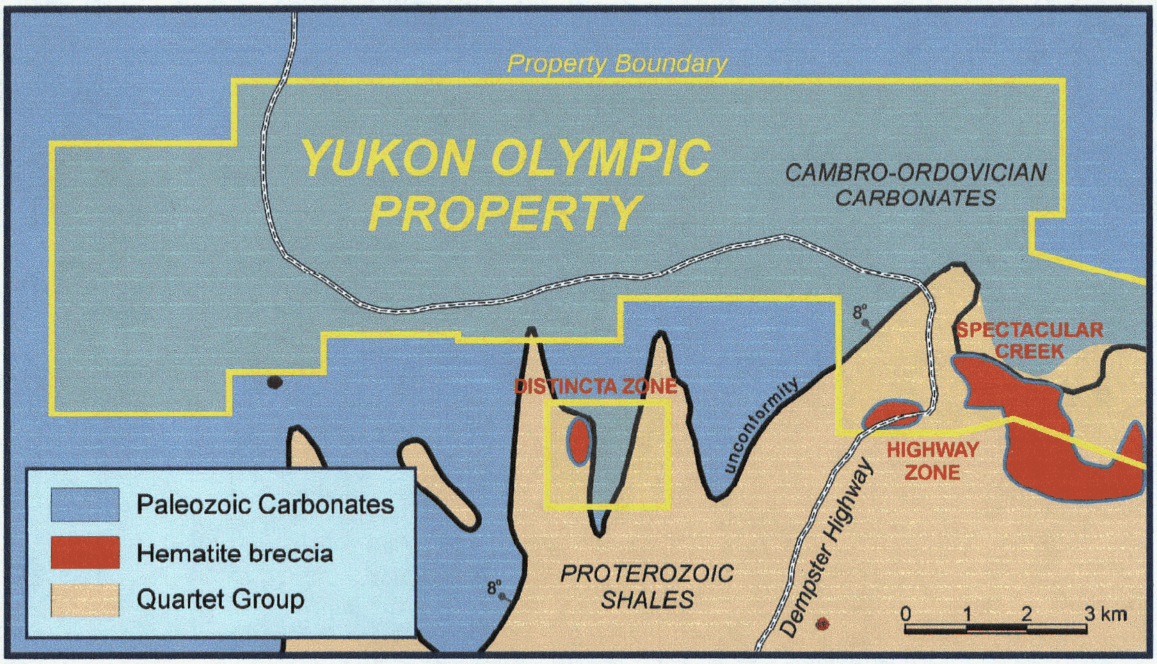


Figure 3. Yukon Olympic property general geology (from GSC digital geology).

The Proterozoic rocks are in turn overlain unconformably by Paleozoic sedimentary rocks, predominantly massive to bedded Cambrian limestone, in turn overlain by basinal shale to siltstone sequences. The Proterozoic to Cambrian unconformity is flat to gently north dipping (see Figure 4).

Exploration

During the summer of 2002, Copper Ridge completed ground geophysical surveys including 90 line km of magnetics plus 261 gravity stations covering an area of approximately 140 square km. The results of this work are summarized in Figure 4.

The magnetometer survey confirmed the magnetic patterns identified in the earlier, high level government airborne survey. A broad magnetic anomaly occurs on the eastern side of the property, east of the Blackstone River and trends in a linear fashion, with decreasing size and intensity, to the west. This linear trend increases again to a smaller magnetic high in the western portion of the property. The magnetic anomaly is believed to reflect the presence of a magnetite-bearing intrusive, or intrusives, at depth. The area covered by the ground survey was not sufficiently large to completely define these airborne magnetic high anomalies. A copy of the magnetometer survey report is included as Appendix xx to this report.

The gravity survey appears to have defined two separate features. On a property-wide scale, it shows increasing gravity to the north. This may reflect increasing thickness of limestone above the regional unconformity. The limestone is expected to have a slightly higher density than the basement siltstones and shales of the Quartet group. Superimposed on this is a linear gravity high, with a contrast ranging from 2 to 4.5 mGals, that extends from the area of known breccia outcrop at Spectacular Creek, east of the Blackstone River, in an arcuate trend to the northwest and west. The strongest part of this anomaly is over 8 km long, 1.5 km wide and lies on the northern flank of the western magnetic lobe. Its intensity is over 6 mGals, or 4.5 mGals above the more regional high. It is believed to be caused by a hematite-rich breccia mass just below the Paleozoic unconformity. The depth to the top of this feature has not been estimated. Figure 6 shows a computer generated model that presents one possible interpretation for the gravity data, showing three discrete bodies, ranging in size from 0.6 to over 5 billion tonnes with a density of approximately 4.5 gm/cc.

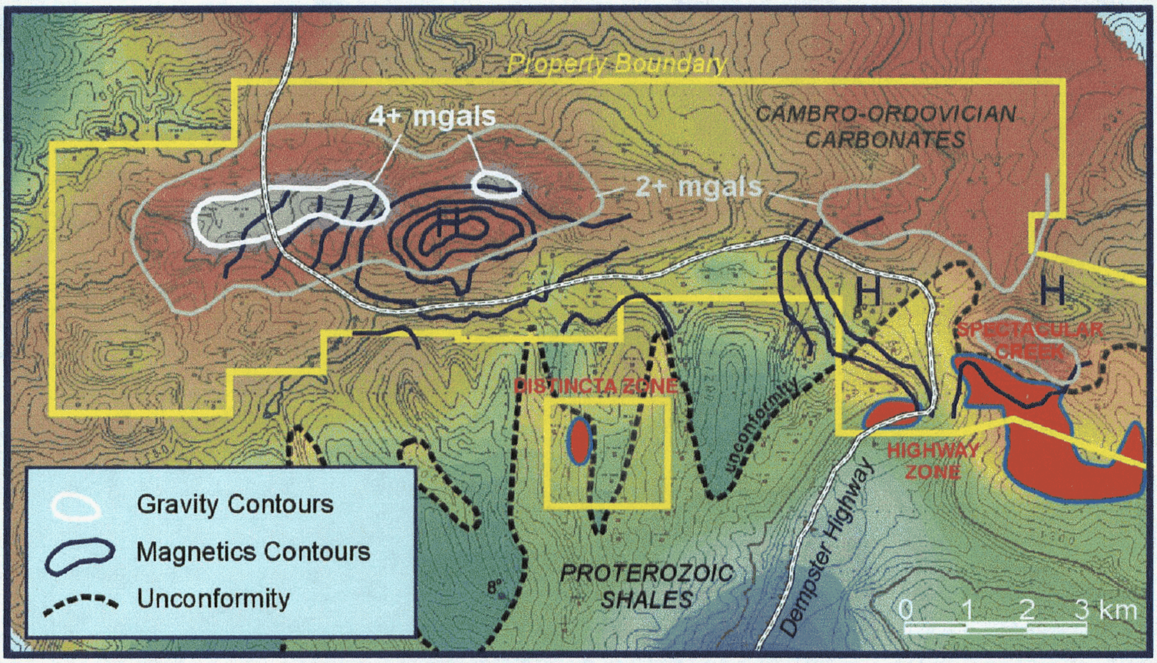


Figure 4. Yukon Olympic property gravity and magnetics summary results

The gravity survey was carried out by Aurora Geosciences Ltd. of Whitehorse while the magnetic survey was carried out by Klondike Exploration of Dawson City. A copy of the gravity survey report is included as Appendix xx to this report.

Mineralization

The hematitic breccias of the Ogilvie and Wernecke Mountains have been recognized for their potential to host Olympic Dam or iron oxide copper-gold style mineralization since the early 1980's, shortly after the discovery of the Olympic Dam deposit in Australia (*2,000 million tonnes of 1.6% Cu, 0.06%* U_3O_8*, 0.6 gpt Au, 3.5 gpt Ag*). Similarities are in the style of mineralization, the character of the breccias and related alteration, geochemical signature, age of mineralization and evidence to suggest that this part of Yukon and Australia were once part of a single landmass and that the breccia bodies were formed during a major rift event. At the time these deposits were formed, plate reconstructions suggest that the Stuart Shelf area of Australia, the host of Olympic Dam, was actually connected to the Yukon as part of the ancient continent Rodinia.

Hematitic breccias are exposed over an area approximately 1 km by 1.5 km along Spectacular Creek, east of the Blackstone River. Although detailed study of the breccia has not been carried out, there are two distinct varieties. The first is pink to pale coloured, with disseminated hematite common in a fine-grained matrix, while the other is darker, chloritic, often has more massive hematite and is associated with the mafic intrusive rocks. This latter breccia variety has slightly elevated magnetic susceptibility and the copper mineralization is most often associated with this breccia variety and with the mafic intrusive rocks.

Grab rock samples from the Yukon Olympic property have shown that the breccias are locally enriched in copper, cobalt, fluorine, rare earth elements and barium, with local minor gold and uranium enrichment. Chalcopyrite and locally bornite mineralization have been observed within the breccias and related intrusive rocks throughout the property. Analysis of grab samples has returned up to 0.9% Cu. Minor cobalt mineralization has also been observed. The exposed areas of hematitic breccia mineralization have not yet been systematically sampled.

The breccia zones are underlain by a large, east-west trending magnetic anomaly that may reflect a magnetite-bearing intrusive mass at depth.

Subsequent Exploration

Canadian Empire completed two drill holes in November, 2002. A report describing the results of this drill program and proposed ongoing exploration is in progress.

Conclusions

The Yukon Olympic breccia occurs at a flexure along a regional, east-west trending structure as defined by aeromagnetics. The breccia appears to be related to aeromagnetic and gravity highs that are elongated parallel to this trend, in the central part of the property. The 2002 field program defined a +4.5 mGal gravity anomaly that is in excess of 8 km in length and over 1 km wide, believed to reflect hematitic breccia below a thin cover of Paleozoic sediments. The gravity anomaly has a large western peak and a subsidiary eastern high. The anomaly is related to, but not coincident with, the regional magnetic anomaly. A preliminary review of the data suggests that the gravity anomaly may reflect hematite-rich breccias, while the magnetic anomaly may be caused by magnetite-bearing intrusive rocks at depth. This interpretation is strengthened by the fact that the easternmost portion of the gravity anomaly trends into the Spectacular Creek breccia occurrence that locally contains copper mineralization. The pattern at Yukon Olympic with the gravity anomaly being displaced from the magnetic anomaly also conforms to the Olympic Dam model. Within the area of the main gravity anomaly, a thin veneer of younger limestone covers the target rocks.

The property is under option to Canadian Empire Exploration Corp. Canadian Empire drilled two core holes late in the season. The results of this drill program are being evaluated by Canadian Empire, along with the geophysical data collected during the program described by this report, to plan an exploration program for the coming field season.

APPENDIX A

Yukon Olympic Property Claim List

The following claims are located in the Dawson Mining District, Yukon Territory, NTS Sheet 116G-01.

HEM 1 to 6 (incl.)	YC19966 to 19971 (incl.)
HEM 1 to 78 (incl.)	YC20973 to 21050 (incl.)
HEM 79 to 100 (incl.)	YC21135 to 21144 (incl.)
HEM 101 to 122 (incl.)	YC21532 to 21563 (incl.)
HEM 123 to 316 (incl.)	YC21615 to 21808 (incl.)
HEG 1 to 20 (incl.)	YC21595 to 21614 (incl.)
HM 1 to 4 (incl.)	YC21189 to 21192 (incl.)
HM 5 to 16 (incl.)	YC21464 to 21471 (incl.)

APPENDIX B

Statement of Costs

HEM 1-78 and HEM 79-88 Claims

All work completed between June 24 and July 31, 2002.

A.	Field work, 110 km gridding	$12,750.00
	70 line kilometers Ground Magnetics	$17,500.00
	Gravity Survey on Property	$ 6,000.00
B.	Geological Prospecting and mapping	$ 6,000.00
C.	Camp Costs	$ 3,430.00
Total Assessment Credits		$45,680.00

CERTIFICATE OF QUALIFICATIONS

I, Gerald G. Carlson, of West Vancouver, British Columbia, hereby certify that:

1. I am a geologist and President of Copper Ridge Explorations Inc. of 500-625 Howe Street, Vancouver, B.C. V6C 2T6.
2. I am a graduate of the University of Toronto, with a degree in geological engineering (B.A.Sc., 1969). I attended graduate school at Michigan Technological University (M.Sc., 1972) and Dartmouth College (Ph.D., 1978) for advanced degrees in economic geology. I have been involved in geological mapping and mineral exploration continuously since 1969.
3. I am a member in good standing of the association of Professional Engineers of Yukon, Registration No. 0198 (since 1971) and the Association of Professional Engineers and Geoscientists of the Province of British Columbia, Registration No. 12513 (since 1980).
4. I am author of this report on the Yukon Olympic Property. The report is based on a literature review and on private company reports and on property work completed in June and July 2002.
5. I am not aware of any material fact or material change with respect to the subject matter of this technical report, which is not reflected in the technical report; the omission to disclose makes the technical report misleading.
6. I have had direct involvement with the exploration programs conducted on the property discussed in this report. I am familiar with the regional geology and metallogeny and have experience writing Qualifying Reports and conducting evaluations of mineral properties.

Dated this 25th day of February, 2003.

Gerald G. Carlson, Ph.D., P.Eng.

APPENDIX C

Magnetometer Survey Report

SUMMARY

A grid and magnetic survey was conducted on the Hem Property between July 13 and August 6, 2002. The survey was conducted to locate iron oxide copper gold mineralization similar to the Olympic Dam Model located in Australia. In total there was 110 kilometers of grid laid out and 95 kilometers of magnetic survey covering the entire claim package. The magnetic survey was run in conjunction with a Gravity survey performed by Aurora Geosciencies Ltd. The idea of the program was to use both survey to define a magnetic target that coincide with a gravity anomaly. Both surveys where successful in outlining a large gravity anomaly in the western part of the grid that measure 8 kilometer by 2.5 kilometers with an associated magnetic anomaly 2.5 kilometer by 1.5 kilometer. The magnetic signature is off set from the gravity anomaly and this is exactly what the Olympic Dam Model signature is. So the geophysical data raise allot of attention and help option the property off to two junior mining companies, Copper Ridge Exploration and Canadian Umpire which is back by Teck \ Cominco. The Property was drilled this fall with 2500 feet with result to follow. The companies are planning to drill the main gravity and magnetic anomaly next summer. So a very successful program with lots of potential in 2003.

1.0 INTRODUCTION

This report describes the grid work and magnetic survey conducted on the Hem claims in the Dawson Mining District, Yukon Territory. The Hem Property host hematite-chalcopyrite breccias similar in style to those hosting economic mineralization at the Olympic Dam Deposit in Australia. The purpose of the survey was to locate a large magnetic anomaly that coincides with a large gravity high anomaly similar to Olympic Dam. The grid was laid out with a three-man crew and the magnetic survey was run by myself. One Aurora Geoscience employees performed the gravity work and a helper provide by Copper Ridge Exploration. All work was performed between July 13 and August 6, 2002.

2.0 LOCATION AND ACCESS

The Hem Property is centered at 65'04'N, 138'12W in central Yukon. The property is 130 Km NNE of Dawson City. The property can be reached via the Dempster Highway. The property cross and follows the Highway from around kilometer mark 146 to 159.

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.

4.0 PHYSIOGRAPHY

The Hem property is located in the Olgilvie Mountains on the height of land between the Blackstone and Olgilvie Rivers. Elevation 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

5.1 REGIONAL GEOLOGY

The regional geology base on the GSC Map 1526A of the Ogilvie River by D.K. Norris the Hem claims lie in three different rock units. The oldest to youngest begins with Proterozoic, Aphebian Quartet Group: argillite, red, green and grey, slaty; quartzite, fine grained, light grey; marine? The next unit is Upper Cambrian to lower Devonian (CDb) Limestone and dolomite, grey and brown; shale, dark grey to black; marine; may include equivalents of Gossage and Ogilvie Formation. The third Unit is Upper Cambrian to lower Devonian (CDr) Road River Formation: shale, black, graptolitic; limestone, medium crystalline, dark grey; marine; includes lateral equivalents of the Michelle Formation.

5.2 PROPERTY GEOLOGY

The Hem Property economic mineralization consists of hematite - chalcopyrite-bearing breccias which outcrop along the Dempster Highway along the Blackstone River. There is also a large 2 KL by 1 KL hematite - chalcopyrite bearing breccia that outcrop east of the Blackstone River along a small creek draw.

6.0 WORK PROGRAM / METHODS

6.1 GRID WORK

The grid was established with a three-man crew. There were two individual grids put in. One grid covered west of the Blackstone River and a second smaller one covered east of the Blackstone River. We started with the large grid by putting in the Base Line from line 000 to 9750 east. With a Garmin Etrex GPS. The Base Line went exactly east - west and line where established every 250 meters. The start of each line was established using lathes with four orange flagging tapes running down to the ground creating a very visible target site that could be seen for over a kilometer away. The line ran north and south of base line. Station spacing on the lines where every 25 meters and where marked with either pickets or orange flagging with grid location marked with permanent black marker. The main large grid was extended to the west and to the north. A new base line was established with the GPS at 1200 N and the grid was extended to Line 2000 west.

A second grid was established east of the Blackstone River. This grid was established by running a base line put in again with GPS. Line where put in every 250 meter with station every 25 meters. All station where marked with orange flagging and wrote out with black permanent marker.

In total there was 110 kilometers of grid put in with 4,400 station established.

6.2 MAGNETIC SURVEY

A magnetic survey was conducted across the whole grid area. Two Scintrex Proton magnetometers where used during the survey. One operator ran the whole survey during July 13 and August 6, 2002. A base station was established close to camp and a magnetometer was set up at this location every day. This base mag would take reading every 30 seconds a map out the daily magnetic drift. This data was used for to correct the field mag for the daily drift.

The magnetic survey was run on the grid lines on station separation of 25 meters with some detail section of 12.5 meters. The survey ran fairly smooth with only one day lost due to base mag failure.

7.0 INTERPRETATION

The magnetic survey revealed two major anomalies, Anomaly A and Anomaly B.

Area A is located on the east part of the grid. This anomaly covers an area of 5 kilometer by 3 kilometer and is center on line 9750 E and station 300-500 N. This anomaly covers known Hematite Breccia with minor copper mineralization outcropping on the eastern grid.

Anomaly B is located in the western part of the grid. The anomaly covers an area of 2 kilometer by 1.5 kilometer. The center of the anomaly is located on line 2000 E around station 1200 N. This anomaly is covering CDb limestone unit. It should not be magnetic. This anomaly is what got everybody excited because it is associated with a large gravity anomaly. The magnetic signature parallels the gravity anomaly with the magnetic peak being 500 meter south of the gravity high. This signature is exactly the same geophysical signature as the Olympic Dam Deposit and the new Minotaur Resources Ltd showing found in Australia. Both are Proterozoic Hematite - Breccia hosting copper - gold mineralization.

8.0 RECOMMENDATION

I would recommend more detail gravity work to better define the eastern gravity and magnetic anomaly. I would also recommended more geology work to get a better idea on the geological structure. This would help with better understanding the nature of this large gravity anomaly. I would follow all this up with a 5000-foot drill program. The first drill target area should be just north of eastern magnetic anomaly and south of the gravity anomaly. The second drill area would be east of the Blackstone River. This area is lower priority because the magnetic anomaly covers the gravity anomaly. Neverless this target area has known copper mineralization and may turn up something interesting.

9.0 REFERENCES CITED

Norris, D.K. Geological Survey of Canada geology map number 1526A. Title " Ogilvie River " from 1979.

Minotaur Resources Ltd. Annual report (2001) and web site www.minotaurresources.com.au

Roberts, D.E. and Hudson, R.T. The Olympic Dam Copper-Uranium-Gold Deposit, Roxby Downs, South Australia.

10.0 QUALIFICATION

I Shawn Ryan located in Dawson City, Yukon work as a professional prospector. I run a small exploration company located in Dawson city.

I have worked in the exploration business for the last 20 years. I worked the first 12 years as a contractor working on numerous projects in the NWT, Ontario, Quebec and the Yukon. I have worked for the last 8 years as a local prospector for myself.

I have being trained to run various geophysical instruments and surveys such as magnetic surveys, max-min surveys, induce polarity surveys and Vlf surveys.

I have overseen the whole Hem Project and was the party chief in charge.

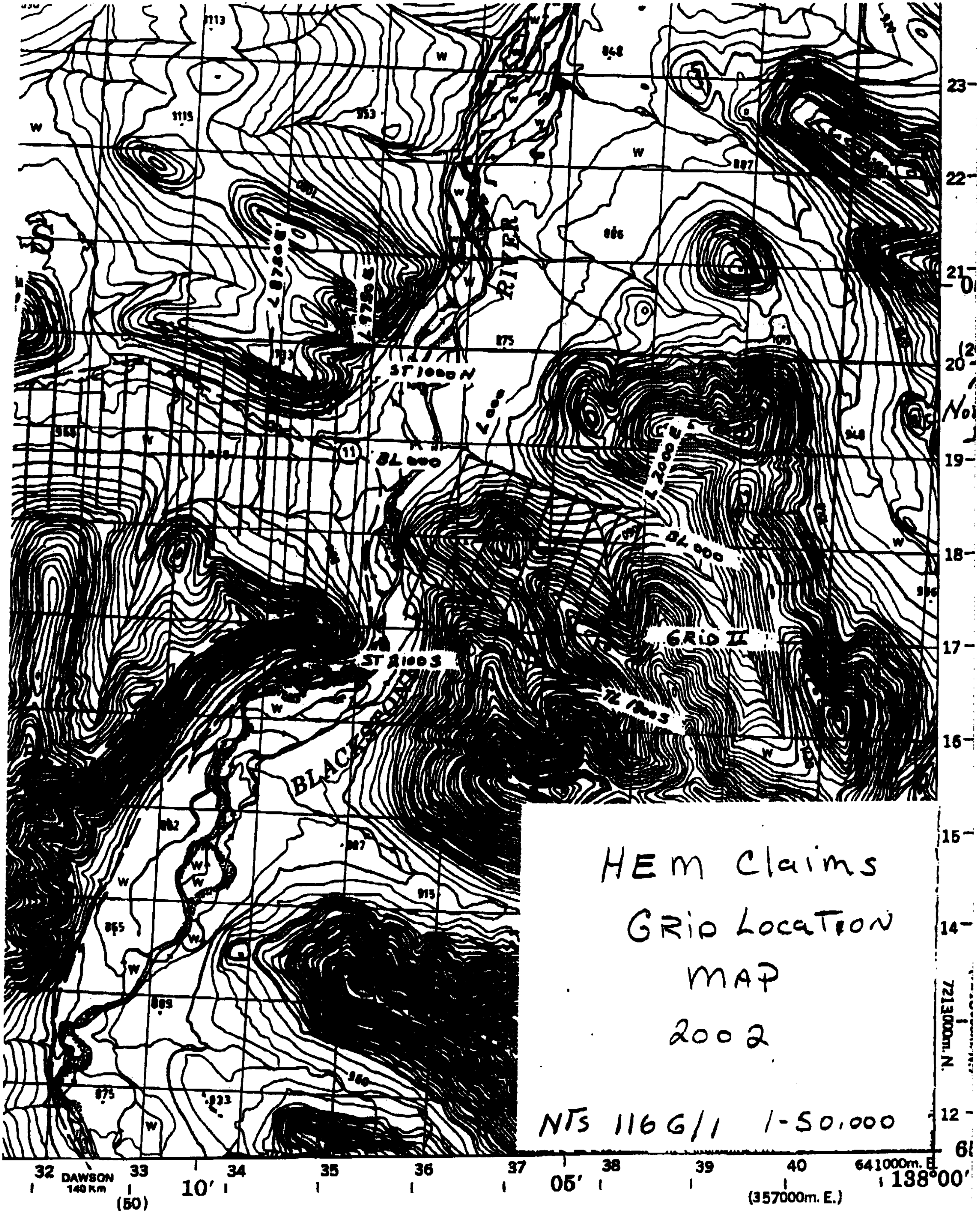
I own 100 % of the Hem claims and have now option the claims to Copper Ridge exploration.

Dated this 25 of January 2003 in Dawson City, Yukon.

Respectfully submitted

Shawn Ryan

ENGINEER CREEK



HEM Claims
GRID Location
MAP
2002

NTS 116G/1 1-50,000

APPENDIX D

Gravity Survey Report

AURORA GEOSCIENCIES LTD.

COPPER RIDGE EXPLORATIONS INC.

GRAVITY SURVEY OF THE HEM PROPERTY, NORTHERN YUKON TERRITORY

Mike Power M.Sc. P. Geoph.

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 ± 61 cm and overall Bouguer anomaly measurements are considered accurate to ± 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

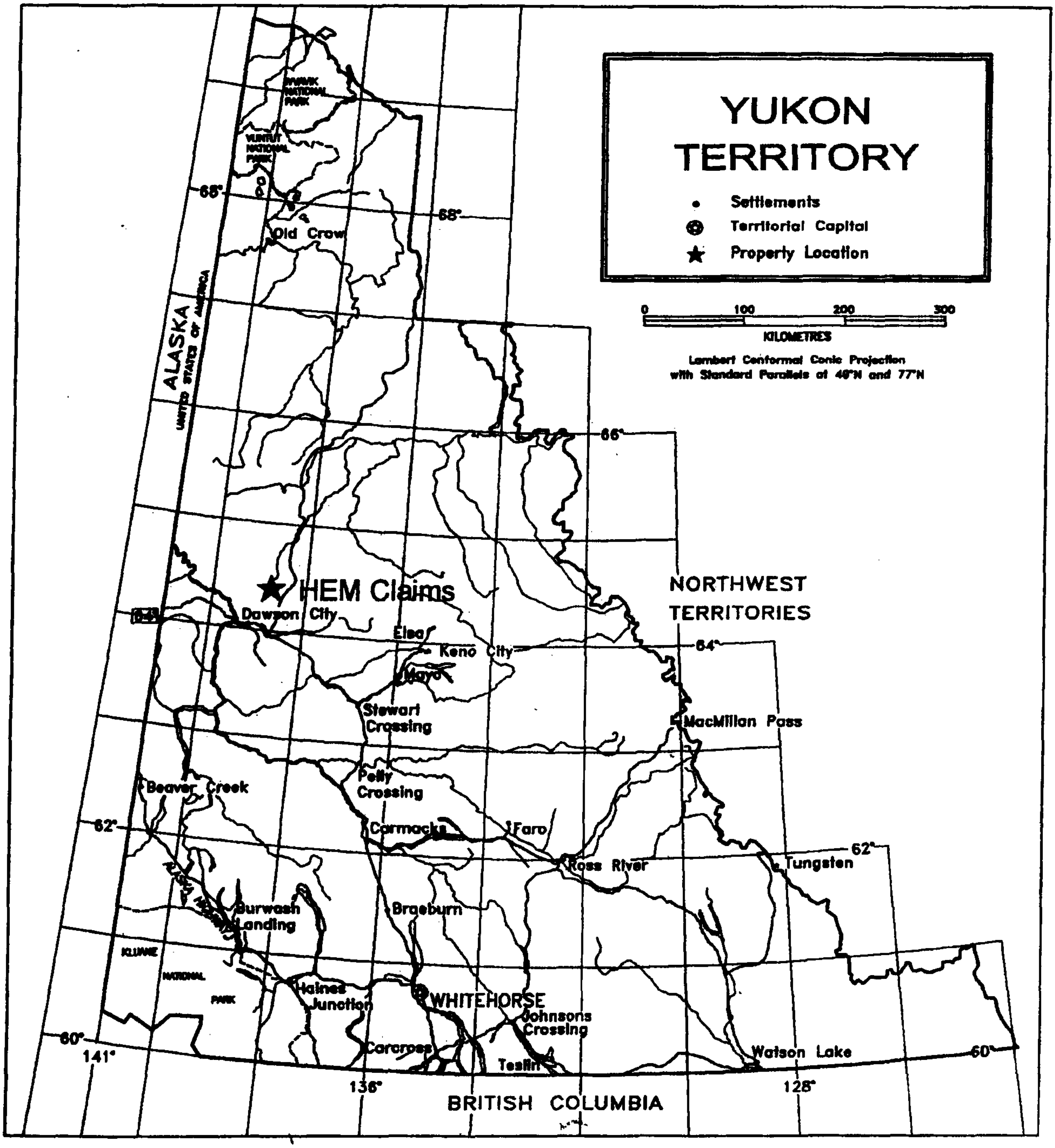
The HEM Property consists of 352 Claims (HEM 1-335 / with duplicates) staked under the Yukon Quartz Mining Act in the Dawson Mining District. Figure 2 shows the location of the claims and of the area in which the gravity survey was conducted.

4.0 PHYSIOGRAPHY

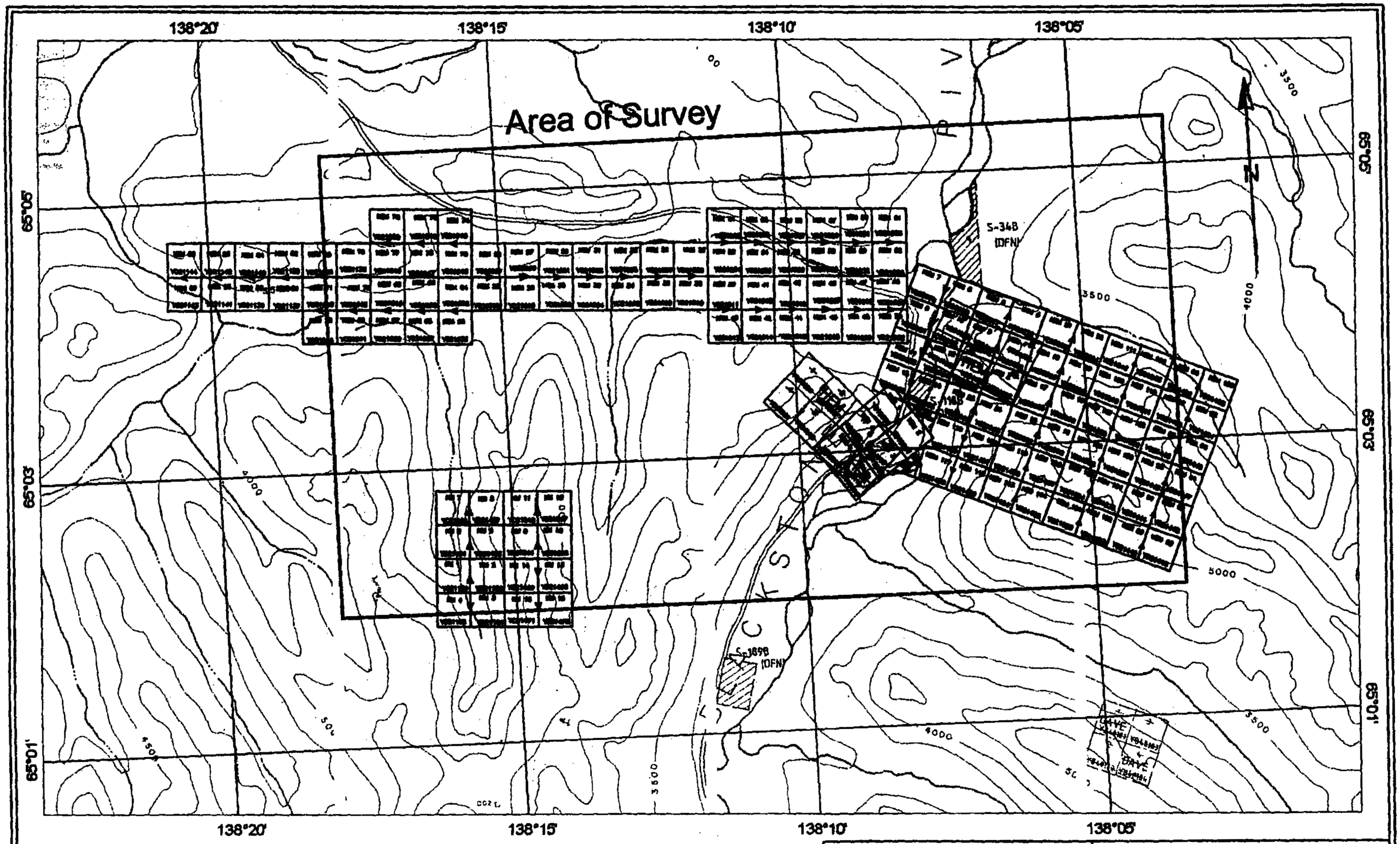
The HEM Property is located in the Ogilvie Mountains on the height of land between the Blackstone and Ogilvie Rivers. Elevations on the property range from 900 to 1600 m. The property covers a steep walled plateau dissected by steep and narrow ravines. The climate in the area is subarctic with long cold 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
	AURORA GEOSCIENCES LTD.	



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COPPER RIDGE EXPLORATIONS INC.

HEM CLAIMS
CLAIM LOCATION MAP
FIGURE 2.

HEM PROPERTY

NTS: 116 G/1
Datum: N/A
Mining District: DAWSON
Job: KRX-02-001-YT
Date: 25 Nov 02

AURORA GEOSCIENCES LTD.

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

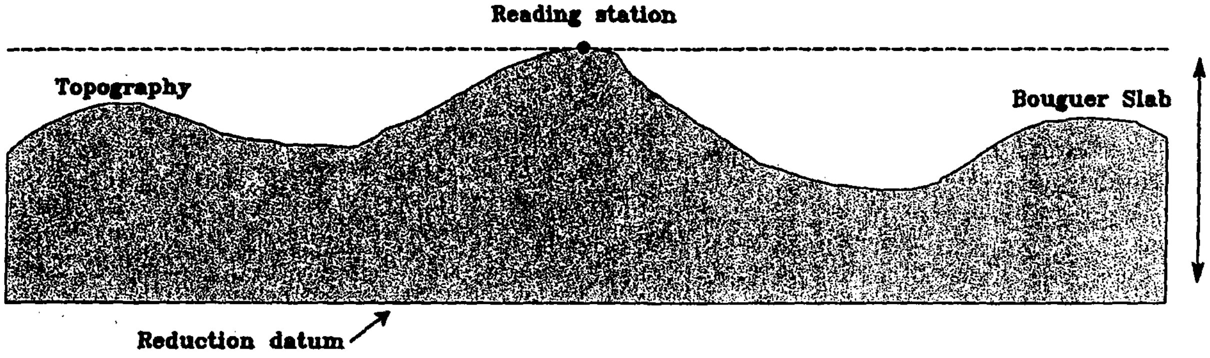
Terrain corrections are applied to correct the Bouguer gravity for the upwards gravitational attraction of masses above the station elevation and for the reduction in gravitational acceleration due to an absence of mass in a depression or valley extending below the station elevation. Both of these corrections 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 (r_i and 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:

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

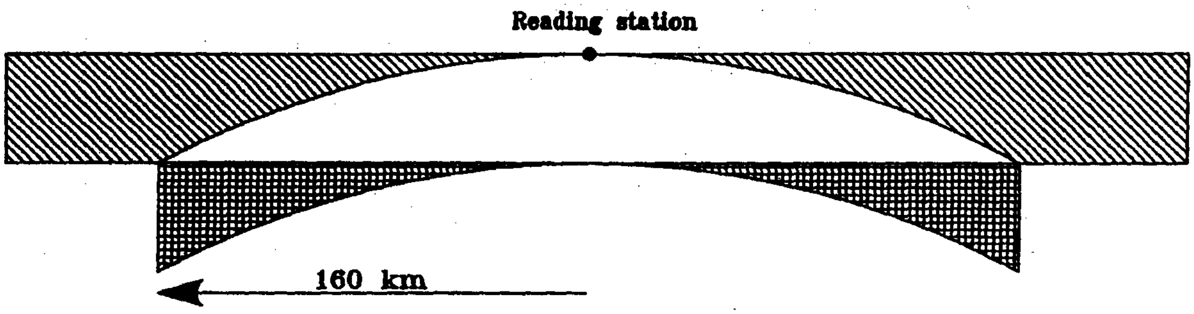
where γ is the universal gravitational constant and $\Delta \mathbf{z}$ is the difference in elevation between that of the sector and that of the station. The terrain effect is the sum of individual terrain corrections. Terrain corrections are always added to the gravity data.

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.

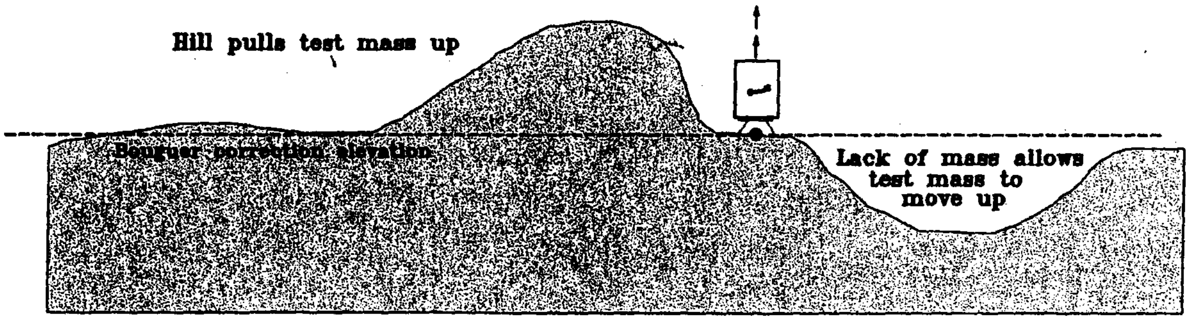


Figure GR-1. Gravity reductions and corrections.

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.

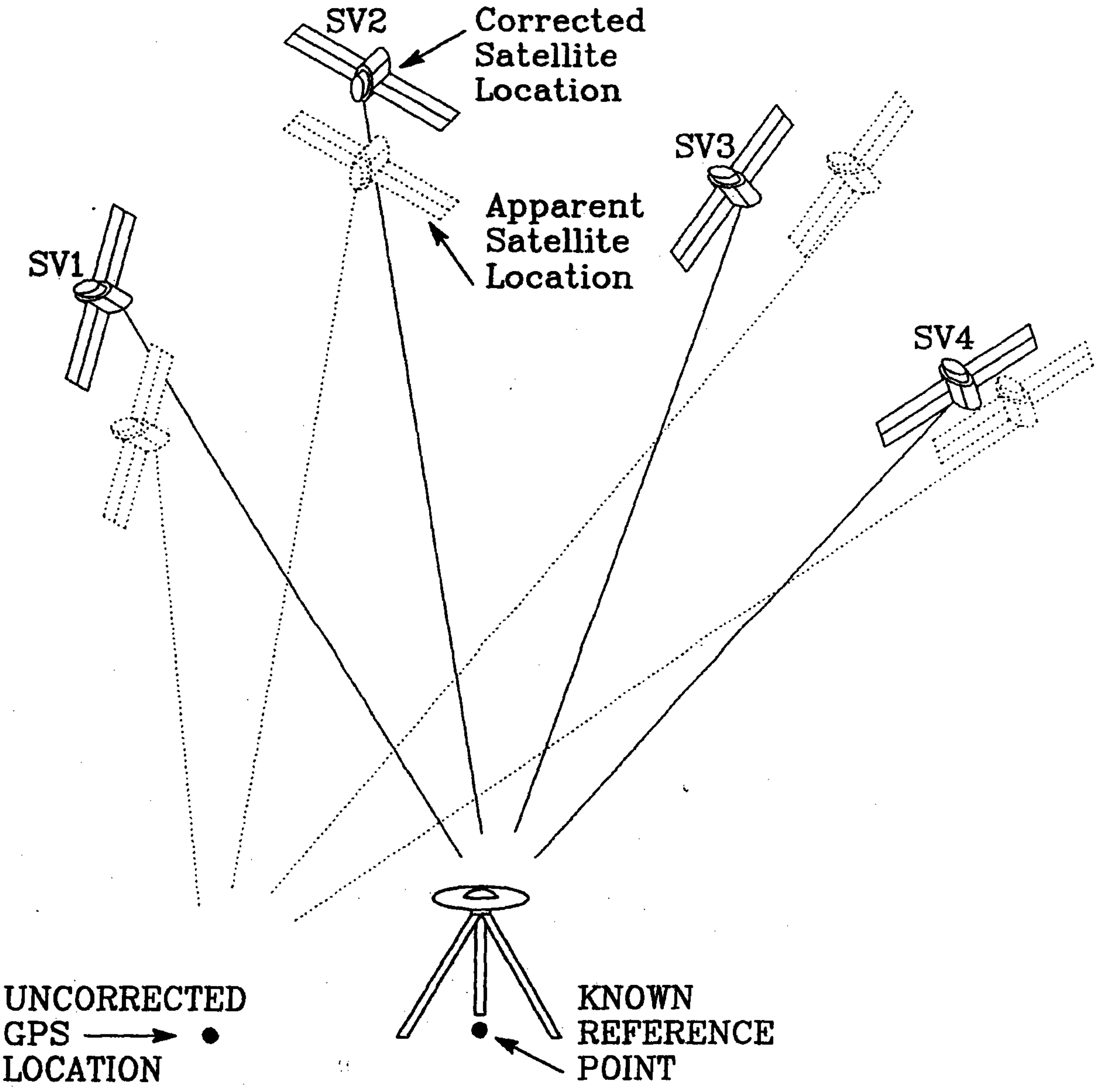


Figure GPSD–1. Principles of differential GPS corrections. The base station GPS is located over a known point. The difference between the known satellite locations calculated from the satellite ephemerides and the base station location, and the apparent locations calculated from the ephemerides and the 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 ±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 ± 30 m with P-Code and to ± 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 ± 5 ppm while Fast Static and kinematic surveys can achieve accuracies of 5 mm ± 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° 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° N
   Azimuth of UTM to Celestial North: 2.5° 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 ($\mathbf{r}_i$ 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 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

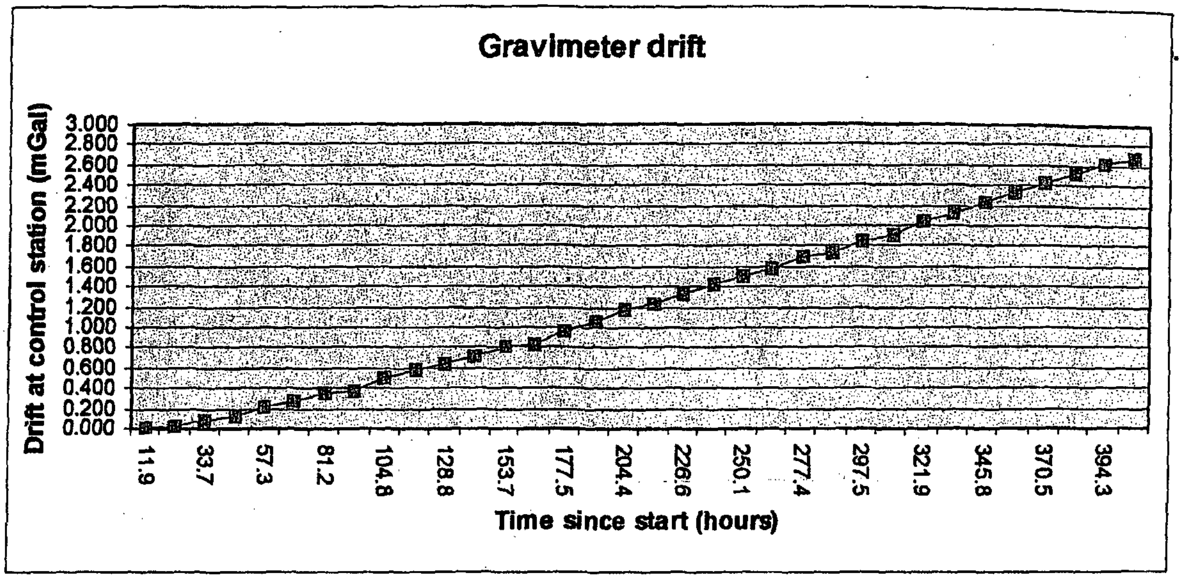
The following is an estimate of the total measurement error.

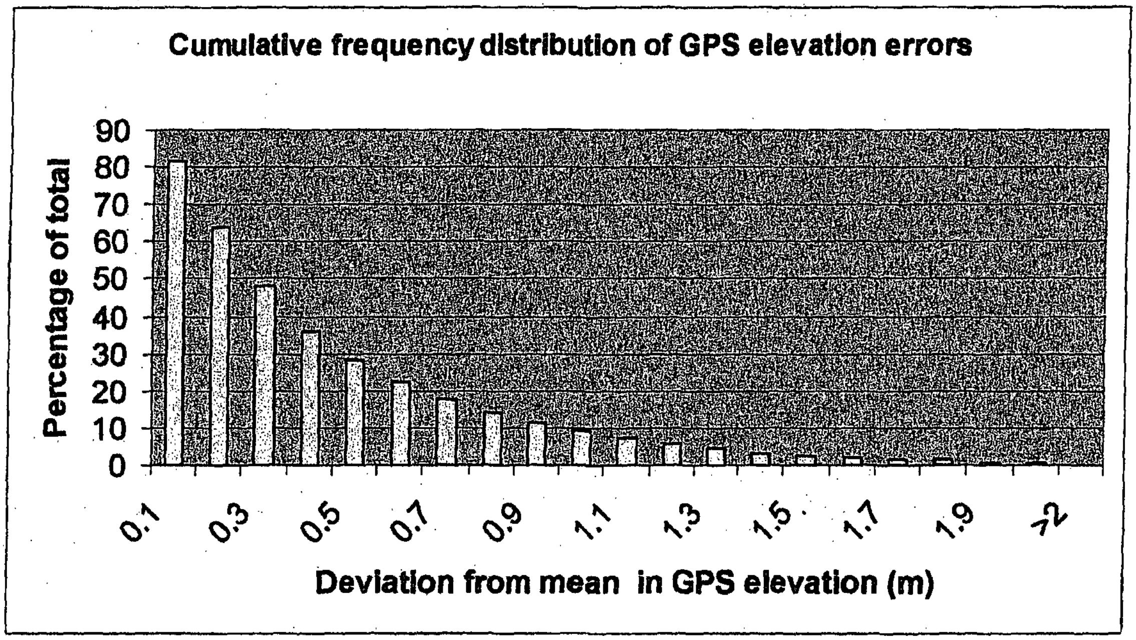
1. *Gravimeter drift.* The graph below shows the daily gravimeter drift over the duration of the project. Over the duration of the project, the average drift rate was 6.64 µGal per hour and the drift rate was essentially linear with no significant tares. A liberal estimate of measurement error due to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

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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,

M. A. POWER
25Nov02

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