YEIP
05-050
2005

FINAL REPORT

SAMPLING and GRAVITY SURVEY

on the

IRONMAN PROJECT

(formerly Hart River Project)

on the

AA and IM Claim Groups

MAYO MINING DISTRICT

N.T.S.: 116 A/15
Latitude: 64° 50' 58" N, Longitude : 136° 40' 48" W, (420 300m E, 7 192 650m N)
(NAD 83 ZONE 8)

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Field Work Completed July 13 to July 16, 2005.

In support of YMIP Project No. 05-050

SUMMARY AND RECOMMENDATIONS

Gerald G. Carlson, on behalf of Copper Ridge Explorations Inc. received YMIP support in 2005 to carry a Target Evaluation program in search of Wernecke Breccia or IOCG style mineralization within Proterozoic rocks in the Hart River area, central Yukon. During the period July 13 to 16, 2005 a $38,345.60 exploration program was carried out on the Ironman (formerly Hart River) Project that includes the AA 1-20, AA 25-40, IM 1-48 and IM 51-52 claims, located approximately 160 km northeast of Dawson City, Yukon. This work included geological mapping and sampling plus a 57 station gravity survey contracted to Aurora Geosciences of Whitehorse.

In 2002 and 2003, Whitehorse prospector Bernie Kreft discovered a number of new copper-gold occurrences in an area that had last seen only minor exploration work in the mid 1970's. Kreft staked the property and optioned it to Copper Ridge Explorations Inc. ("Copper Ridge"). In 2004, Copper Ridge completed a helicopter supported gravity survey as well as mapping, prospecting and sampling. Among the most interesting Copper Ridge results, high grade copper values were returned from three showing areas. Assays included up to 15.5% Cu in quartz veinlet float at the AA-Petit showing, up to 6.7 % Cu in interlaminated siltstone/dolomite-albite float at the Copper Slope showing and up to 2.0% Cu in a siliceous fine grained sandstone at Smokey showing (Zuran, 2004). A potentially large gravity anomaly was partially defined in the northwest corner of the area surveyed.

Mineralization and breccias at Ironman are developed within the 6km by 10km area of a large magnetic anomaly and within Proterozoic aged sedimentary rocks. The gravity anomaly defined by the 2004 and 2005 surveys occurs in an area where the Proterozoic rocks are covered by a sequence of younger carbonate rocks. Significantly, a number of locally copper-bearing hematite (iron-rich) breccia occurrences, including the previously reported ***Ironman*** and ***Iron Mama*** showings, have been discovered around the periphery of the anomaly, within the Proterozoic sedimentary rocks adjacent to the unconformable contact with the younger carbonates. Of 21 rock chip samples from this exposed breccia, copper (Cu) values ranged from 53 parts per million (ppm) to 1.4% Cu, with four samples in the range of 1,450 ppm to 8,976 ppm Cu. A silt sample from a creek draining the Ironman showing area contained 55 ppb gold, the highest gold value returned from the 2004 silt sampling program.

Recommendations for further work on the Ironman Property are as follows:

1) Carry out detailed mapping and sampling, focused on the unconformity between the Proterozoic Quartet Groups Sediments and overlying Bouvette Group limestones as well as related mineralization and structures, particularly in proximity to the Ironman gravity anomaly.

2) Carry out a detailed ground magnetic survey over the Ironman gravity anomaly. If feasible, carry out three dimension modelling of the results of the gravity and magnetic surveys.

3) Complete a three to four hole drill program for a total of 750 to 900 m to test the gravity anomaly.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

The first recorded claims in the area were staked in 1975 by the Blackstone JV (UMEX and Shell) who followed up anomalous copper geochemistry to discover the Dyson showing. No further work was reported in the area until Whitehorse prospector Bernie Kreft carried out a stream, soil and rock sampling program in 2002 and 2003 which resulted in the discovery of IOCG style copper-gold mineralization and the staking of the original AA claim group.

Kreft optioned the property to Copper Ridge later in 2003 and, in 2004, Copper Ridge carried out a program of geological mapping and soil sampling (see Zuran, 2004) plus a helicopter supported gravity survey contracted to Aurora Geosciences of Whitehorse. Copper Ridge also staked an additional 66 claims.

During the period July 13 to 16, 2005, a second gravity survey was completed on the AA 1-20, AA 25-40, IM 1-48 and IM 51-52 claim group (the "Property"). This survey complemented and expanded the 2004 gravity survey. At the same time, a small program of prospecting, geological mapping and rock sampling was carried out by JP Exploration Services. The purpose of the program was to fully define a potential IOCG-type (iron oxide copper gold) exploration target that had been partially defined by the 2004 program. The program was successful in defining a 4 milligal gravity anomaly, with dimensions of approximately 1,500 m by 2,000 m, and discovering a number of new breccia occurrences and copper mineralization peripheral to this gravity anomaly.

This report describes the work contracted to Aurora Geosciences Ltd. and JP Exploration Services, supervised by personnel of Copper Ridge Explorations Inc.

Location and Access

The Property is centred at latitude 64° 51', longitude 136° 40' W. The Property is approximately 475 km north of Whitehorse; 160 km northeast of Dawson City; 145 km north-northwest of Mayo; 80 km east of the Chapman Airstrip on the Dempster Highway; and 25 km north east of the Hart River gravel strip on Marc Creek. The Property is located on the NTS 116 A/15 1:50,000 scale topographic map sheet as shown on Figure 1.

There is no road access to the Property. Access is by helicopter via various fixed wing connections. For the 2004 exploration program, camp, fuel and supplies were freighted to the Chapman Airstrip on the Dempster Highway from Dawson City. A fixed wing aircraft then flew personnel and equipment to the Hart River Airstrip, approximately 60 km to the east. A helicopter was then used to move to the Property, 25 km to the northeast.

The current program was helicopter supported from a base at the Blackstone Outfitters lodge at km 121 on the Dempster Highway, 80 km west of the Property.

Topography, Vegetation and Climate

The relief on the claim group is 675 metres (2215'), ranging from 1125 to 1800 metres elevation above sea level. Topography comprises steep north-facing cirques with knife

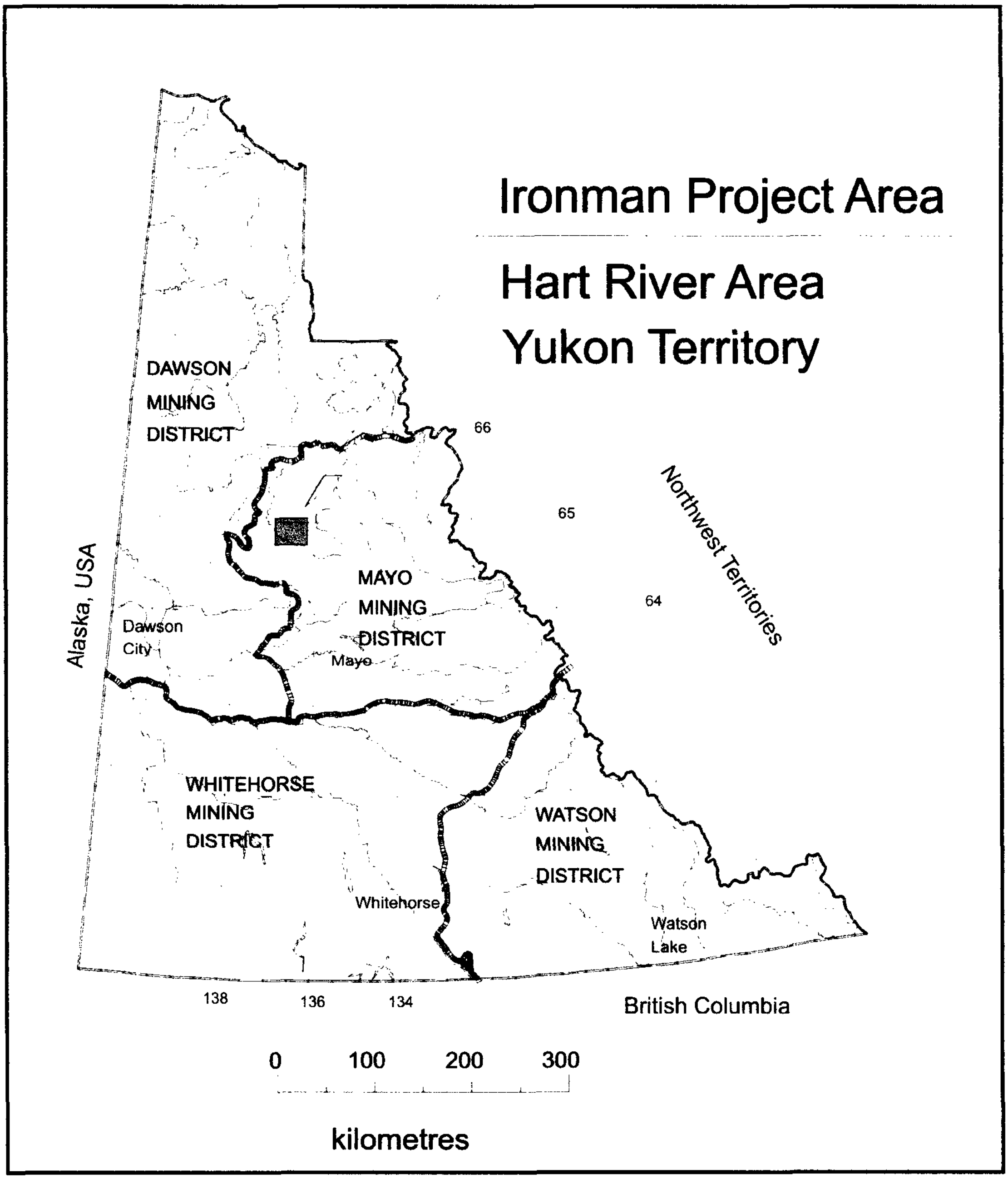

Figure 1 - Ironman Property - Yukon Location Sketch

edge ridges, steep outcrops, bluffs and steep blocky talus slopes. More gentle terrain is be found at lower elevations along side the north draining creeks cutting covered rolling alpine moraine.

Vegetation consists of alpine grasses, flowers, moss and lichen. All claims are above tree-line.

Climate is northern interior continental with moderate to low precipitation of some 250 to 300 mm annually. Temperature ranges from 15-25°C in the summers down to -15 to -40°C in the winters. Permafrost is discontinuous and often found on north and steeper east facing slopes. Exploration is best done during the snow free months from late June to late August.

Claim Status

The property consists of 86 quartz claims covering approximately 1800 hectares, staked in accordance with the Quartz Mining Act, as shown on Quartz Claim Sheet 116 A/15, within the Mayo Mining District. Copper Ridge Exploration Inc. ("Copper Ridge") has signed an option agreement with Bernard Kreft ("Kreft Option").

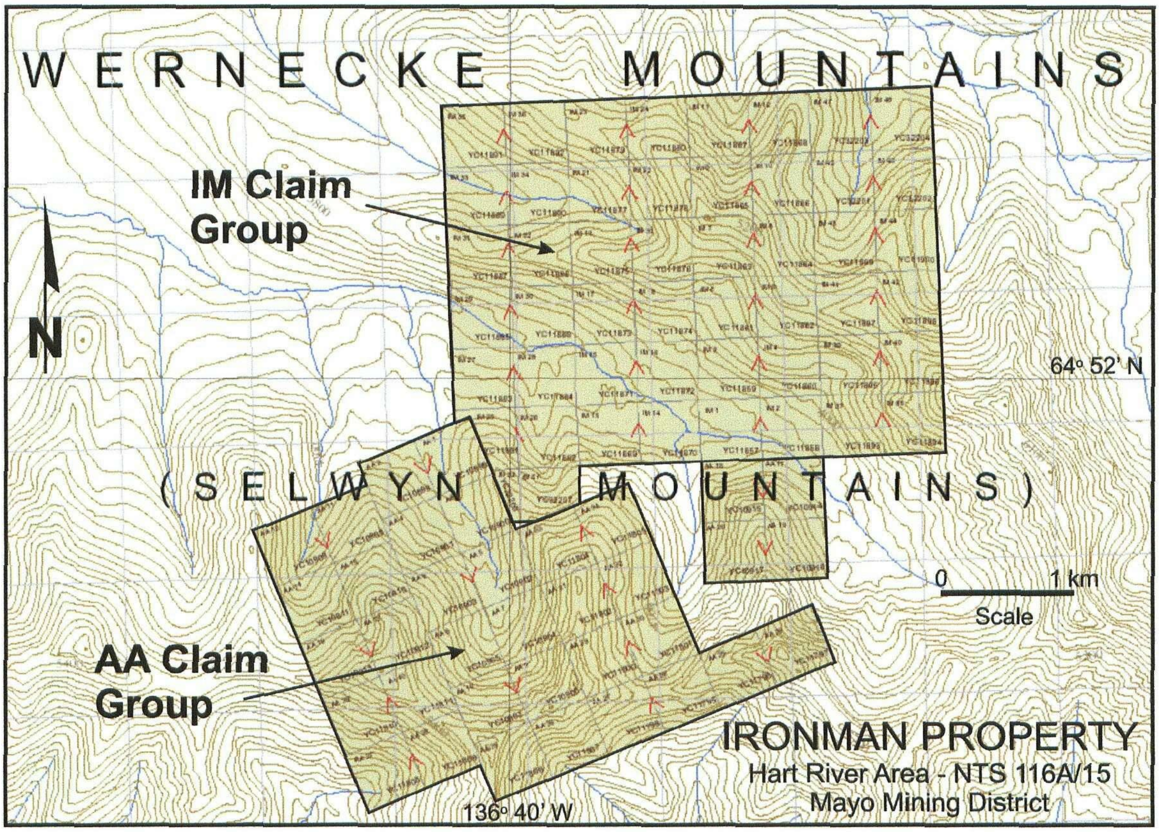

Figure 2 - Ironman Property - Claim Sketch

The AA 1-20 claims are 100% owned by Bernard Kreft, while the AA 25-40, IM 1-48 and IM 51-52 claims are recorded in the name of Copper Ridge, but are subject to the Kreft option. The claims and grant numbers are summarized in Table 1 below.

Claim Name	Grant No.	Expiry Date	No. Claims
AA 1 -16	YC10899 - YC10913	29-Jul-09	16
AA 17 - 20	YC10914 - YC10917	29-Jul-09	4
AA 25 - 40	YC11796 - YC11811	26-Jul-06*	16
IM 1-44	YC11857 - YC11900	6-Aug-06*	44
IM 45 - 48	YC32201 - YC32204	6-Aug-06*	4
IM 51 - 52	YC32207 - YC32208	6-Aug-06*	2

*Subject to approval of 2005 assessment work.

HISTORY

Very little mineral exploration has been reported for the general vicinity of the Ironman Property and there is only one Minfile occurrence within this Proterozoic inlier. The work history is as follows:

1961 Mapping by the Geological Survey of Canada produced the regional framework for geology. This was compiled by L.H Green and J.A. Roddick on the Larsen Creek 1:250,000 scale map sheet for NTS 116 A. Map 1283A was published in 1971 and accompanied by GSC Memoir 364 by L.H. Green.

1975 The Last 1-8 claims (YA1124-YA1131) were staked by the "Blackstone Project" (UMEX and Shell Oil) in August.

1976 UMEX (Union Miniere Explorations and Mining Corporation Limited), under the supervision of Dr. Colin Dyson conducted a geochemical soil survey. The company collected 227 grid soils at 200 foot spacings on 500 foot spaced north-south lines. Two east trending copper-cobalt-silver anomalies associated with minor amounts of chalcopyrite were delineated. This became the "Dyson" Minfile Occurrence #116017.

2003 Whitehorse prospector Bernie Kreft staked the AA 1-16 and AA 17-20 on July 10th. AA 17-20 covers the east half of the Dyson Minfile Occurrence. Prospecting, rock sampling and silt sampling led to the discovery of what is now known as the Smokey showings on the AA 1-16.

2004 Copper Ridge Explorations Inc. optioned the Property from Bernie Kreft and completed a program of geological mapping, prospecting, rock and soil sampling and helicopter supported gravity surveying. Copper Ridge staked the AA 25-40, IM 1-48 and IM 51-52 claims to cover new the showings and target areas.

REGIONAL GEOLOGY

The regional geological setting in north central Yukon (Iron Man Project Area) includes two main geological subdivisions of the northern Cordilleran miogeocline: 1) the Selwyn Basin; and 2) the Yukon Block. These are sharply separated by the east-southeast trending Dawson Fault. In this report, the Hart River Inlier and surrounding rocks within the Yukon Block are of particular interest (see Figure 3).

The Selwyn Basin (south of the Dawson Fault), comprises outer deeper water or basinal siliclastic rocks, shale, chert, limestone, and volcanic rocks; ranging in age from Late Proterozoic to Devonian (Abbott, 1997).

The Yukon Block (north of the Dawson Fault), comprises a six kilometre thick complex assemblage of shallow marine clastic and carbonate rocks plus minor volcanic rocks. This isostatically stable crustal block has persistently remained high standing since Late Proterozoic time. Paleozoic and Mesozoic strata within the Yukon Block define several troughs and platforms while the Proterozoic strata occur as several inliers. The inliers are cores of anticlinoria which developed during the Late Cretaceous-Paleogene (Laramide) orogenesis (Norris, 1984; Abbott, 1997). The inliers include (from west to east): Tatonduk, Coal Creek, Hart River, and Wernecke. The Hart River Inlier and smaller un-named inliers to the north lie in the area of interest. Several episodes of dated intrusives are noted within the Yukon Block and are exposed in the inliers; they include:

- Bear River Dykes (ca. 1270 Ma - U-Pb zircon, baddeleyite)
- Hart River Sills (ca. 1380 Ma - U-Pb zircon), 30-250m thick
- Wernecke Breccia (ca. 1595 Ma - U-Pb titanite)
- Early Proterozoic Lamprophyre
- Bonnet Plume River Intrusions (ca. 1710-1725 Ma - U-Pb zircon)

Thorkelson, 2000

With the exception of the Wernecke Breccias, the intrusions are remarkably similar despite their diverse ages and often can't be told apart unless dated (J. Hunt, pers. comm., 2004). Outside the inliers there are additional Cambrian pyroxenite-monzogabbro sills up to 150m thick, and late Paleozoic diabase sills up to 60m thick.

The Wernecke Breccias cut Wernecke Supergroup sedimentary rocks and are associated with Cu, Co, Au, Ag, U and locally Mo mineralization of the IOCG (iron-oxide-copper-gold) type model. This mineralization occurs within breccia zones and in adjacent metasomatized country rock. Several authors (cf. Bell, 1989; Gandi and Bell, 1990; Hitzman et al., 1992; Thorkelson et al., 2001) have drawn a connection with breccias in Australia based on similar physical and mineralogical characteristics.

Stratigraphy of the Hart River Inlier comprises rocks of the Lower Proterozoic Wernecke Supergroup, Lower-Middle Proterozoic Hart River volcanics/intrusives, Middle Proterozoic Pinguicula Group sedimentary rocks, Upper Proterozoic Callison Lake dolostone and Upper Proterozoic Mt. Harper Group clastic and mafic volcanic rocks.

Rocks of the Wernecke Supergroup are the oldest rocks in the Ogilvie and Wernecke Mountains and include the Fairchild Lake, Quartet, and Gillespie Groups. Only the Quartet and Gillespie lake groups are exposed in the Hart River Inlier. The Quartet

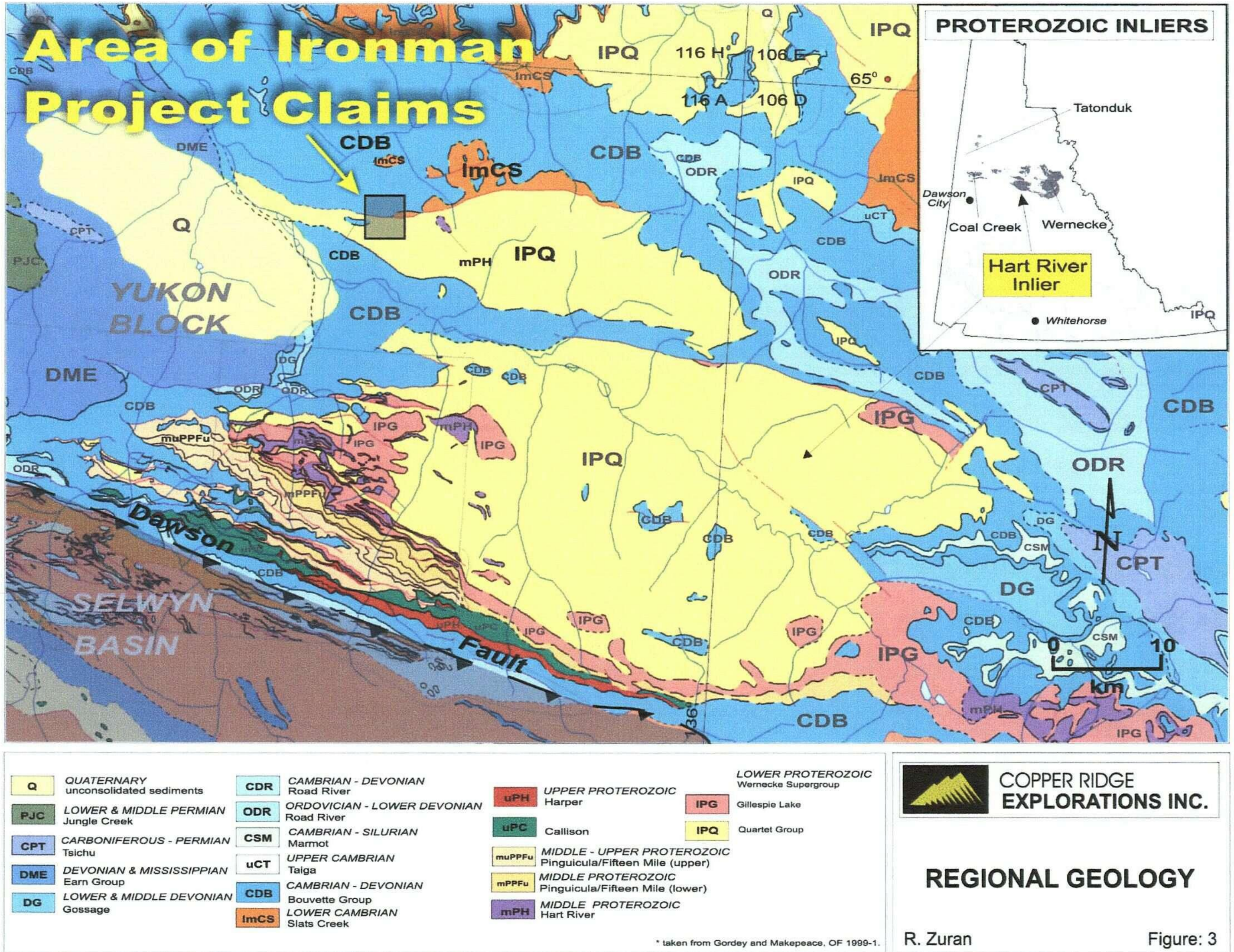

Figure 3 - Ironman Property - Regional Geology

Group, with an estimated minimum thickness of 2000m, is a clastic to carbonate package (oldest to youngest). It is structurally complex with three phases of deformation (J. Hunt, pers. comm., 2004) and no marker horizons. The Gillespie Lake Group is characterized by shallow, orange weathering stromatolitic dolostone. The Hart River basalts are about 75 m thick and have dioritic-gabbroic sill and dyke equivalents. The Pinguicula Group comprises clastic and some carbonate rocks and is observed to have an angular unconformable contact with the Hart River volcanic rocks. The Callison Lake dolostones, estimated to be 500m thick, is a distinctive light grey weathering, well bedded dolostone with well preserved sedimentary structures that include stromatolites, pisoliths and intra-formational breccias. The Callison Lake rocks are seen primarily along the southwest side of the Hart River Inlier and are unconformable on both upper and lower contacts. The Harper Group, sandwiched unconformably between the older Callison Lake dolostone and younger Paleozoic carbonates, comprises diamictite, shale, siltstones and volcanic rocks. The diamictites form a useful marker horizon separating similar carbonate rocks of the Callison from the Paleozoic carbonates. (Abbott, 1997).

The Lower Cambrian Slats Creek marine and alluvial deposits unconformably overlie the Proterozoic rocks around the periphery of the Hart River Inlier. In addition, numerous Paleozoic shallow water facies rocks include Bouvette, Taiga, Marmot, Road River, Gossage, Earn, Tsichu, and Jungle Creek group rocks. Volumetrically carbonates and shales predominate in the Yukon Block.

A chronology of events of Proterozoic rocks in the Yukon covers at least 1.2 billion years. These events include crustal extension, mountain building, mafic magmatism, and hydrothermal brecciation.

PROPERTY GEOLOGY

The original AA claims portion of the property was mapped at a 1:10,000 scale during the 2004 field season (see Zuran, 2004). The current program was supplemented by a minor amount of mapping in the vicinity of the Ironman and Iron Mama showings.

Sedimentary rocks

The lower Proterozoic Quartet Group rocks underlying the AA claims are a fine grained clastic succession with carbonate interbeds becoming more frequent in the upper part. The Quartet group (IPQ) consists of dark grey to black shaly to locally slaty weathering shale; off white to white angular blocky weathering locally gossanous very fine grained quartz rich to arkosic equigranular sandstone/quartzite; pale grey to dark grey weathering, interlaminated rhythmite-mudstone/arkosic siltstone; interlaminated dolostone or in part dolomitic in composition higher in the section and: an orange to buff brown grey weathering, commonly laminated to thin bedded, fine to medium grained, rarely massive, locally recrystallized dolostone.

All units of the Quartet Group are typically interbedded with each other, with gradational contacts. The siltstone unit is volumetrically abundant on the AA claims and represents a thick sequence. The resistant weathering, very fine grained sandstone unit forms an east-west ridge at the south edge of the AA claims. The recessively weathering black shale is uncommon and is only noted in the west of the AA 1-16 claim block and south of the AA Petit Showing. It is typically interlaminated with the rhythmite siltstone unit. The dolostone is typically interlaminated with sandy layers and/or siltstone. When interlaminated, the dolostone is characteristically differentially weathered.

Low grade regional and local contact metamorphic derivatives of Quartet Group lithologies are noted through the AA-IM claim block, namely slaty and phyllitic siltstones, quartzites, fine grained siliceous hornfelsed siltstone and skarn-like recrystallized carbonate pods. Hornfels and skarn-like pods are local, proximal to, or embodied by, the diorite to gabbro intrusive rocks (i.e. Copper Top & AA Petit areas). The hornfelsed siltstones are variably magnetic.

The Cambrian to Devonian Bouvette Group rocks consists of a section of distinctive light pale buff to light grey weathering, massive to thick bedded, locally recrystallized dolostone and dolomitic limestones. These rocks are observed north of the main east-west trending creek on the IM claims. They are relatively flat dipping and occur in cliff forming outcrops at the west boundary of the claims in the east-west trending creek with local minor brecciation.

Igneous rocks

Igneous rocks on the property consist largely of dark grey, locally greenish, brownish, medium grained, sub-ophitic, melanocratic diorite/gabbro. The age of intrusives is unknown and may include more than one suite; the Hart River Suite (ca. 1380 Ma) diorite/gabbro sills and dykes are the nearest government mapped intrusives; approximately 2.5 km to the east of the AA claims.

Igneous rocks on the AA claims occur as several northwest elongated stocks along a northeast trend. The intrusives are characteristically dark, blocky resistant weathering, forming steep cliff faces and local spires occupying high points in the topography. Local coarse grain textures are noted within the largest part of the stock. Occasional quartz+/-calcite-dolomite-ankerite+/-epidote comb-textured veinlets within the diorite to gabbro commonly have trace amounts of chalcopyrite associated with them. The intrusives are variably magnetic.

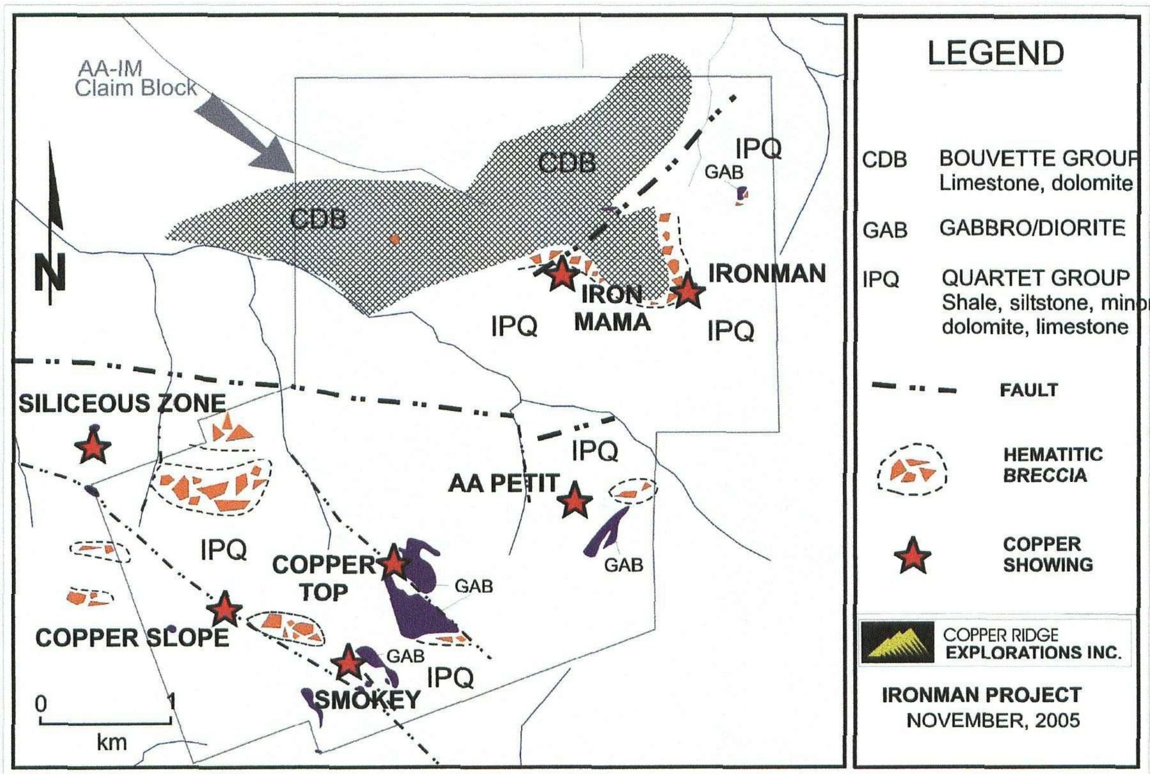

Figure 4 - Ironman property geology and showings.

Breccias

At least 5 breccia bodies were mapped within the AA-IM claim block perimeter. The exact areas of the breccia bodies are remain ill-defined as no sharp contacts were noted. The breccia bodies typically occur as large differentially grey (dark brown to reddish-brown at Ironman) weathering irregular blocks over rubbled outcrop or sub-crops. Two styles of breccia were observed:

1) Monolithic or polylithic sub-angular to angular clast composition ranging 0.5-50cm -typically Quartet Group lithologies in the AA claim block with a fine grained carbonate and/or clastic matrix; Trace to 5 % fine to coarse grained specularite and/or hematite is common. (*i.e. claim AA 2*).

2) Intra-formational solution collapse of inter-laminae form local breccias at the Copper Slope Showing.

Structure

The Hart River Inlier has an east southeast elongation which is reflected in the S1 (first) cleavage and the, predominant east-southeast strike of the rocks. In most cases the S_1 cleavage is equivalent to the axial plane cleavage. Other directional cleavages were infrequently observed suggesting two or possibly three deformational events. However, only the primary first cleavages were measured in the field. The Racklan orogeny inverted the Wernecke basin and involved at least two phases of folding and three phases of cleavage and fabric development (Abbott, 2003) - not all are seen on the property.

Two northwest trending, steep dipping faults on the property are called the Smokey and Copper Top structures. The Smokey Structure is coincident with the Copper Slope and Smokey showings where shearing is noted locally. The Copper Top Structure is coincident with the Copper Top showings. Both structures are locally coincident with diorite intrusive bodies having a north-westerly elongation. Displacement along the structures has not been determined; however the main diorite stock appears disrupted by the Copper Top Structure.

Two north-south trending faults are interpreted to lie coincident with creeks on the AA claims. This is supported by joint structural plots but not confirmed in the field.

Alteration

Four types of alteration have affected the Quartet Group and igneous rocks present on the property; including greenschist facies metamorphism, metasomatic-thermal alteration, oxidation and hydrothermal activity.

Regional greenschist metamorphism occurred prior to intrusive and brecciation events. Alteration is characterized by the presence of fine grained muscovite-sericite and chlorite in siltstone and meta-siltstone rocks.

Metasomatic-thermal alteration is restricted to intrusive margins (post greenschist), structural "conduits", and breccias. Alteration proximal to intrusive contacts is typified in the hornfelsed siltstones and includes quartz, minor epidote-calcite, trace pervasive disseminated euhedral fine grained magnetite, and local trace disseminated sulphides (pyrrhotite-pyrite+/-chalcopyrite). Albite-quartz+/-sulphide (pyrite-chalcopyrite) alteration is suspected in the fine grained sandstone unit proximal to diorite stocks; and confirmed in selective laminae of dolomitic siltstones coincident with structure and proximal to diorite.

Oxidation alteration is present as gossanous outcrops containing weathered sulphides, primarily pyrite, pyrrhotite, chalcopyrite and magnetite. Alteration is characterized by limonite, jarosite with rare local malachite and azurite.

Alteration associated with hydrothermal activity is assumed to have take place during the emplacement of breccia bodies, possibly also associated with the diorite-gabbro intrusive event. Hydrothermal alteration is commonly manifested by bleaching and silicification. Veinlets of quartz+/-calcite-ankerite+/-epidote+/-sulphides (pyrite-chalcopyrite) are not uncommon in the diorite-gabbro intrusive. Local tight chlorite rich selvages and rare amphibole may be associated with veinlets in the intrusive. There is a gradation between metasomatic-thermal, oxidation, and hydrothermal alteration and the same rocks may have been affected by all three events.

MINERALIZATION

Three basic styles of mineralization are noted on the property: 1) iron rich magnetite – hematite breccias; 2) hydrothermal-silica flooding and quartz vein development; and 3) contact metasomatic-skarn/hornfels. Areas of significant mineralization are shown on Figure 6.

Breccia Zones

Magnetite – hematite breccias are generally developed in the metasediments adjacent to gabbro intrusions. The breccia zones can be up to tens of square metres in size and consist of angular to rounded fragments of metasediments in a matrix of massive specular hematite and / or magnetite. Copper mineralization in the breccias occurs as local blebs of chalcopyrite. The only breccia significantly mineralized with copper is the Ironman, as described below.

AA Petite

Mineralization at the AA Petit showing consists of a lens of massive to semi massive magnetite and chalcopyrite developed in the sediments on the margin of a gabbro dyke. The lens is up to 1 m wide and was traced in a window of outcrop for about 5 m along an east – west strike. A high grade grab sample of this material assayed 5.8 % Cu while a 90 cm chip sample across the lens assayed 3.1 % Cu.

Smokey Showing

The Smokey showing is exposed on the face of a cirque and was the original showing discovered by Bernie Kreft. The Smokey area is predominantly underlain by very fine grained altered arkosic sandstone and minor siltstone. This unit strikes generally east-west and dips moderately to the north. Several gossans caused by the oxidation of disseminated to locally massive chalcopyrite occur along the northwest trending Smokey structure. Mineralization is hosted within strong silicification and quartz veining within the structure. Grab samples of the mineralization assay up to 1.9 % Cu. Chip sampling was difficult due to the dip slope nature of the mineralization on the steep face of the cirque. Results from the chip sampling included 8 m of 0.27 % Cu, 6 m of 0.26 % Cu and 3 m of 0.7 % Cu

Mineralization at the Smokey showing is crudely zoned with chalcopyrite down the centre and pyrite on the flanks of the veins and silicified zones (R. Tafti, pers. comm., 2004). The mineralization is suspected to be hydrothermal flooding into the permeable sandstone and occurs with varied bleaching, silicification, limonite-hematite-jarosite oxidation and suspected albite alteration.

Copper Slope

The Copper Slope covers a very steep area immediately west of the ridge west of the 2004 base camp. The host lithology is an orange-brown weathering argillite-siltstone interlaminated with lighter coloured albite-carbonate altered rock. These laminae are locally folded and exhibit solution collapse breccia textures. Pyrite +/- chalcopyrite disseminations and blebs were noted selectively along the albite rich laminae. Other mineralization seen in the area in trace amounts - typically along fractures, include: pyrrhotite, magnetite, bornite, covellite, malachite, and two fist size pods of chalcopyrite float. A grab sample of the pods assayed 6.6 % Cu

Copper Top

At the Copper Top showing patchy mineralization over a 100 by 300 m area is coincident with a northwest trending structure. A grab sample of subcrop of calcareous material with blebs of chalcopyrite returned an assay of 3.0 % Cu.

The mineralization at the Ironman and Ironmama showings is discussed below under the heading *2005 Work*.

The characteristics of the mineralized zones are summarized in Tables 1 and 2.

Table I: Copper Showing Descriptions (Zuran, 2004)

ZONE	SIZE - (approximate in metres)	MINERALIZATION	HOST LITHOLOGY	STYLE
IRONMAN	50m wide X 200m down slope (open)	Up to 70% fine grained hematite +/- magnetite and rare trace amounts of blebby chalcopyrite +/- malachite stain.	Polymictic breccia (BXA $_{HEM}$): clasts include: various sedimentary and possible volcanic lithotypes, as well as mineral grains of quartz, feldspars (albite) and Fe-stained carbonate. Matrix is fine grained and contains carbonate.	breccia - mineralization in both clasts and matrix
IRONMAMA	100m X at least 200m in the east-west direction (open)	Two types: 1) 90% limonite-jarosite +/- MnO_2; 2) up to 90% fine grained hematite.	1) gossanous breccia - rusty porous oxide cemented rock - ferricrete (?); 2) dark weathering foliated silica-hematite flooded siltstone	1) undetermined 2) hydrothermal silica flooding - fine grained hematite replacement along selective layers
AA-PETIT	minimum 1 by 5 m	Two types: 1) disseminated to blebby chalcopyrite - oxidized with limonite, hematite and malachite; 2) also massive magnetite with interstitial pyrite note.	1) & 2) dolomitic siltstone	1) hydrothermal - quartz veinlets 2) skarn-like pod
SMOKEY	150m wide X over 500m down slope, sub-parallel to Smokey Structure	Trace to locally up to 8% disseminated/blebby chalcopyrite, 5% to locally up to 35% disseminated and blebby pyrite, locally up to 2% malachite, locally up to 2% azurite; outcrop E contains up to 20% magnetite. Intense limonite+/-hematite+/-jarosite stain local.	Very fine grained arkosic sandstone and siltstone	metasomatic-hydrothermal silica flooding & structurally controlled
COPPER SLOPE	~100m wide X undetermined strike length (open) , coincident with Smokey Structure	Two types: 1) up to 5% disseminated and blebby sulphides that include: pyrite +/- chalcopyrite +/- magnetite +/- bornite +/- covellite +/- local azurite and malachite stain; 2) two fist size float of massive chalcopyrite found within area of mineralized outcrops.	1) Folded argillite/siltstone interlaminated with albite/dolomite. Petrography indicates 30% albite, 10% sericite and minor tourmaline. Solution collapse breccias in zone. 2) Same lithologies.	1) Selective replacement along albite rich laminae (metasomatic-hydrothermal?) 2) undetermined
COPPER TOP	patchy over a 100 X 300m area, coincident with Copper Top Structure	Three types: 1) trace to 3% disseminated sulphides including pyrite-pyrrhotite-chalcopyrite +/- euhedral magnetite; 2) massive chalcopyrite blobs 5 cm in diameter; 3) trace to 3% blebby chalcopyrite, quartz-calcite, epidote +/- actinolite.	1) hornfelsed silicified cherty dolomitic siltstone; 2) coarse crystalline calcite/marble; 3) diorite (DIO)	1) contact metasomatic, pervasive and along fractures; 2) skarn-like pods; 3) hydrothermal quartz veinlets
SILICEOUS ZONE	not determined, adjacent to and may be related to Smokey Structure	Up to 30% very fine grained hematite associated with silica flooding.	Predominantly a quartzite interbedded with silica flooded siltstone	quartz stockwork & hydrothermal silica flooding - fine grained hematite replacement along selective layers

Table II: Summary of metal values, copper showings (Zuran 2004)

ZONE	No. of samples	GEOCHEMICAL STATISTICS												Copper Correlation
		Copper (ppm)			Cobalt (ppm)			Gold (ppb)			Fe (%)			STRONG (1.00-0.75) moderate (0.75-.50)
		mean	max.	92-95th Percentile	mean	max.	92-95th Percentile	mean	max.	92-95th Percentile	mean	max.	92-95th Percentile	
IRONMAN and IRONMAMA	14	1153	5373	2239	20.8	116.2	36.9	3.5	24.5	6.9	9.67	17.02	16.91	**Au-Se-U-S** K
AA-PETIT	14	23062	154620	59020	36.1	149.2	107.9	30.7	147.6	86.5	6.84	17.44	15.11	**Ag-Hg-Au-Se-Bi-Sb-Cd-Pb-S** Fe
SMOKEY	66	1412.3	19500	5939.2	195.87	1740.1	456	15.126	73.6	45.6	3.1992	10.55	5.38	**Ag** Au-Hg
COPPER SLOPE	6	12009	66540	X	85.8	157.0	X	29.0	147.2	X	5.98	12.56	X	**Au-Hg-Ag-Cd-Se-Th-Fe-Bi-Zn-La-Sc-Cr** Ni-Co-S-As
COPPER TOP	4	12937	29680	X	15.8	27.3	X	160.2	508.8	X	10.55	29.51	X	**S-Se-Ag-Bi-Pb-Hg-Cd** Ca-Sb-Zn-Au-Sr
SILICEOUS ZONE	2	14.9	16.6	X	3.1	4.7	X	0.5	0.5	X	2.415	3.59	X	X

2005 WORK

Exploration Program

The objective of the 2005 exploration program was to define an IOCG (iron-oxide copper gold) drill target on the AA and IM claims. Geological mapping, prospecting and rock chip sampling were carried out on and around the Ironman and Iron Mama showings. A helicopter supported gravity survey was also completed to fill in areas north and west of the initial gravity survey completed in 2004. The total expenditure for this program was $38,345.60.

Prospecting, geological mapping and rock sampling was completed by Jean Pautler of JP Exploration Services. The gravity survey was completed by personnel of Aurora Geosciences (see Appendix I) with helicopter support using a Hughes 500D under contract from Prism Helicopters. Gerald Carlson of Copper Ridge Explorations Inc. supervised the program.

The 2005 field schedule included:

July 13: G. Carlson and J. Pautler complete reconnaissance of Ironman and Iron Mama showing areas. Gravity crew arrives at Blackstone camp.

July 14 & 15: Gravity survey completed. J. Pautler mapping and sampling.

July 16: G. Carlson mapping and prospecting. Backhaul of fuel drums.

The program was based from the Blackstone Outfitters base camp at km 121 of the Dempster Highway, just south of the Chapman Lake airstrip.

Mapping

Three days (July 13-15, 2005) were spent following up new copper-bearing breccia occurrences discovered in 2004 on the IM 3-24, 39-48 claims. The program consisted of detailed prospecting, mapping and rock and soil geochemical sampling (with a total of fifteen rock and six soil samples). The target is an iron-oxide-copper-gold type of deposit, associated with the lower Proterozoic Wernecke Breccias and the Quartet Group of the Wernecke Supergroup.

Gravity Survey

In 2004, an initial gravity survey was carried out, centered on the AA claim group and consisting of 58 gravity stations at approximately 500 m centres, by Aurora Geosciences Ltd. of Whitehorse. This survey outlined the southern and eastern edges of what appeared to be a significant gravity anomaly in the northwestern portion of the grid.

The 2005 survey was designed to fill in and close off this anomaly. During the two day survey, an additional 57 gravity stations were collected. The data was reduced and combined with the 2004 data to produce a Bouger gravity map as described in Aurora's field report, Appendix I to this report.

RESULTS

Geology and Mineralization

The breccia exposed in the Ironman to Ironmama area may represent a regolith at the base of the upper Cambrian to lower Devonian Bouvette Assemblage, as it occurs for a considerable distance directly below the unconformity. The Bouvette consists of flat lying to gently dipping massive limestone and dolomite unconformably overlying the Quartet Group. It was traced from the Ironman Showing itself to above the Ironmama Showing and, in part, along the southern and eastern sides of the ridge at approximately the same elevation, with the unconformity dipping gently to the west. Minor chalcopyrite mineralization was encountered within the regolith at the base of the Bouvette Formation, with a possible source from the underlying Quartet siltstones or an adjacent breccia body.

Chalcopyrite mineralization also occurs within chloritized gabbro bodies that appear to be of Proterozoic age (Samples HR-JP23R, 27R). The gabbro may also be the cause of local honfelsing within the siltstones resulting in silicification and pyritization with limonitic weathering and occasional presence of chalcopyrite (Samples HR-JP29R, 36R).

Massive specular hematite interbedded with hematitic breccia, and minor quartz occurs within variably silicified bedded hematitic siltstones at the northeast end of the property (IM 48). The unit hosts chalcopyrite mineralization, as previously observed in float (136997). Massive to disseminated magnetite was noted also in a number of the samples.

The structure in the area is complex. A northeasterly fault system appears to extend from the Ironmama area to IM 48 and beyond, exposing a sliver of the Paleozoic carbonate package (Bouvette Assemblage) within the Proterozoic succession on IM 48. Approximately 500m northeast of the Ironmama Showing, along this fault system, the unconformity between the upper Paleozoic and the Proterozoic is sinistrally offset by 100 to 150m. An easterly trending fault may extend from this same area passing through, possibly just south of, the breccia occurrence on IM 44 to 46, resulting in repetition of the stratigraphy in this area.

The breccia occurrences on the IM 3-24 and 39-48 claims appear to represent a basal regolith to the Paleozoic carbonate succession. However, the widespread occurrence of chalcopyrite, often associated with magnetite alteration, within the Proterozoic Quartet Group of the Wernecke Supergroup is promising, particularly within the north-eastern property area and this is consistent with the iron-oxide-copper-gold model.

Rock sample locations and corresponding copper values for the 2005 program are summarized below in Table III and on Figure 5.

Table III: 2005 Sample descriptions and copper values.

IRON MAN PROJECT, Yukon Territory									
SAMPLE		NAD 83	ZONE 8	ELEV			Cu	Au	Fe
No.	LOCATION	EASTING	NORTHING	(m)	TYPE	GEOLOGY	ppm	ppb	%
HR-JP16S	Ironman	423410	7194913	1569	soil	bright red rusty soil in area of gabbro talus +/-pyrite, po, cp; bx in area	27	5	10.1
HR-JP17R	West of Ironman	423263	7194901		grab	hematitic polymictic bx, weakly chloritic, with 50% fg spec, cp	407	4	19.05
HR-JP18R	West of Ironman	422822	7195045	1483	grab	silicified siltstone, +/- brecciated with cp and minor cg spec in frcs	265	8	5.77
HR-JP19R	West of Ironman	422679	7195159	1442	grab	massive magnetite with quartz-carbonate, trace chalcopyrite	159	3	39.71
HR-JP20S	West of Ironman	422666	7195203		soil	rich medium orange brown talus fines	448	2	8.79
HR-JP21S	West of Ironman	422595	7195216		soil	light orange brown talus fines below ferricrete zone	40	10	4.99
HR-JP22S	West of Ironman	422541	7195211		soil	light orange brown B below rusty weathering silicified siltstone	36	23	5.21
HR-JP23R	N of Ironman	424543	7195935	1195	grab	chloritized gabbro with 3% mt and 1% cp, minor qtz-carb strs with cp	8976	19	8.97
HR-JP24R	N of Ironman	424526	7195884	1205	grab	hematitic to less chloritic weak breccia with mal on shears and cp in matrix	3920	26	4.78
HR-JP25R	N of Ironman	422530	7195898	1200	grab	dolomitic stst with 0.5% cp as dissem and in frcs, qtz-carb strs	1459	16	3.02
HR-JP26R	N of Ironman	424606	7195879	1209	grab	hem breccia with 70% f-mg spec, 1 % cp	59	36	8.38
HR-JP27R	N of Ironman	424618	7195821	1224	grab	gabbro with cp, mal in qtz-carb strs	749	10	6.33
HR-JP28R	N of Ironman	424512	7195873	1218	grab	mt altered sil siltstone with 20% mt, 0.5% cp assoc with mt-chl layers	527	64	5.71

PAGE 2

IRON MAN PROJECT, Yukon Territory
2005 SAMPLE DESCRIPTIONS AND RESULTS

SAMPLE		NAD 83	ZONE 8	ELEV			Cu	Au	Fe
No.	LOCATION	EASTING	NORTHING	(m)	TYPE	GEOLOGY	ppm	ppb	%
HR-JP29R	N of Ironman	424542	7195898		grab	limonitic hornfelsed siltstone with py, cp	13950	305	8.94
HR-JP30S	above Ironmama	422404	7195251	1437	soil	red brown talus fines, ferricrete float at unconformity	15	4	1.67
HR-JP31S	below Ironmama	422324	7195106	1379	soil	Rusty orange talus fines, in limestone along 040 fault?	219	3	6.44
HR-JP32R	below Ironmama	422425	7195111		grab	otc of silicified siltstone +/-chloritized, with minor py, cp	134	2	7.59
HR-JP33R	N of Ironman	422894	7195632	1541	grab	pyritic dolomitic sandstone and siltstone	53	1	6.07
HR-JP34R	N of Ironman	423028	7195539	1498	grab	calcareous grit layer in siltstone with cp in qtz-carb strs and along foln	40	8	5.41
HR-JP35R	N of Ironman	423058	7195527	1496	grab	calcareous sandstone with cp	3194	13	4.87
HR-JP36R	N of Ironman	423718	7195241	1480	grab	limonitic silicified hornfelsed white siltstone +/- ser altered, with py pods and dissem	39	12	7.86

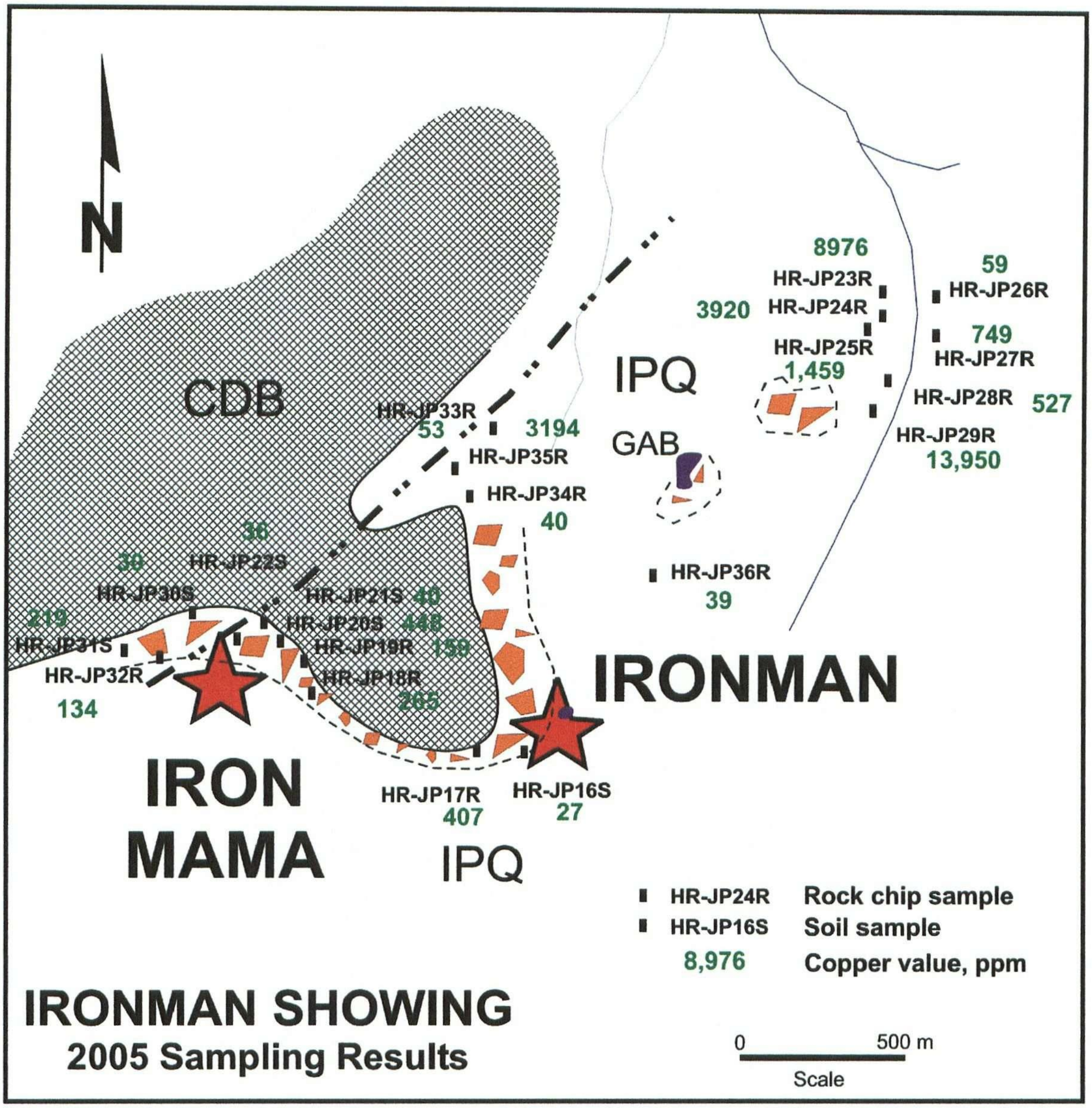

Figure 5 - Results of 2005 sampling, Ironman showing area.

Gravity Survey

The 2005 survey successfully fully defined a gravity anomaly that is approximately 4 milligals in with a core measuring approximately 1.5 by 2 km (see Figure 6). A number of locally copper-bearing hematite (iron-rich) breccia occurrences, including the previously reported ***Ironman*** and ***Iron Mama*** showings, have been discovered around the periphery of the anomaly, within the Proterozoic sedimentary rocks adjacent to the contact (unconformity) with the younger Bouvette carbonates. Of 21 rock chip samples from this exposed breccia, copper (Cu) values ranged from 53 parts per million (ppm) to 1.395% Cu, with four samples in the range of 1,450 ppm to 8,976 ppm Cu. A silt sample from a creek draining the Ironman showing area contained 55 ppb gold, the highest gold value returned from the 2004 silt sampling program.

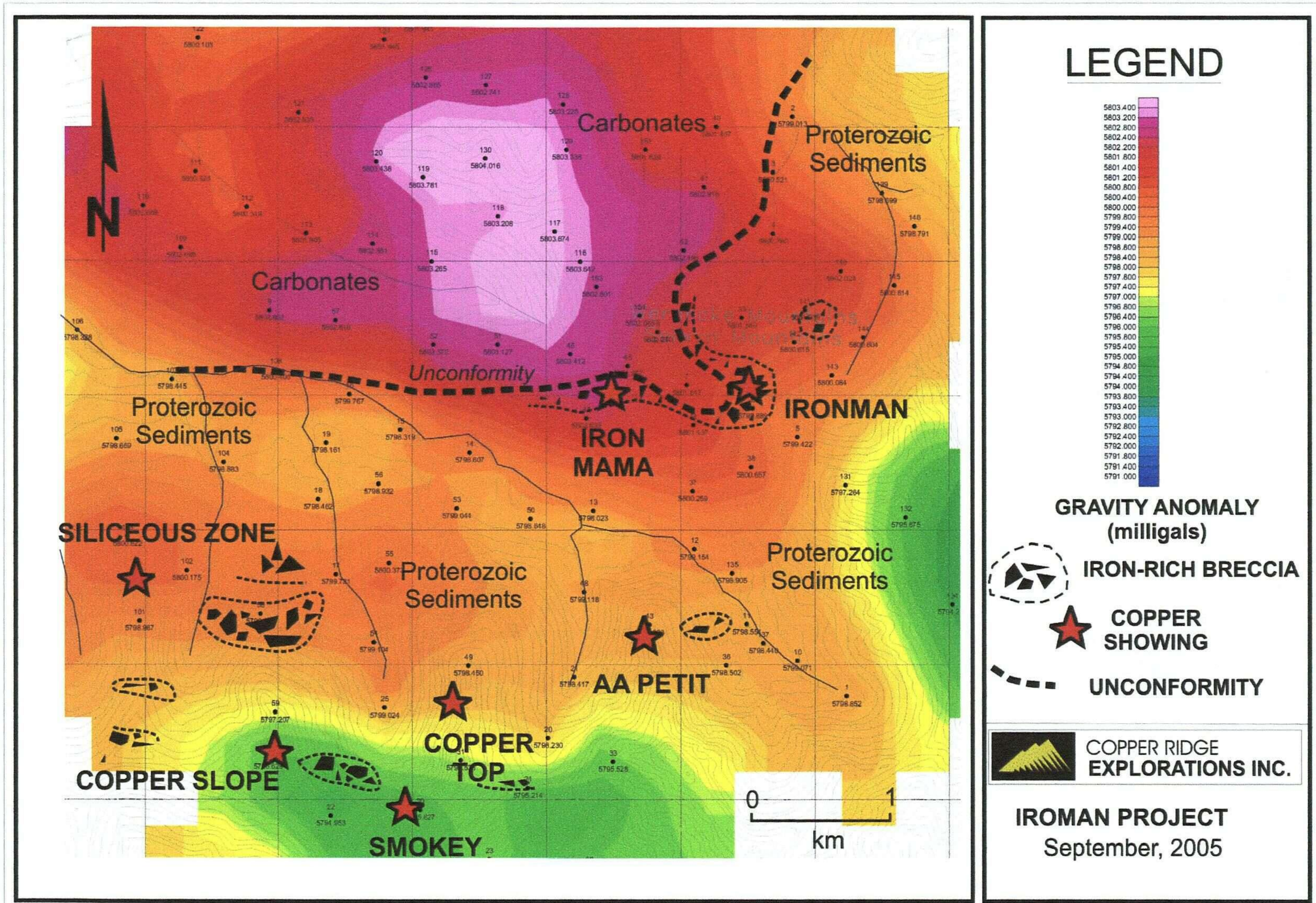

Figure 6 - Ironman Gravity Survey - Bouger Anomaly Map.

Whether the breccia occurrences represent a regolith just below the Quartet Group – Bouvette Group unconformity or the fringes of a true Wernecke style iron-rich breccia, or some combination of the two, the fact that these occurrences fringe the gravity anomaly suggests that the anomaly may indeed represent a large breccia occurrence beneath the younger carbonate cover.

CONCLUSIONS

The Ironman Property was first noted for its IOCG potential by Bernie Kreft, who discovered copper-gold mineralization associated with iron-rich breccias of the Wernecke type within Proterozoic sediments in the Hart River inlier. Kreft sampled the area in 2002 and 2003 and staked 20 claims. In late 2003, the Property was optioned to Copper Ridge and, in 2004, Copper Ridge completed a program of mapping, sampling and a gravity survey. Copper mineralization was noted in a number of areas associated with several discrete breccia bodies. The gravity anomaly partially outlined a strong anomaly in the northwestern quadrant of the survey area. The property is centered on a large, regional gravity anomaly.

The purpose of the 2005 program was to fully define the gravity anomaly and to further investigate copper mineralization associated with breccias at the Ironman and Iron Mama showings, located peripheral to the gravity anomaly. Copper values from 15 rock chip samples collected in this area in 2004 ranged from 40 ppm to 1.4%, with four other samples falling in the range 0.1% to 0.9% copper. The highest gold value was 305 ppb.

The gravity survey successfully defined an anomaly that is roughly 1.5 km by 2 km in size, with a magnitude of 4.0 milligals. The area of this anomaly is totally covered by younger sedimentary rocks and thus the source, believed to be within the Proterozoic succession, is hidden. However, the occurrence of iron-rich breccias and copper mineralization along the fringe of the unconformity suggests that the source may be an iron-rich breccia body. Indeed, some of the iron-rich zones immediately below the unconformity, in the area of the Ironman and Iron Mama showings, have the appearance of a regolith. It is possible that we are seeing a weathering profile related to the erosion of a nearby IOCG deposit.

The 2004 and 2005 exploration programs by Copper Ridge have demonstrated the potential for the occurrence of a significant IOCG deposit on the Ironman property. The occurrence of copper mineralization, some with very high values and, locally, with anomalous gold values, suggests a potential mineralization centre nearby. Much of this mineralization is associated with Wernecke-style iron oxide breccias and Proterozoic mafic intrusions. The 4.0 milligal gravity anomaly, located adjacent to a number of the copper and breccia occurrences and roughly over the centre of a regional aeromagnetic anomaly, provides a compelling IOCG target that deserves drill testing.

Recommendations for further work on the Ironman Property are as follows:

1) Carry out detailed mapping and sampling, focused on the unconformity between the Proterozoic Quartet Groups Sediments and overlying Bouvette Group limestones as well as related mineralization and structures, particularly in proximity to the Ironman gravity anomaly.

2) Carry out a detailed ground magnetic survey over the Ironman gravity anomaly. If feasible, carry out three dimension modelling of the results of the gravity and magnetic surveys.

3) Complete a three to four hole drill program for a total of 750 to 900 m to test the gravity anomaly.

STATEMENT OF COSTS

Helicopter Support – 16.6 hr @ 971.50/hr	$16,126.90
Fuel – 16.6 hrs @ 150/hr	$2,490.00
Geological	
JP Exploration Services - 5 dys @ 535/dy	$2,675.00
KGE Management – 4 days @ 642/dy	$2,568.00
Gravity Survey	$9,041.50
Assay	589.20
Room & Board – 8.5 days @ 35/dy	$297.50
Camp rental, consumables, communications	$1,500.00
Final Report	$5,000.00
Total	**$40,288.10**

STATEMENT OF QUALIFICATIONS

I, Gerald G. Carlson, hereby certify that:

1. I am a consulting mineral exploration geologist and President of KGE Management Ltd. of 1740 Orchard Way, West Vancouver, B.C. V7V 4E8.
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., 1974) and Dartmouth College (Ph.D., 1978). I have been involved in geological mapping, mineral exploration and the management of mineral exploration companies continuously since 1969, with the exception of time between 1972 and 1978 for graduate studies in economic geology.
3. I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia, Registration No. 12513 and of the Association of Professional Engineers of Yukon, Registration No. 0198.
4. I am the author of this report on the Ironman Project, Report on 2005 Exploration Activities. The report is based on a literature review, on private company reports and on property visits during the 2003, 2004 and 2005 field seasons.
5. I am a Director, President and CEO of Copper Ridge Explorations Inc. and I own shares of Copper Ridge.
6. I personally supervised the exploration programs conducted on the area discussed in this report.
7. I hereby grant Copper Ridge Explorations Inc. the use of this report in support of documents submitted to the British Columbia Securities Commission and the TSX Venture Exchange or for other corporate purposes in accordance with applicable government regulations.

Dated at Vancouver, B.C. this 12th day of December, 2005,

Gerald G. Carlson, Ph.D., P. Eng.
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1740 Orchard Way
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604-816-3012

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APPENDIX I

Gravity Survey Field Report

Aurora Geosciences

COPPER RIDGE EXPLORATIONS INC.

2005 GRAVITY SURVEY AT THE HART RIVER PROPERTY, NORTHERN YUKON TERRITORY

Mike Power M.Sc. P. Geoph.

Location: 64° 52' N 136° 39' W
NTS: 116 A 15
Mining District: Mayo, YT
Date: November 9, 2005

SUMMARY

A gravity survey was conducted at the Hart River Property for Copper Ridge Explorations Inc. between July 14 and 15, 2005. The survey was conducted to locate hematite breccias associated with copper-gold mineralization. A total of 57 stations were surveyed with helicopter support. Topographic elevations and station locations were surveyed with differential GPS receivers and elevations are considered accurate to ± 50 cm. 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 and a digital elevation model. Terrain within 20 m of the survey station was measured with a laser range finder and removed using the sector equation. Terrain effect to a distance of at least 3 km from any station was removed using a 20 m DTM constructed from digital topographic maps of the area. Bouguer anomaly measurements are considered accurate to ±245 mGal accounting for all sources of error. The report contains a digital archive and a Bouguer Anomaly map showing the final reduced gravity.

Table of Contents

List of Figures

1.0 INTRODUCTION

Aurora Geosciences Ltd. was retained by Copper Ridge Explorations Inc. to conduct a regional scale gravity survey on the Hart River Property in the Mayo Mining District, Yukon Territory. The Hart River Property hosts copper-gold mineralization, similar in style to that found in the Olympic Dam deposit in Australia. The purpose of the survey was to locate regional Bouguer Anomaly highs potentially associated with hematite breccias.

2.0 LOCATION AND ACCESS

The Hart River Property is centred at 64° 52' N 136° 39' W on NTS 116 A/15 in the northern Yukon Territory (Figure 1). The property is 160 km NE of Dawson City, 25 NE of the Hart River Mine airstrip and 85 km ESE of the Chapman Strip on the Dempster Highway. The property is only accessible by helicopter with the nearest charter service available in Dawson City.

3.0 MINERAL PROPERTY AND SURVEY LOCATION

The Hart River Property consists of the following mineral claims staked under the Yukon Quartz Mining Act in the Mayo Mining District[1]:

Claim Name	Record Number	Expiry Date
AA 1-20	YC10898-YC10917	July 29, 2010
AA 25-40	YC11796-YC11811	July 26, 2006
IM 1-44	YC11857-YC11900	August 6, 2006
IM 45-48	YC32201-YC32204	August 6, 2006
IM 51-52	YC32207-YC32208	August 6, 2006

The gravity survey was conducted in the area shown in Figure 2. A total of 57 stations were surveyed with helicopter support in an area bounded by 418000E 7190000N to 426000E 7198500N (NAD83 / UTM Zone 8N). The gravity stations were distributed to evenly cover an area surrounding and north of a Bouguer Anomaly detected during the previous season's gravity survey on this property. Stations were sited along traverse lines and in locations with ready helicopter access.

[1] Claim information from www.yukonminingrecorder.ca on Nov 9, 2005.

4.0 PERSONNEL AND EQUIPMENT

The gravity survey was conducted by the following personnel:

Carla Kennedy	Crew chief / geophysicist
Derek Torgersen	Technician

The crew was equipped with the following instruments and equipment:

Gravimeter:	Scintrex CG-5 s/n 911009188
GPS base:	Trimble 4000 SSE s/n3535A12121 Antenna 12619 (dual frequency / no ground plane)
GPS rover:	Trimble Pro-XRS s/n 0224005367
Other:	1- Impulse laser range finder (ALG22) 1- P-1.2GHz laptop & colour printer 2 - VHF radios 1 - Jeep SUV

The crew was on the property July 14 and 15, 2005. The survey log in Appendix B describes survey operations. Instrument specifications are included in Appendix C.

5.0 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:

$$F = \frac{GM_1 M_2}{r^2}$$

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.

5.1 Gravity meter function

The Scintrex Autograv gravimeter contains a small test mass suspended by a zero-length fused quartz spring. An electrostatic system is used to maintain the 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 may vary during the course of a measurement because of tripod settling. The Autograv measures the vertical component of the gravity field and as the housing moves off true vertical, the apparent gravity acting 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 Autograv 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 leveled to the Geological Survey of Canada gravity control network by the addition or subtraction of an instrument specific constant determined in the field by taking a gravity reading at a GSC control point and computing a static shift.

5.2 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 extraterrestrial 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 an 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 are commonly applied to the raw gravity data:

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

These are discussed in turn.

5.3 Drift correction

Repeated gravity readings at a single station show temporal variations caused by solar and lunar gravity (tides), spring hysteresis and atmospheric pressure. Tidal variation is in the order of 30 to 300 μGal per day, instrument drift is in the order of 20 to 200 μGal per day and pressure variations are generally negligible unless there are thunderstorms nearby. In addition to these variations, gravimeters occasionally suffer *tares* or large shifts in base level due to mechanical shock.

To remove the effect of these temporal variations on the final gravity data, the operator establishes one or more gravity base stations and assigns fixed values of the raw gravity to these stations. Prior to, after, and if possible, at several times during each survey day, the operator will reoccupy a gravity base station and take several readings. The difference between the check-in readings and the fixed value (datum) is the instrument drift at the check-in time; this is subtracted from the raw gravity to correct for instrument drift. If tidal corrections are performed with appropriate formulas described below and if there are no tares, the remnant instrument drift is linear and of small amplitude. Consequently, the amount of drift at any station can be calculated by linearly interpolating the drift between bracketing base station measurements using the measurement times of the bracketing base station readings and the measurement time at the field station. A minimum of three base station measurements are required during a long survey day but a gravity base station reading before and after the field readings will suffice on a short day. Large changes in drift indicate that a tares has occurred and the stations between the check-in measurements bracketing the tares must be resurveyed.

The Autograv calculates tidal drift by applying Longman's (1959) formula taking the gravity station latitude and the reading time as inputs. Because the tidal effects are uniform over large areas at any given time, the Autograv uses a single average latitude value in this calculation. During the same correction, instrument drift is also removed by applying a linear drift correction using constants determined through a cycling experiment described later in this report. Despite this latter correction, there is a small amount of remnant linear instrument drift which must be removed by linear interpolation of drift measured at the gravity base stations during the survey day.

5.4 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:

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

Latitude effect varies with north-south distance and is greatest at mid-latitudes and least at both the poles and the equator. On small grids, latitude variations are 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.

5.5 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 is 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. Figure GR-1 illustrates the effect of these corrections.

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.

5.6 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. Consequently, terrain corrections are always positive and are added to the gravity data. Terrain corrections are often applied using different algorithms in several zones surrounding the gravity station. The most accurate terrain measurements and algorithms are commonly used for the topography close to the station (near station terrain correction - NSTC) and both the density of data and the accuracy of the approximation algorithms can be decreased at greater distances from the gravity station. Far station terrain corrections are usually applied with digital terrain models (DTMs). A fine DTM and more accurate algorithm is used to calculate terrain effect to within a few kilometres of the gravity station and a coarser DTM and less accurate gravitational approximation algorithm is used at greater distances. LaFehr (1990) recommends terrain corrections be taken to a distance of 160 km surrounding a gravity station and this practice is often used for regional surveys with sparsely spaced stations.

Near station terrain corrections are commonly applied with the sector equation or Kane's Method. This method is based on calculating the gravitational effect of a mass which can be approximated using the equation for the gravitational attraction of a right cylinder. The method is applied using differences in terrain elevation measured in several zones defined by radial distances. Aurora commonly employs standard zones of 2-20 m, 20-50 m and 50-200 m. Each zone is further subdivided into 6 - 60^0 sectors. The gravitational acceleration caused by the excess or deficit mass can be calculated by considering 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 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 in each sector and zone. The NSTC is performed with elevation difference measurements taken by the operator in the field with a clinometer or laser range finder. Visibility limits near station terrain corrections to a distance of about 200 m surrounding the station.

At greater distances, the terrain correction is generally made with DTMs. These consist of an array of nodes to which elevations in metres above mean sea level are assigned. The vast majority of DTM's employ a rectangular distribution of nodes although it is also possible to construct DTM's with triangular node distributions. In general the nodes are uniformly distributed so that each node is square and each node can be considered as an upright prism with a height above mean sea level.

The terrain correction at a gravity station is performed by determining the elevation difference between the top of each node and the gravity station, and then calculating the gravitational effect of the node element. In this calculation, the height of the node element is the difference in elevation between the gravity station and the node top. It is immaterial whether the top of the node is above or below the gravity station as the correction is always positive.

The gravitational effect of the right prism centred at each node can be calculated using a variety of different methods, each of which incorporates some limiting assumptions. The geometry of these methods is sketched in Figure GR-2. Methods commonly applied in order of increasing accuracy include the line mass, Kane's Method, the flat topped right prism approximation (Nagy's Method) and the inclined top right prism method.

At great distances from a station, the dimensions of a node are negligible in comparison to the distance between the node centre and the gravity station. Under these conditions, the gravitational effect of the node-prism can be approximated by a line of mass at a distance r, with cross sectional area s, density ρ and height h as

$$\Delta g = G\rho s\left(\frac{1}{r} - \frac{1}{\sqrt{r^2 + h^2}}\right)$$

A better approximation is to consider each node as a small sector defined by distances to the near and far sides (r_i and r_o), by an elevation difference Δz, and by the angle which the node subtends at the distance r from the station to the centre of the node (angle θ). With these inputs, the sector equation can be used to calculate the gravitational effect of the node prism (Kane's Method).

A further improvement is to consider the node as a flat-topped rectangular prism at a distance r and at relative coordinates (x,y,z). The coordinates of the prism corner furthest from the gravity station are (x_2, y_2, z_1) and the coordinates of the prism corner nearest the gravity station are (x_1, y_1, z_2). The gravitational attraction of the prism is then:

$$\Delta g = G\rho \left\| \left| \left| x \ln(y+r) + y \ln(x+r) - z \arcsin\left(\frac{z^2 + y^2 + yr}{(y+r)(y^2+z^2)^{1/2}}\right) \right|_{z_1}^{z_2} \right|_{y_1}^{y_2} \right|_{x_1}^{x_2}$$

This relation (Nagy's Method) is used to perform the terrain correction with flat topped prisms. This provides the most accurate, readily calculable approximation to the terrain correction for a topography approximated with a digital terrain model.

One slight approximation remains in the terrain effect calculation. Nagy's Method assumes that the prism has a flat top whereas a more accurate approximation to the true topography would be to construct prisms with inclined tops whose slopes (angle and direction) are determined by the relative elevations of surrounding nodes. This method is numerically challenging and prone to instability; consequently it has not be implemented in the available software.

Upon completion of the terrain corrections, the resulting corrected gravity data is is commonly referred to as the Bouguer Anomaly.

5.7 Bouguer adjustment

The raw gravity readings are made relative to an internal instrument range. The values are correct *relative* to each other across a grid but the absolute values must be levelled to the National Gravity Network. This is performed by re-occupying a government (GSC) gravity station, taking a measurement and then computing a correction factor required to level the survey data to the national network. The field data are then leveled to the national datum by the addition or subtraction of the constant. Care must be taken to apply only those corrections used on the government data to the raw survey data before computing the shift constant. In many cases, GSC data has not been corrected for terrain effect.

5.8 Residual anomaly

The Bouguer anomaly data contains features caused by density variations at various depths. The gravity anomaly caused by a source at an economic depth has a relatively high spatial frequency anomaly since it arises from a shallow source. The Bouguer anomaly from a larger crustal feature at depth will produce a higher amplitude and lower spatial frequency anomaly. It is common practice to estimate a "regional" Bouguer anomaly due to large scale features not of economic interest and to remove the regional from the Bouguer data, leaving the residual Bouguer anomaly. If properly performed, the residual Bouguer anomaly would be that portion of the gravity field due solely to shallow sources of economic interest.

There are several approaches used in calculating the regional Bouguer anomaly. A simple method is to apply a spatial low-cut filter to the data, removing long wavelength features in the process. In small surveys, regional gradients are sometimes visually estimated and removed from profile data. A third approach is based on the expected signal to noise ratio of the survey. The gravitational effect of the sought-after target can be calculated using modeling software. Given the range of observed drifts, the apparent error in elevations and other sources of error, it is also possible to determine an expected overall accuracy of the gravity survey readings. The gravitational response of the target can then be upward continued until the detectible response falls below the apparent noise level. In other words, the target could not be detected from noise at this height. The gravity data, upward continued to this elevation, can be taken as an estimate of the regional field. The upward continued data is then subtracted from the Bouguer anomaly and the residual data is then largely free from the effect of large, deep sources.

6.0 GPS THEORY

Gravity station elevations must be surveyed in to at least $\pm$ 10 cm in order to produce gravity data accurate to $\pm$ 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 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.
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.

6.1 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 are 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 ephemerides 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.

6.2 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 computed from the satellite ephemerides and the known base station position. 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 can yield positions accurate to 0.50 m in x, y and z provided the PDOP is acceptable.

6.3 Dilution of precision

The accuracy of a GPS position depends upon both the accuracy of the pseudoranges and the distribution of the satellites relative to the receiver. If the SV's are clustered in one location in the sky, small changes in the pseudoranges will translate into large variations in the station coordinates. In particular, if the SV's are clustered overhead, the error in elevation will be increased. The effect of the SV distribution on the quality of the position measurement is quantified as the "dilution of precision" or DOP. DOP is further subdivided into horizontal (HDOP) and vertical (VDOP). A quantity which describes the overall accuracy of the position measurement considers the length of the error ellipse axes, the largest of which is quantified as the point dilution of precision (PDOP). In general, a PDOP less than 6.0 is considered desirable to achieve accuracies of $\pm$ 50 cm in a differential correction.

6.4 Carrier phase processing

GPS positions can be refined further by employing the short wavelength carrier phase to refine the position accuracy. 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:

<u>Static survey</u>	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 1 to 2 m. To further improve accuracy, the carrier phase difference (phase shift) 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 receivers cannot be readily determined with a single phase difference. This is referred to as the integer ambiguity. 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 (19 to 24 cm) 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.

6.5 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.

7.0 GRAVITY SURVEY SPECIFICATIONS AND FIELD PROCEDURE

The gravity survey was conducted according the following specifications with exceptions as noted:

Instrument preparation:	The gravimeter was levelled on a concrete slab and warmed up for a period of 48 hours to stabilize on June 3, 2005, prior to a previous survey. Thereafter, the instrument was cycled for 24 hours, taking readings for 120 seconds every 10 minutes. Instrument drift constants were reset at this time and the instrument drift rate derived from this measurement was used throughout the survey. The instrument remained under power at all times throughout the survey operation.
Horizontal survey datum:	NAD 1983 (Canada) with all data projected in UTM Zone 8N coordinates.
Vertical survey datum:	Mean sea level (EGM96(Global)) with all heights in metres.
Station marking:	Stations were marked with flagged nails.

GPS base station: 422473.269E 7195615.984N 1616.266 m (HAE) Marked with a flagged post .

Gravity base station: Two gravity base stations were read each day. The first was located in the camp at the Blackstone Outfitters Lodge. The grid gravity base station was located at the 2004 survey gravity base station. This gravity base station is coincident with the GPS base station hub. The nominal gravity base station datum used for all drift corrections was 5468.649 mGal.

Gravity readings: Readings were stacked for 60 s. Readings were repeated 3 times if the standard derivation was greater than 50 µGals.

Drift corrections: Drift check-in readings were conducted prior to and after each day's survey at a minimum. Check-in readings were taken at both the camp gravity base station and the grid gravity base station. Readings at the Outfitters station are denoted as Line 98 / Station 98. Readings at the grid base station are denoted as Line 99 / Station 99. The outfitter's dogs carried the station tag away during the survey and consequently this station was not used in any corrections.

Base GPS: The base station GPS receiver was cycled using a 10 s epoch (reading interval) as an optimum compromise between memory requirements and rover acquisition time. PDOP masks were set to <6.0, elevation mask to > 2^0 and signal to noise (SNR) ratio mask was set to >2.0 at the base station receiver. All elevation readings were corrected for base GPS antenna height. The base antenna was rigidly mounted on a tripod throughout the survey.

Rover GPS: Antenna was placed on the gravity survey station hub and elevations were corrected for rover antenna height. A minimum of 3 measurements of 15 readings were taken per station survey and these measurements were averaged to determine the final station location. Rover mask settings were PDOP <6.0, elevation mask to > 15^0 and signal to noise (SNR) ratio mask was set to >12.0

Near station terrain corrections: Terrain within 20 m of the survey station was surveyed with the laser rangefinder in 6-60^0 sectors. Because of the extreme topography near many stations, some of the terrain measurements are estimates.

Levelling: The following 3 station were revisited from the 2004 survey: 2, 3, and 40. Note that in the data file they are named 200, 300, and 4000. There were negligible differences between the repeat readings and no levelling was required.

8.0 DATA PROCESSING AND REDUCTIONS

Data processing included the following steps and procedures:

1. *GPS processing.* The GPS data was processed with Trimble Pathfinder Office (5.01) using carrier phase and code processing. The nominal GPS base station location cited above was used as the reference position for all station measurements and the antenna heights of the rover and base were checked daily and used in the corrections. The data was exported in UTM NAD 83 (Zone 8N) coordinates with elevations in metres above mean sea level with a geoid model EGM96/Global.

2. *Position merge.* The gravity data was merged with the GPS data based on common line / station coordinates of readings in each data set.

3. *Drift corrections.* Daily drift files were created from the check-in measurements. The nominal 2004 gravity base station reference value was used in all corrections. Drift corrections were applied by linear interpolation between the nearest-in-time check-in measurements prior to and after the field reading.

4. *Latitude correction.* The latitude correction was applied by calculating the linear gradient in the latitude effect at the centre of the survey area and removing the latitude effect calculated relative to this point. The central point used in the latitude calculation was 422000E 7194000N at a latitude of 64.86^0 N. The effect of the declination between UTM Grid North and True North was removed by adjusting the distance north of the central point using the measured declination of 1.25^0 W.

5. *Elevation corrections.* Free Air, Bouguer Slab and Bullard-B corrections were applied using mean sea level (z=0 m) and a density of 2.67 g/cm^3.

6. *Near station terrain corrections.* The terrain effect from topography within 20 m of the station was removed using the measurements described above and by applying the sector equation. An assumed density of 2.67 g/cm^3 was used.

7. *Far station terrain corrections.* A digital terrain model was created from the Geodetic

Survey of Canada NTS topographic sheet 116A15 by extracting the coordinates of contour line segment end points and gridding this data using a 20 m cell size. The DTM extends from 418000E 7190000N to 4260000E 7198500N and encompasses an area at least 3 km from any station in the survey area. The far station terrain corrections were applied with an exclusion distance of 30 m to complement the near station terrain corrections applied with direct terrain measurements within 20 m of the station. The far station terrain correction algorithm calculates the gravity effect of a flat-topped prism with dimensions equal to the node spacing.

9.0 MEASUREMENT ERROR

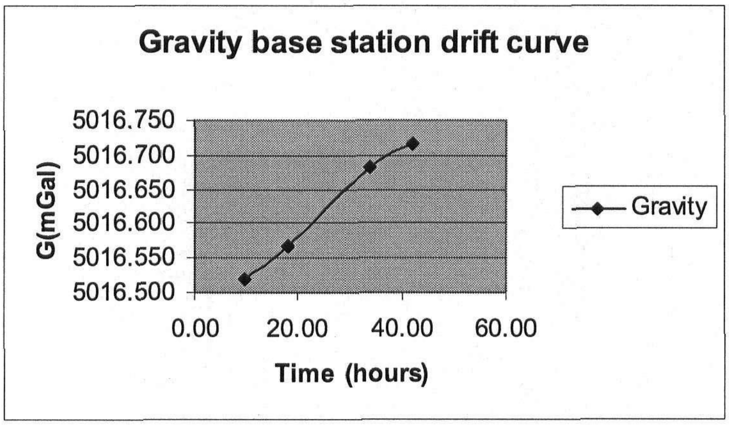
This section describes the sources of error present in the data and estimates the overall error in the Bouguer Anomaly after the application of all standard reductions.

9.1 Measurement error

Each gravity reading was stacked 60 times and, if the reading standard deviation exceeded 50 μGal, the reading was repeated three times and averaged. The discrepancies between repeat readings at noisy stations rarely exceeded 20 μGal and this value is taken as a measure of raw measurement error.

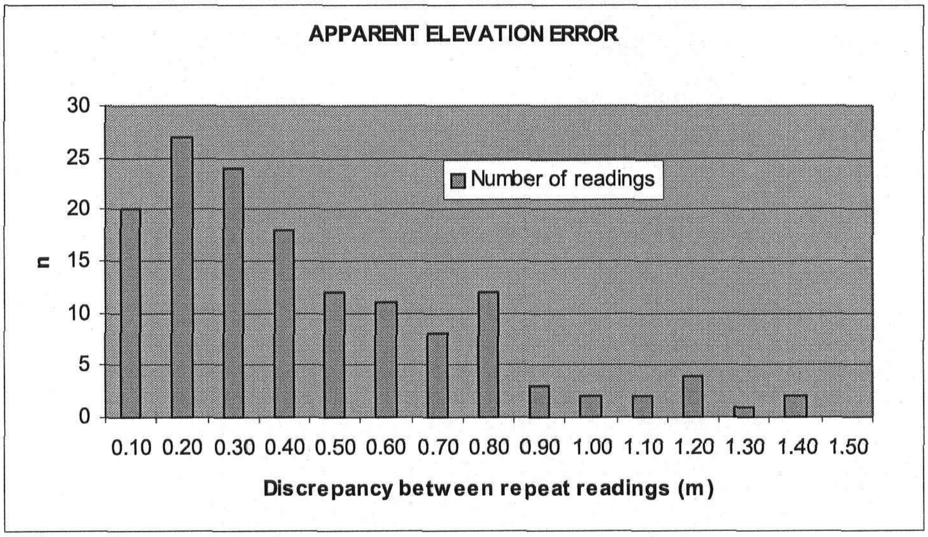
9.2 Instrument drift

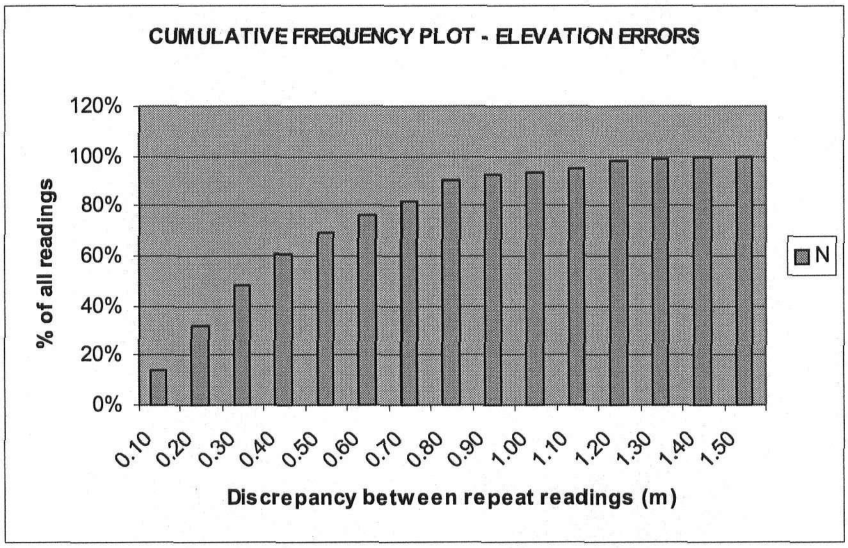
Gravimeter drift during the course of the survey is shown in the plot below. Average daily drift was in the order of 100 μGal and was linear. Error due to incorrectly estimated drift is estimated at no more than 10 μGal.



9.3 Elevation error

Each elevation reading is an average of 15 positions and, at each station, three elevations readings were taken. Since no surveyed monuments were in the area, the only way to assess the accuracy of the GPS elevations is to examine the scatter between repeat readings. The discrepancy between the repeat readings at each site was tabulated and the graph below is a frequency histogram showing the number of readings in each discrepancy range. It is readily apparent that the most common discrepancy between elevation readings was no more than 20 cm. A cumulative frequency plot showing the number of readings with errors less than the specified thresholds is shown below the frequency histogram. This diagram indicates that 66% of all readings showed discrepancies of less than ± 50 cm. Since the discrepancy is a difference between two elevation readings, this suggests that the apparent standard deviation in the elevation measurements in this data set is ± 25 cm. Accordingly, this would translate into an error in the Bouguer Anomaly of 50 μGal.





9.4 Latitude correction error

The latitude correction error is assumed to be negligible given the assumed horizontal accuracy of the station locations ($\pm$ 50 cm).

9.5 Near station terrain correction error

Errors in near station terrain correction measurements arise from several sources. Direct slope measurement error is assumed to be 2 to 3%. Error in averaging the elevation within a sector is estimated at 10% of the average sector value. The near station terrain measurement was confined to an area within 20 m of the station location and there is likely no significant error caused by the operator being unable to observe all the terrain surrounding the gravity station. As an approximation, error in near station terrain correction is assumed to be 10% of the average near station terrain correction or 25 μGal.

9.6 Far station terrain correction

Errors in far station terrain corrections are due to three sources. These include the effect of the simplified geometry of each DTM node (flat topped prism) and the node size (20 m); errors in the topographic maps from which the DTM was constructed; and round-off error. Errors introduced by the first source are likely minimal given the great distance between the sources (nodes) and the gravity stations. Errors in the topographic maps would likely create small local anomalies - largely single station anomalies in this case. Round-off error is likely not significant as the processing is performed with double precision float variable and rounding errors should in general cancel as there is as much chance of rounding up as rounding down in any calculation. As an approximation, far station terrain corrections errors are assumed to be no more than 2% of the applied far station terrain correction, averaging 140 μGal for the 2005 gravity data.

9.7 Global error estimate

The error in the Bouguer Anomaly from all sources is the sum of the errors in each correction and is estimated to be 245 μGal.

10.0 PRODUCTS

Figure 3 (Back pocket) is a Bouguer Anomaly map showing the reduced gravity data together with topography. A summary of the data and reductions is contained in Appendix D. A digital archive is appended to ehis report as a CD-ROM and contains the gravity data in Excel and Geosoft data base format. The archive also contains all raw GPS and gravity data , near station terrain measurements, the digital model used in the corrections and a digital copy of the report and Bouguer Anomaly map.

Respectfully submitted,
AURORA GEOSCIENCES LTD.

Mike Power M.Sc. P.Geoph.
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 in Northern Canada and Alaska since 1988.

4. I supervised the project described in this report.

Dated this 9th day of November, 2005 in Whitehorse, Yukon.

Respectfully Submitted,

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

APPENDIX B. SURVEY LOG

AURORA GEOSCIENCES LTD.

NORTH YUKON GRAVITY
JOB KRX-05-02-YT
COPPER RIDGE RESOURCES

Period:	July 13th - July 16th, 2005	
Personnel:	Carla Kennedy	Crew Chief
	Derek Torgerson	Helper

Wed 13 Jul/05

Mobe

Left Whitehorse at 13:00 hrs. Reached Dempster Highway turn off at 18:30 hrs. Reached the Blackstone Lodge at 20:00 hrs. Was shown to rooms and was given office space. Gear was sorted and organized.

Thu 14 Jul/05

Survey

At Helicopter at 8:00 hrs. Left around 8:45 hrs, flying with Prism pilot , Jeff, for Hart River property after safety briefing. Located 2004 Aurora Geosciences GPS base station and used it for this survey (9:40 hrs). Established a local gravity base station at the GPS base station. Began survey at the north side of the grid. Returned to base station at 18:00 hrs. While returning to camp crew stopped at the Hart River Mine to refuel; return to camp 19:00 hrs. High winds in some locations caused some difficulty with data quality

Wx: Partly cloudy and warm; towards days end winds grew stronger, thunder was heard in the distance and rain was moving in.

Production: 1- 13, 16-30 28 stations

Fri 15 Jul/05

Survey

At Helicopter at 8:30 hrs (delayed helicopter start due to the need to transport fuel). Arrived at base station at 9:45 hrs. Stayed on the east side of the grid. There was a hour after second gravity station for refuelling, after which the helicopter was ours for the day. Revisited station 2, 3, and 40 from 2004 survey for levelling. Returned to base station at 6:00 and closed down base station.

Wx: Partly cloudy and warm; strong and changing winds made some stations impossible to reach.

Production: 14-15, 31-32, 34-37, 39-46 , 51-54 24 stations

Sat 16 Jul/05

Demobe

Was informed at 7:00 hrs by Gerry that we were no longer needed. Crew sorted and packed gear and headed up the Dempster Highway to the next job.

Production summary:

Survey:	2 days
Mobe / demobe:	2 days

APPENDIX C. INSTRUMENT SPECIFICATIONS

APPENDIX D. GRAVITY MEASUREMENTS & REDUCTIONS

APPENDIX II

Assay Results

Acme Analytical Laboratories Ltd. Certificates

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
(ISO 9001 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

Copper Ridge Exploration Inc. PROJECT Ironman File # A503757

500 - 625 Howe St., Vancouver BC V6C 2T6 Submitted by: J. Pautler

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au** ppb
HR-JP-17R	1	407	9	6	<.3	35	21	719	19.05	13	<8	<2	3	25	<.5	<3	<3	42	.96	.045	14	258	.25	332	.09	<3	.42	<.01	.12	<2	4
HR-JP-18R	<1	265	7	13	<.3	41	23	871	5.77	10	<8	<2	9	38	<.5	<3	<3	58	1.07	.088	201	70	1.24	1174	.08	<3	.96	.05	.09	<2	8
HR-JP-19R	4	159	13	12	<.3	35	11	1217	39.71	3	<8	<2	<2	25	<.5	<3	<3	7	.83	.009	2	<1	.02	65	<.01	<3	.03	.01	.01	<2	3
HR-JP-23R	3	8976	11	15	<.3	58	122	1777	8.97	25	<8	<2	<2	7	<.5	<3	8	164	1.37	.043	4	27	3.59	201	.14	<3	3.12	.01	1.02	<2	19
HR-JP-24R	19	3920	9	10	<.3	13	16	1577	4.78	8	<8	<2	11	18	<.5	4	<3	62	3.70	.080	39	50	1.37	80	.10	<3	1.22	.01	.53	2	26
RE HR-JP-24R	18	3837	4	9	<.3	13	15	1548	4.67	6	<8	<2	11	18	<.5	<3	<3	61	3.64	.078	39	49	1.34	79	.10	<3	1.20	<.01	.52	<2	17
HR-JP-25R	11	1459	5	5	<.3	10	186	5280	3.02	45	<8	<2	5	33	<.5	<3	<3	10	10.46	.034	14	3	4.48	58	.01	<3	.35	.02	.20	<2	16
HR-JP-26R	<1	59	7	3	<.3	6	4	1046	8.38	11	<8	<2	7	16	<.5	<3	<3	115	.93	.216	21	11	.12	89	.05	4	.28	.01	.20	2	36
HR-JP-27R	6	749	9	23	<.3	72	56	1143	6.33	<2	<8	<2	<2	12	<.5	<3	<3	267	2.04	.067	5	62	3.78	213	.05	<3	2.44	.03	.05	<2	10
HR-JP-28R	<1	527	4	7	<.3	24	15	3291	5.71	<2	<8	<2	9	25	<.5	<3	<3	116	4.77	.092	13	54	2.82	122	.05	<3	.93	.05	.18	<2	64
HR-JP-29R	25	>10000	15	12	7.9	69	94	226	8.94	7	26	<2	<2	2	<.5	<3	34	237	.18	.089	3	42	2.64	94	.02	6	2.18	.01	.09	<2	305
HR-JP-32R	<1	134	3	10	<.3	23	90	636	7.59	6	<8	<2	9	15	<.5	<3	<3	20	.19	.074	42	18	.43	170	.02	5	2.19	<.01	.23	<2	2
HR-JP-33R	<1	53	21	8	<.3	54	16	807	6.07	18	<8	<2	4	20	<.5	4	<3	45	2.92	.150	9	179	1.14	34	.01	3	.66	.01	.49	<2	<2
HR-JP-34R	<1	402	4	12	<.3	38	32	811	5.41	<2	<8	<2	2	24	<.5	3	<3	200	4.60	.082	12	30	2.00	16	.03	<3	1.43	.04	.09	<2	8
HR-JP-35R	1	3194	<3	12	.7	28	29	642	4.87	4	<8	<2	12	18	<.5	<3	<3	48	3.39	.083	9	47	1.37	12	.01	<3	1.25	.08	.03	<2	13
HR-JP-36R	1	39	457	36	2.4	30	8	34	7.86	76	<8	<2	2	5	<.5	5	<3	12	.09	.072	3	4	.03	19	<.01	3	.18	.03	.16	<2	12
STANDARD DS6/AU-R	12	128	29	143	<.3	26	11	715	2.89	21	<8	<2	3	41	5.8	3	5	57	.88	.079	14	195	.58	168	.08	16	1.95	.09	.16	2	479

GROUP 1D - 0.50 GM SAMPLE LEACHED WITH 3 ML 2-2-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR, DILUTED TO 10 ML, ANALYSED BY ICP-ES.
(>) CONCENTRATION EXCEEDS UPPER LIMITS. SOME MINERALS MAY BE PARTIALLY ATTACKED. REFRACTORY AND GRAPHITIC SAMPLES CAN LIMIT AU SOLUBILITY.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
- SAMPLE TYPE: ROCK R150 AU** GROUP 3B - 30.00 GM SAMPLE BY FIRE ASSAY & ANALYSIS BY ICP-ES.
Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

Data ___ FA ___ DATE RECEIVED: JUL 25 2005 DATE REPORT MAILED: Aug. 4/05

BRITISH COLUMBIA CERTIFIED ASSAYER
Clarence Leong

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716
(ISO 9001 Accredited Co.)

GEOCHEMICAL ANALYSIS CERTIFICATE

Copper Ridge Exploration Inc. PROJECT Ironman File # A503758

500 - 625 Howe St., Vancouver BC V6C 2T6 Submitted by: J. Pautler

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm
G-1	2	4	<3	41	<.3	8	4	512	1.84	<2	9	<2	3	62	<.5
HR-JP-16S	<1	27	16	28	<.3	16	7	510	10.10	16	<8	<2	<2	15	.5
HR-JP-20S	3	448	54	76	.7	14	19	2008	8.79	85	<8	<2	<2	50	1.0
HR-JP-21S	6	40	45	12	.8	3	1	193	4.99	56	<8	<2	<2	9	<.5
HR-JP-22S	2	36	46	78	3.0	15	6	1563	5.21	147	<8	<2	<2	18	.7
HR-JP-30S	2	15	21	82	<.3	8	6	1836	1.67	18	<8	<2	<2	61	<.5
HR-JP-31S	4	219	16	7	.6	10	22	794	6.44	61	<8	<2	<2	20	<.5
STANDARD DS6/AU-S	12	122	30	146	.5	25	10	698	2.90	21	9	<2	2	38	5.7

SAMPLE#	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au** ppb
G-1	<3	3	36	.51	.072	10	116	.53	200	.12	<3	.95	.09	.49	<2	5
HR-JP-16S	<3	7	57	.05	.070	19	761	.22	199	.02	<3	1.09	.01	.85	<2	5
HR-JP-20S	6	<3	14	11.99	.018	6	13	6.21	57	<.01	<3	.45	.01	.04	<2	2
HR-JP-21S	7	7	9	.61	.016	12	8	.35	68	.01	<3	.30	<.01	.10	<2	10
HR-JP-22S	17	11	25	3.91	.058	11	15	1.98	107	.02	<3	.63	.01	.05	<2	23
HR-JP-30S	<3	<3	14	16.21	.046	6	10	7.72	173	.01	<3	.23	.01	.01	<2	4
HR-JP-31S	6	4	9	4.99	.016	9	11	2.79	33	.01	<3	.18	.01	.06	<2	3
STANDARD DS6/AU-S	4	5	58	.84	.077	16	196	.58	163	.08	18	1.93	.07	.16	3	51

GROUP 1D - 0.50 GM SAMPLE LEACHED WITH 3 ML 2-2-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR, DILUTED TO 10 ML, ANALYSED BY ICP-ES.
(>) CONCENTRATION EXCEEDS UPPER LIMITS. SOME MINERALS MAY BE PARTIALLY ATTACKED. REFRACTORY AND GRAPHITIC SAMPLES CAN LIMIT AU SOLUBILITY.
AU** GROUP 3B - 30.00 GM SAMPLE ANALYSIS BY FA/ICP.
- SAMPLE TYPE: SOIL SS80 60C

Data FA ______ DATE RECEIVED: JUL 25 2005 DATE REPORT MAILED: Aug 8/05