

ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TITLE: GEOPHYSICAL AND GEOLOGICAL REPORT on the SILVER DOLLAR PROPERTY

TOTAL COST: \$ 99,854.02

AUTHOR(S): Sassan Liaghat, Ph.D. and David Blann, P.Eng.

SIGNATURE(S): Sassan liaghat, David Blann

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):

STATEMENT OF WORK EVENT NUMBER(S)/DATE(S): 5412855

YEAR OF WORK: 2012

PROPERTY NAME: Silver Dollar

CLAIM NAMES (on which work was done):

404910	526870	953717	520481	856057	520466	576561
509488	528107	926661	521031	854581	520479	973569
520413	528970	944509	526441	1010634		
520415	576560	989803	526833	1010635		

COMMODITIES SOUGHT: Gold, Silver, Base Metals

MINFILE NUMBERS:

MINING DIVISION: Revelstoke Mining District

NTS / BCGS: NTS 82K/13E (82K.072)

LATITUDE: Latitude 50°46'53"N/Longitude 117°36'32"W

UTM: East: 458000, North: 5624000, Zone 11N

OWNER(S): Happy Creek Minerals Ltd. (FMC 203169)

MAILING ADDRESS: #460 – 789 West Pender St.; Vancouver, B.C.; V6C 1H2

OPERATOR(S) [who paid for the work]: Same as above

MAILING ADDRESS: Same as above

REPORT KEYWORDS: Silver Dollar property, Revelstoke, the community of Trout Lake, Wind Flower, British Columbia, the historic mining town of Camborne on the east side of the Incomappleux River. Gillman group

PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: 05209, 07207, 08491, 09146, 09814a, 09814b, 10844, 11532, 11756, 12016, 13202, 15946, 18836, 19181, 25031, 29005, 30629, 31264,

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (in metric units)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)						
GEOLOGICAL CONSULTING									
Prospecting, Geology, Sampling	4 sq km	52415, 404910, 520413,520479	\$14,950.00						
GEOPHYSICS, MAPPING									
Topographic base mapping- LIDAR	35 sq km	All, except some claims	\$26,000.00						
Airborne Geophysical survey- magnetic and spectral/Radiometrics	35 sq km	All, except some claims	\$48,730.00						
GEOCHEMICAL ANALYSES									
Rock Samples-Assays and Petrographic	38 samples	52415, 404910, 520413,520479	\$1,710.00						
Rock Samples – Shipping and Disposal	38 samples	52415, 404910, 520413,520479	\$437.00						
SUPPORT AND SUPPLIES									
Field Supplies			\$850.00						
Communications - radios, cell, satellite phone/airtime			\$250.00						
Transportation - Truck + ATV			\$1,470.00						
Field expenses - Gilchrist/Raffuse			\$907.02						
Report preparation, drafting			4500.00						
Total Cost									

GEOLOGICAL AND AIRBORNE GEOPHYSICAL REPORT

on the

SILVER DOLLAR PROPERTY

Event # 5412855

Revelstoke Mining District British Columbia BC Geological Survey Assessment Report 33523a

Map Sheet: NTS 82K/13E (82K.072) UTM East: 458000 UTM North: 5624000 UTM Zone 11N Latitude 50°46'53"N/Longitude 117°36'32"W

for

HAPPY CREEK MINERALS LTD. #460 – 789 West Pender Street Vancouver, B.C. V6C 1H2

by

Sassan Liaghat, PhD. David Blann, P.Eng. December 2012

SUMMARY

The Silver Dollar property is located approximately 45 kilometers southeast of Revelstoke and 15 kilometers north-northeast of the community of Trout Lake, British Columbia. The property consists of 32 contiguous mineral claims in the Revelstoke Mining District that cover a total area of approximately 41.41 square kilometers. The property is within the historical Camborne gold-silver mining camp and there is good access and infrastructure.

The Silver Dollar claims are situated within Lower Paleozoic rocks of the Kootenay Arc and are primarily underlain by northwest -southeast trending metasedimentary rocks of the Lardeau Group, Broadview Formation. Locally metavolcanic rocks of the Jowett Formation occur on the property. The Silver Dollar claims cover a broad shear zone called the Camborne fault.

The property covers a number of historical high-grade, past-producing gold-silver-lead-zinc mines and developed prospects dating from around the 1890's. The property has seen sporadic exploration, underground mining and development into the 1980's. Historical surface exploration included geology, geochemical surveys, limited trenching and drilling. Geological reconnaissance was conducted between 2006 and 2009.

In 2012 Happy Creek Minerals conducted a Lidar topographic survey and a Heli-GT, three axis magnetic gradient and spectrometer survey consisting of 345.5 km of data was completed over the Silver Dollar property. The Company also completed a geological evaluation on the Silver Dollar, Gillman and Wheelbarrow areas, visiting some showings and collecting 38 rock samples for analysis.

The airborne geophysical data combined with Lidar topography survey shows a good correlation with the Camborne fault. The Camborne fault is a key structure for mineralization and most of the mines and showings on the Silver Dollar property lie along the fault.

Geological prospecting and rock sampling were also completed in several locations on Silver Dollar property. Sample analyses have returned encouraging assay results including high gold and silver values associated with elevated to substantial copper, lead and zinc values. Locally positive indium values up to 4.89 g/t also occur. Of 38 rock samples, 12 returned silver values in excess of 200 g/t (including 4496 and 2219 g/t Ag) and four samples returned gold values in excess of 35 g/t (including 50.3 and 40.7 g/t Au). The data suggests a rough correlation between silver and gold values. A 1.8 metre chip across the Silver Dollar vein returned 16.8% zinc, 3.92% lead, 1.67 g/t Au and 241 g/t silver.

The Silver Dollar property has historically received widespread surface exploration and some mining activity, however historically fragmented ownership has limited exploration effectiveness and limited drilling has been completed. The airborne magnetic geophysical survey outlines important under-lying geological structures and features. The results are thought to be encouraging and

Happy Creek Minerals, Ltd

prospective for undiscovered mineralization. The historical data, geophysical surveys and current geological prospecting and sampling has returned several promising trends that confirm potential for precious and base metal deposits in this area. It is recommended that further exploration consist of thorough compilation of historical data, detailed structural and geological mapping, trenching and drilling.

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Appendix 1	Heli-GT, 3 Axis Magnetic Gradient and Spectrometer Survey
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1. Location, Access, Infrastructure and Physiography

The Silver Dollar property is located approximately 45 kilometers southeast of Revelstoke and 15 kilometers north-northeast of the community of Trout Lake, British Columbia (Figure 1). The property is immediately east of the historic mining town of Camborne on the Incomappleux River. The Incomappleux River flows into the northeast arm of Upper Arrow Lake.

The claims are accessible via Highway 31 from the Galena Bay ferry on Upper Arrow Lake. From the ferry landing, it is 18 km to the Beaton/Camborne junction, then an additional 18.5 km through the area once occupied by the historic mining town of Camborne. From this point, the property may be accessed by a variety of logging and historic mine access trails. Access along these trails is most easily achieved using all terrain vehicles. The summer exploration season is typically between late May and late November.

The claim group is situated within rugged terrain. Most of the valley bottom areas are covered with glacial overburden, vegetation and talus. The Silver Dollar claims are bisected and incised by Mohawk Creek, a northwest flowing tributary of the Incomappleux River. Elevations vary from 900 m above sea level, along Mohawk Creek at the north end of the property to 2580 m above sea level in the southeastern portion of the property.

2. Claim Status

The Silver Dollar property comprises 32 contiguous mineral claims that cover a total area of approximately 41.41 square kilometers (Figure 2). This includes the Wind Flower claims which adjoin the north side of the Silver Dollar claims. The claims are centered at 458000 East and 5624000 North, UTM zone 11N on NTS map sheet NTS 82K/13E (82K.072) (Figure 1), in the Revelstoke Mining District. All claims are recorded as 100% owned by Happy Creek Minerals Ltd. (Table 1, Figure 2). The claims have not been legally surveyed. Although most crown grants have reverted, several small lots or fractions may still exist within the claims and the current status of these crown grants are unknown.

3. Exploration and Development History

The historic Camborne mining camp dates to the early 1900's with the discovery of gold mineralization on the historic Eva and Iron Dollar claims. Between 1900 and the mid 1920's work was focused on the Eva mine which produced 543.9 kilograms of gold and 165.5 kilograms silver from 88,763 tonnes of mined material (BC Government MINFILE 082KNW066). There are a number of historical precious and base metal showings. These include the Spider (Sunshine Lardeau), Mohawk,

Wheelbarrow, Homestake, Gillman, Mountain Boy, Silver Dollar, Iron Dollar, Beatrice and Rainy Day. The showings have seen varying amounts of exploration and development work.

The Spider Mine (Sunshine Lardeau) is located some 700 meters west of the north end of the Silver Dollar claims. Between the discovery of the occurrence in 1910 and mine closure in 1958, 371 kg gold, 53,451 kg silver, 85 tonnes copper, 10,845 tonnes lead, 11,519 tonnes zinc, 65 tonnes cadmium and 4 tonnes antimony were recovered from 124,436 tonnes of milled ore. Five veins were traced to vertical depths of 270 m. The Beatrice Mine is located on a crown grant within mineral tenures 549488 and 546441. The precious metal – bearing polymetallic showing was discovered in 1897. Between 1899 and 1984 the reported production from the mine included 558 grams gold, 1,832 kg silver, 182,939 kilograms lead and 10,894 kilograms zinc, produced from 618 tonnes of ore (BC MINFILE 082KNW040).

Of the various precious metal showings located on the Silver Dollar claims, the area encompassing the Gillman, Silver Dollar and Iron Dollar occurrences has seen the most exploration and development.

The Silver Dollar vein was accessed by two connected adits developed 15. 0 meters apart vertically. In 1947, Silver Pass Development Syndicate processed 6 tonnes of ore and recovered 9,860 grams silver, 1,378 kilograms lead and 1009 kilograms zinc. Between 1952 and 1957, Monteray Mining Company Limited completed a 590-meter exploration diamond drilling program and carried out 197 meters of underground development work. In 1974, Resoursex Ltd. completed a very limited geological program to assess the various quartz veins for further work. Two samples from existing trenches were collected at that time, both returning low gold and silver values (Allen, 1974).

In 1983, B and B Mining (Canada) Limited completed a trenching program to remove overburden 170 m of the Gillman vein. The vein was then sampled with gold assays confirming historical assays (1.64 to 1.84 ounces/ton gold) (Sampson, 1983). The remaining showings located in the Gillman area have received minor exploration work and development.

In 1984, Fleck Resources Ltd. carried out a diamond drilling and sampling program on the property. The most significant drill intersection included 2.10 meters grading 229 g/t silver, 1.0 g/t gold, 10.95 % zinc, 4.04% lead and 0.29% copper (BC MINFILE 082KNW101). Exploration effort within the area of the Gillman – Silver Dollar and Iron Dollar has focused on trying to trace the various quartz veins on surface, primarily through trenching.

In 2006, 2008 and 2009, Manson Creek Resources Limited completed three limited geological evaluations on the Silver Dollar property.

A summary of historical exploration work is presented in Table 2.

4. Geological Setting

The following regional and property geology description is after Church, and Jones 1998, Chernish, 2009, and from prospecting performed by the Company during 2012.

Regional Geology

The Camborne camp in general and the Silver Dollar claims in particular, are hosted within rocks of the Kootenay Arc, early Paleozoic to Mesozoic in age and sedimentary, volcanic and metamorphic in composition. The Kootenay Arc is bordered to the east by the Windermere-Purcell anticlinorium. The Monashee and Shushwap metamorphic complexes bound the western and northwestern margins of the terrine. The Kootenay Arc is the locus of a significant change in structural style from up-right folds in the Purcell anticlinorium to coaxially folded westward – verging isoclinal folds within the Kootenay Arc (Fyles, 1964). Metasedimentary rocks of the Lardeau Group underlie the majority of the Silver Dollar claims (Figure 3). The Lardeau comprises a lower calcareous section overlain by phyllitic schists, quartzites and lenticular greenstone formations. The Jowett Formation is a greenstone unit consisting of volcanic breccias and pillow lavas altered locally to chlorite schist. The Jowet Formation is intercalated upwards with the Broadview Formation. The predominant lithology of the Broadview Formation is grey green, gritty quartz wacke or subarkosic wacke with inter-beds of grey to black or green slate or phyllite. Two important bands of quartzite, within the Broadview Formation, are an exceedingly hard, compact, dark blue rock invaded extensively by numerous quartz stringers.

Many batholiths and arrays of small stocks cut older, deformed stratigraphic units throughout the Kootenay Arc. The Kuskanax and Nelson batholiths, apparently middle or late Jurassic in age, are predominantly granite and granodiorite in composition although diorite, monzonite and syenite are locally important phases. The Nelson batholith and related granitic stocks may have been controlled by antecedent structures. Medium-size plutons and small stocks of fresh granite, monzonite and syenite, Cretaceous and Tertiary in age also occur.

Property Geology

The Silver Dollar claims are situated within Lower Paleozoic rocks of the Kootenay Arc and are primarily underlain by northwest -southeast trending metasedimentary rocks of the Lardeau Group, Broadview Formation. Black slates, carbonaceous schist, grey and reddish-brown weathering grits and quartzite and greenish grey talcose schist underlie the property. Locally metavolcanic rocks of the Jowett Formation occur near the north end of the property. The metasedimentary succession typically displays a northwest – southeasterly strike of 140° and dip varies between 50° and 80° and averages 65° to the northeast. The lithological sequence has been folded such that dip angles show considerable variation. Joint planes are locally developed within the stratigraphic succession and oriented perpendicular to regional strike, and dip 40° to 80° to the northwest.

The Silver Dollar claims cover a broad shear zone called the Camborne fault. The regional trend of the Camborne fault is between 140° and 160° azimuth and dips on the order of 50° to the northeast. The various quartz veins on the property are developed parallel, or sub-parallel to the fault. The foliation observed generally parallels this trend as well. The developed quartz veins proximal to this fault appear to be on the order of 0.5 to approximately 3.0 metres in width and display boudinage. Quartz veins and stringers also occur some distance from the main fault. Within this broad shear zone, the numerous quartz veins are commonly associated with graphite – chlorite schist partings. A number of the quartz veins host significant concentrations of precious and base metals.

Where observed, the Broadview Formation sequence is dominated by black, grey to greengrey phyllite and psammite, locally graphitic. Bedding is on the centimeter to metre scale, and bedding is generally quite recognizable. Minor quartz veining, ± iron carbonate, is common parallel to bedding parallel foliation.

5 Mineralization

Mineralization on the Silver Dollar property is related to the Camborne shear zone, which is host to numerous quartz veins, a number of which contain significant concentrations of base precious and base metals. These veins vary from several centimeters to several meters in width. The quartz veins, developed as discrete veins and en-echelon sets, are commonly associated with graphite – chlorite schist, or contain fine laminae of these shear related minerals. The quartz veins can be described as open-space filling in the zones of the intense fracturing and visible wall rock alteration has been described as limited. Precious and base metal mineralization occurs both within the quartz veins and the along the vein selvages. Ankerite is present. Sulphide minerals observed include, in order of deposition at the neighbouring Barclay vein (MINFILE 082KNW049) ankerite, quartz, pyrite, sphalerite, chalcopyrite, and fine to coarse grained galena. Argentiferous tetrahedrite and arsenopyrite also occur locally. Native silver and sometimes in argentite, polybasite, ruby silver, stephanite and electrum occur are locally observed (Church and Jones, 1998). Gold is present in small quantities and is rarely seen as native gold or electrum. It is suggested that the carbon in the phyllite has assisted in the precipitation of gold contained in the mineral-bearing solutions as the highest grade of gold occurs around the carbonaceous inclusions (Church, and Jones 1998). Chernish (2006) notes an association

between gold, pyrite and minor graphitic lamina and silver mineralization is broadly associated with tetrahedrite and galena.



Quartz veins with pyrite, chalcopyrite, sphalerite, galena cutting metasedimentary rocks



Face of adit- approx 2.0m wide view: well-mineralized quartz vein with semi-massive sulphide

6 Sampling and Analytical Procedures

Rock samples were collected from both float boulders and outcrop that displayed alteration and/or mineralization. The primary area of interest on the property was a region of historic showings and trenches. Rock samples were cleaned to avoid weathered surfaces or organic material and to best represent the mineralization and/or alteration for that location. Sample types were recorded on the sample booklet and a field book. The extent of weathering was noted if fresh samples were unavailable. Rock sample size varied depending on whether a float or outcrop sample was taken. On average approximately 4 kilograms of rock was collected from each sample location. Sample bags were labeled with the corresponding sample ID numbers from the sample booklets. The sample ID tag was also inserted into the sample bag prior to sealing. The field sampling site was labeled with the sample ID number. Descriptions of each rock sample were recorded in the sample booklets.

The samples were shipped via Greyhound bus to AGAT Laboratories Ltd. of Vancouver, BC. The rock samples were crushed in their entirety to 80% passing -10 mesh (2 millimetres) and the crusher was cleaned with barren rock between samples. From the coarse rejects a sub-sample of 250 grams was pulverized to 85% passing -200 mesh (0.074 millimetres). The pulveriser was cleaned with silica sand between samples. Analysis was performed using an aqua regia solution to digest the sample, followed by ICP+ ICP-MS finish. Over limit base metals were re-analyzed by assay AA, and gold and silver were fire assayed. AGAT's quality system is compliant with the International Organization for Standardization's ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories' and the ISO 9000 series of Quality Management standards.

7 2012 Reconnaissance and Sampling

Between September 4th and 13th, 2012 Happy Creek Minerals completed a geological evaluation on the Silver Dollar, Gillman and Wheelbarrow prospects. The prospecting program was focused on mineral tenures 404910, 509488, 520413, 520466, 856057 and 520515. Some showings were visited and 38 rock samples were collected and submitted for assay. Additional elements such as indium, rhenium and others not previously analyzed, were assayed. Sample location, type and description are summarized in Table 3. A sample location overview is provided in Figure 4. Wheelbarrow and Silver Dollar-Gillman area sample locations are presented in Figure 5 and 6, respectively. A summary of assay results is provided in Table 4. Figures 5a to 5e and 6a to 6e show sample locations for each area with Au, Ag, Cu, Pb and Zn assay results. Certificates of analyses are provided in Appendix 3.

Three rock samples from the Wheelbarrow area, east of the Spider mine, show high, lead, silver and gold content: Sample E51311062: (Pb 11.6%, Ag 211 g/t, Au 7.56 ppm and indium 4.89 g/t); E51311063: (Pb 22.5%, Ag 369 g/t, Au 1.98 ppm) and E51311064: (Au 5.46 ppm). Some of the rock samples from the Silver Dollar and Gillman areas have also returned high silver values associated with elevated to substantial copper, lead and zinc values: Of 38 rock samples, 12 returned silver values in excess of 200 g/t (including sample E5631069 and E5631071 containing 4496 and 2219 g/t Ag, respectively) and four returned gold values in excess of 35 g/t (including sample E5631086 and E5631095 containing 50.3 and 40.7 g/t Au, respectively) . The data suggests a rough correlation between silver and gold values. Sample E5631089 is a 1.8 m chip across the Silver Dollar vein and returned 16.8% zinc, 3.92% lead, 1.67 g/t Au and 241 g/t silver and 1 g/t indium, and 842 g/t cadmium.

8 Heli-GT, 3 Axis Magnetic Gradient and Spectrometer Survey

Between August 16th and 17th, 2012 the Company completed a Heli-GT, three axis magnetic gradient and spectrometer survey consisting of 345.5 kilometres of data collection at 60 metres above the ground surface and at 100 metre line spacing (Figure 7). This work was performed by Tundra Airborne Surveys with the program managed by Scott Hogg and Associates Ltd. Details of the airborne survey and compilation are documented in Appendix 1. The total field magnetic data image along with potassium, uranium, thorium distribution patterns are also available in Appendix 1.

The magnetic data provide an image of a major northwest trending structure, or structures cutting through the length of the property. These are thought to reflect the Camborne fault. Several of the main historical mines and developed prospects are seen to occur in proximity with this structure. Other lineaments in the magnetic data may reflect other fault zones and ground follow up is required.

The raw data from the spectral survey indicate a moderately strong potassium and thorium zone at least one kilometre in width that occurs in a generally northwest trend, in part, along the trace of the Camborne fault and in a broad area covering the Rainy Day, Beatrice, Silver Dollar and Gillman prospects. Spectral data is thought to reflect lithology, alteration or weathering. Further detailed analyses are required.

9 Lidar Topographic Survey

In August 2012, Eagle Mapping Ltd completed a Lidar Intensity and Contours Survey over the Silver Dollar property. The survey covered the property with one meter contour intervals. Details of the

Lidar survey are presented in Appendix 2. The Lidar topography image and photography image are presented with sample locations in Figure 4. The Lidar survey assists with structural interpretations of geology, and provides an accurate base map for future exploration and development.

10 Discussion, Conclusions and Recommendations

The Silver Dollar property totals 4,141 hectares (41.4 square kilometres) and located approximately 45 kilometres southeast of Revelstoke, B.C., Canada. The property is within the historical Camborne gold-silver mining camp and there is excellent access and infrastructure. The property covers a number of historical high-grade, past-producing gold-silver-lead-zinc mines and developed prospects dating from around the 1890's. In general, the historically fragmented ownership, and limited drilling is thought to provide a good opportunity to discover additional mineralization to that identified historically.

In September 2012, geological prospecting and rock sampling were completed in several locations on Silver Dollar property. Sample analyses have returned encouraging assay results including high gold and silver values associated with elevated to substantial copper, lead and zinc values. Locally positive indium values up to 4.89 g/t also occur. Of 38 rock samples, 12 returned silver values in excess of 200 g/t (including 4496 and 2219 g/t Ag) and four samples returned gold values in excess of 35 g/t (including 50.3 and 40.7 g/t Au). The data suggests a rough correlation between silver and gold values. A 1.8 m chip across the Silver Dollar vein and returned 16.8% zinc, 3.92% lead, 1.67 g/t Au and 241 g/t silver.

The Company completed a Heli-GT, three axis magnetic gradient and spectrometer survey consisting of 345.5 kilometres of data. The airborne geophysical data combined with Lidar topography survey shows several locations with strong low and high magnetic intensity and potassium and thorium anomalies that provide opportunity for precious and base metals to occur in several areas. The property also covers a portion of the Camborne fault, a key structure for mineralization in this area. Most of mines and showings on Silver Dollar property lie along the Camborne fault.

The Silver Dollar property has historically received widespread surface exploration and some mining activity, however historically fragmented ownership has limited exploration effectiveness and limited drilling has been completed. In addition, the airborne surveys reveal a clear picture of important under-lying geological features. These results are thought to be encouraging and prospective for undiscovered mineralization. The historical data, geophysical surveys and current geological prospecting and sampling has returned several promising trends that confirm potential for precious

Happy Creek Minerals, Ltd

and base metal deposits in this area. It is recommended that further exploration consist of thorough compilation of historical data, detailed structural and geological mapping, trenching and drilling.

Respectfully Submitted,

"Sassan Liaghat"

Sassan Liaghat. Ph.D

"David Blann"

David Blann, P.Eng.

11 Statement of Costs

Silver Dollar August 1-October 28 2012

Geological & Consulting				
Tom Gilchrist, Prospector Sept 1-15	10	\$ 425.00	\$	4,250.00
Debborah Raffuse, Prospector Sept 1-15	10	\$ 425.00	\$	4,250.00
Louis Doyle, Prospecting Sept 1-3	2	\$ 400.00	\$	800.00
David Blann, P.Eng, QP, Geology, Supervision Aug 1-Oct 25	4	\$ 600.00	\$	2,400.00
Sassan Liaghat, PhD, Geological, GIS, geology, Aug 1-Oct 27	6	\$ 550.00	\$	3,300.00
	number	\$/sample		
Rock Samples – assays and petrographic	38	45	\$	1,710.00
Rock Samples – shipping and disposal	38	11.5	\$	437.00
Field Supplies			\$	850.00
Communications - radios, cell, satellite phone/airtime			\$	250.00
Transportation - Truck + ATV			\$	1,470.00
Field expenses - Gilchrist/Raffuse			\$	907.02
Geophysics / Mapping				
Tundra Airborne Surveys - Magnetic and				
Spactral/radiomatrics			ć	10 720 00

spectral/radiometrics	\$ 48,730.00
Dudley Thompson Mapping - LIDAR Topographic base map	\$ 26,000.00
Report preparation, drafting	\$ 4,500.00
Total	\$ 99,854.02

12 References

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Fyles, J.T., 1964. Geology of the Duncan Lake Area, Lardeau District, British Columbia Department of Mines and Petroleum Resources Bulletin 49, 78 p.

Fyles, J.T., Eastwood G.E.P. 1972. Geology of the Ferguson Lake Area, Lardeau District, British Columbia Department of Mines and Petroleum Resources Bulletin 45, 90 p.

Sampson, C.J. 1983. Report on Geological Mapping and Trenching, Gillman Gold Property L4496, L4497, L4498, L2495, L7061, L7062 for B and B Mining (Canada) Limited.

13 Statement of Qualifications

I, Sassan Liaghat, Ph.D, of Coquitlam, British Columbia, do hereby certify:

That I am a senior geologist with an office at #460 - 789 West Pender Street, Vancouver, BC, V6C 1H2.

That I am graduate from the Ecole Polythechnique of Montreal with a Ph. D of Engineering degree in Economic Geology in 1992.

That I am a graduate of the Mineral and Exploration Diploma Program (MINEX) in 1988, and a Master of Science, Economic Geology program in 1989 from McGill University.

That since 1992, I have been involved in research, teaching and mineral exploration activities for base and precious metals in various areas of Canada.

That I have been actively engaged in the mining and mineral exploration industries in British Columbia since 2006.

That, I managed, in part, the 2009, 2010 exploration programs on the Rateria and West Valley properties.

That I am the author or co-author of more than 70 international scientific papers or local reports.

That I have been granted Share options of Happy Creek Minerals Ltd.

Dated in Vancouver, B.C., December 10, 2012

"Sassan Liaghat"

Sassan Liaghat Ph.D.

I, David E. Blann, P.Eng., of Squamish, British Columbia, do hereby certify:

That I am a Professional Engineer registered in the Province of British Columbia since 1990.

That I am a graduate in Geological Engineering from the Montana College of Mineral Science and Technology, Butte, Montana, 1987.

That I am a graduate in Mining Engineering Technology from the B.C. Institute of Technology, 1984.

That I have been actively engaged in the mining and mineral exploration industry since 1984.

Dated in Vancouver, B.C., December 10, 2012

"David Blann"

David E Blann, P.Eng.

Tables

Tenure Number	Claim Name	Map Number	Issue Date	Good To Date	Status	Area (ha)
404910	GILLMAN'S LODE	082K073	2003/sep/09	2016/dec/31	GOOD	300
509488		082K	2005/mar/23	2016/dec/31	GOOD	102.243
520413	LEAD 2	082K	2005/sep/25	2016/dec/31	GOOD	40.889
520415	SUNSHINE LARDEAU 2	082K	2005/sep/25	2016/dec/31	GOOD	61.304
520466	PIPESTEM	082K	2005/sep/27	2016/dec/31	GOOD	40.863
520479	GOLDDUST	082K	2005/sep/27	2016/dec/31	GOOD	183.968
520481	PRODIGY	082K	2005/sep/27	2016/dec/31	GOOD	122.623
521031	GRAFIC	082K	2005/oct/12	2016/dec/31	GOOD	81.764
526441	O.K.	082K	2006/jan/26	2016/dec/31	GOOD	40.904
526833	RAINY DAY	082K	2006/ian/31	2016/dec/31	GOOD	81.811
526870	JACKPOT	082K	2006/feb/01	2016/dec/31	GOOD	102.274
528107	MOUNTAIN GOAT	082K	2006/feb/12	2015/dec/31	GOOD	61.37
528970	SILVER DOLLAR	082K	2006/feb/25	2015/dec/31	GOOD	122.662
576560	OLD GOAT # 2	082K	2008/feb/18	2015/dec/31	GOOD	163.6691
576561		082K	2008/feb/18	2014/dec/31	GOOD	408 9677
973569	SD SW	082K	2012/mar/28	2015/dec/31	GOOD	204 5391
856057	RUSSKY	082K	2011/iun/01	2015/dec/31	GOOD	81.73
854581		082K	2011/may/16	2015/dec/31	GOOD	204.32
1010634	SD SW	082K	2012/JUI/03	2015/dec/31	GOOD	20.43
1010635	SD SW 2	082K	2012/JUI/03	2015/dec/31	GOOD	20.43
597182	GOLDEN GOOSE	082K	2009/jan/09	2015/dec/31	GOOD	81.6356
597183	LARGE TENURE AT 82K.	082K	2009/jan/09	2015/dec/31	GOOD	510.3514
974390	GOOSE 2	082K	2012/mar/29	2015/dec/31	GOOD	428.7974
1010633	WINDFLOWER SOUTH	082K	2011/oct/31	2015/dec/31	GOOD	367.57
926660	WAKE UP	082K	2012/jul/03	2015/dec/31	GOOD	81.66
940010	WAKE UP	082K	2012/jan/05	2015/dec/31	GOOD	20.42
1010701	CAP	082K	2012/jul/04	2015/dec/31	GOOD	20.42
1010702	HARRY	082K	2012/jul/04	2015/dec/31	GOOD	20.42
953717		082K	2012/mar/01	2015/dec/31	GOOD	61.31
926661	EDMOND	082K	2011/oct/31	2015/dec/31	GOOD	61.35
944509	FLORENCE	082K	2012/jan/31	2015/dec/31	GOOD	40.91
989803	SILVER DOLLAR	082K	2012/may/24	2015/dec/31	GOOD	142.85
					TOTAL	4141.605

Table 1, Mineral Tenures

Table 2, SUMMARY OF EXPLORATION HISTORY

The historic Camborne mining camp dates to the early 1900's with the discovery of gold mineralization on the historic Eva and Iron Dollar claims

Between 1900 and the mid 1920's the area centered on the EVA mine produced 543.9 kilograms of gold and 165.5 kilograms silver from 88,763 tonnes of mined material

Between 1899 and 1984 the reported production from the Beatricemine included 558 grams gold, 1832 kg silver, 182,939 kg lead, 10,894 kg zinc from 618 tonnes of ore.

Between the discovery of the Spider mine in 1910 and mine closure in 1958, 371 kg gold, 53,451 kg silver, 85 tonnes copper, 10,845 tonnes lead, 11,519 tonnes zinc, 65 tonnes cadmium and 4 tonnes antimony were recovered from 124,436 tonnes of milled ore.

In 1947, Silver Pass Development Syndicate processed 6 tonnes of ore and recover 9,860 grams silver, 1,378 kilograms lead and 1009 kilograms zinc from Silver Dollar.

Between 1952 and 1957, Monteray Mining Company Limited completed a 590-meter exploration diamond drilling program and carried out 197 meters of underground development work.

In 1974, Resoursex Ltd. completed a very limited geological program to assess the various quartz veins of the Silver Dollar.

In 1983 B and B Mining (Canada) Limited completed a trenching program to remove overburden from a 170 m length of the Gillman vein.

In 1984, Fleck Resources Ltd. carried out a diamond drilling and sampling program on the Silver Dollar property.

In 2006 Manson Creek Resources Limited completed a limited geological evaluation of the Silver Dollar calims.

In 2008 Manson Creek Resources Limited completed a limited geological prospecting program in the Silver Dollar claims.

In 2009, Manson Creek Resources Limited completed a limited prospecting program on the Silver Dollar claims.

	Table 3, Rock Sa	ample Descri	iptions								
	UTM Zone: 11N		NAD 83								
	Project Date: September 4 to 13, 2012										
#	Sample ID	Sample Tag No.	Claim Area	Easting	Northing	Elev (m)	Sample Type	Major rock mineral	Color	Texture	Description / Mineralization
1	SD12-R1	E5631060	Silver Dollar	460036	5621732	1831	Chip	Qtz	Wht	Med gr.	Qtz chipped from vein structure in schist bedrock creekbed 20m below road crossing. Structure strike-130° dip-70°. Vn width 6-8 cm.
2	SD12-R2	E5631061	Silver Dollar	460037	5621733	1828	Chip	Qtz	Wht	Med gr.	Same description as #5631060. Collected 10m further downstream.
3	SD12-R3	E5631062	Wheelbarrow	457768	5625392	955	Grab	Qtz	Wht/brn	Fine gr.	Qtz with galena, pyrite, minor sphalerite. Limonite alt. From old overgrown roadbed below apparent veins in forested cliffs far above.
4	SD12-R4	E5631063	Wheelbarrow	457809	5625382	940	Grab	Qtz	Wht/brn	Fine gr.	Qtz with massive galena, pyrite, weak limonite alt. From old overgrown roadbed below area of old adit.
5	SD12-R5	E5631064	Wheelbarrow	457799	5625333	960	Grab	Qtz	Wht	Med gr.	Qtz with massive pyrite/marcasite. Dark sulphide veins. From old overgrown roadbed beside old drill collars: one collar vertical, the other azimuth 202°, angle 40°.
6	SD12-R6	E5631065	Gillman	459759	5622120	1750	Grab	Qtz	Wht/org	Med gr.	Chipped from qtz boulder blasted from Gillman vein. Contains massive pyrite and galena.
7	SD12-R7	E5631066	Gillman	459760	5622118	1750	Grab	Qtz	Wht/org	Med gr.	Chipped from qtz boulder blasted from Gillman vein. Contains massive pyrite and galena. Collected 5m from #5631065.
8	SD12-R8	E5631067	Gillman	459772	5622115	1750	Grab	Qtz	Wht/gry	Med gr.	Chipper from qtz boulder blasted from Gillman vein. Contains massive pyrite, galena, some graphite layering.
9	SD12-R9	E5631068	Silver Dollar	460176	5621731	1873	Chip	Qtz	Wht/gry	Med gr.	Qtz containing swarms of secondary sulphide veining, pyrite, weak limonite alt. Chipped from vein exposed by previous trenching above upper adit.
10	SD12-R10	E5631069	Silver Dollar	460213	5621678	1855	Grab	Qtz	Wht/brn	Med gr.	Qtz with massive gray sulphide mineralization an pyrite veins, limonite alt. From below trench on old road leading ESE from main adit.
11	SD12-R11	E5631070	Silver Dollar	460142	5621752	1842	Grab	Qtz	Dk gray	Coarse	Massive galena with swarms of qtz veins and some pyrite. From Silver Dollar main adit waste rock piles
12	SD12-R12	E5631071	Silver Dollar	460142	5621752	1842	Grab	Qtz	Wht/gry	Med gr.	Qtz wth massive pyrite and gray sulphide veining. From near Silver Dollar main adit entrance.
13	SD12-R13	E5631072	Silver Dollar- Gillman	459989	5622099	1892	Chip	Qtz	Wht/gry	Med gr.	Chipped from vein exposed in old trench. Contains blebs and veins of galena and chalcopyrite. Vein 1.5m wide, strike 310°, dip 40°. Forested slopes above and between Silver Dollar and Gillman.
14	SD12-R14	E5631073	Silver Dollar- Gillman	459989	5622099	1892	Grab	Qtz	Wht/gry	Med gr.	From loose vein material in old trench. Qtz containing blebs and veins of galena and pyrite. From same trench as #5631072.
15	SD12-R15	E5631074	Silver Dollar- Gillman	459964	5622096	1887	Grab	Qtz	Wht/gry	Med gr.	Qtz containing pyrite and galena blebs and veinlets. From entrance to old adit on steep forested slope above and between Silver Dollar and Gillman.
16	SD12-R16	E5631075	Silver Dollar- Gillman	459964	5622096	1887	Chip	Qtz	Wht/org	Med gr.	Rusty qtz with galena and limonite. Chipped from across 1m face of vein at inner end of old adit (~50m long).
17	SD12-R17	E5631076	Silver Dollar- Gillman	460044	5622031	1886	Grab	Qtz	Wht/brn	Med gr.	Rusty heavily oxidized and vuggy qtz with galena. Broken off vein exposure at old workings above and between Silver Dollar and Gillman.
18	SD12-R18	E5631077	Silver Dollar	460037	5622033	1887	Grab	Qtz	Wht/brn	Med gr.	Rusty qtz, very vuggy, containing pyrite and galena. Broken of vein outcrop near old workings.
19	SD12-R19	E5631078	Silver Dollar	460037	5622033	1887	Grab	Qtz	Wht/brn	Med gr.	Rusty qtz, vuggy, containing galena and pyrite. From old workings dump pile - location of #5631077
20	SD12-R20	E5631079	Silver Dollar	460037	5622033	1887	Grab	Qtz	Wht/brn	Med gr.	Vuggy quartz with massive galena. From dump pile area as in #5631078
21	SD12-R21	E5631080	Silver Dollar	460102	5621739	1831	Grab	Qtz	Wht/brn	Breccia	Qtz with galena, pyrite, chalcopyrite, some sphalerite, and siderite. From waste rock pile at entrance to Silver Dollar main adit.
22	SD12-R22	E5631081	Silver Dollar	460110	5621760	1840	Grab	Qtz	Brn	Med gr.	Brown qtz with massive pyrite and galena. From waste rock pile at
23	SD12-R23	E5631082	Silver Dollar	460136	5621825	1864	Chip	Qtz	Brn	Med gr.	Chip sample from vein exposed in trench above old secondary adit. Rusy quartz containing pyrite and sulphides. Chipped over 1.5m length.
24	SD12-R24	E5631083	Silver Dollar	460136	5621825	1864	Chip	Qtz	Brn	Med gr.	Chip sample continuation of #5631082 on adjacent face of irregular vein exposure. Collected over about 1.5m length.
25	SD12-R25	E5631084	Silver Dollar	460136	5621825	1864	Grab	Qtz	Gry	Coarse	Massive galena with about 10% qtz veins. Taken from entrance to old secondary adit.

Table 3, Rock Sample Descriptions											
	UTM Zone: 11N		NAD 83								
	Project Date: September 4 to 13, 2012										
#	Sample ID	Sample Tag No.	Claim Area	Easting	Northing	Elev (m)	Sample Type	Major rock mineral	Color	Texture	Description / Mineralization
26	SD12-R26	E5631085	Silver Dollar	460136	5621825	1864	Chip	Qtz	Brn	Med gr.	Chip sample continuation of #5631082 on adjacent face of irregular vein exposure. Collected over about 2m length.
27	SD12-R27	E5631086	Silver Dollar	460119	5621829	1835	Grab	Qtz	Gry	Coarse	Qtz with massive pyrite and galena in graphitic schist host rock. From the entrance of another secondary adit below trench at #5631082.
28	SD12-R28	E5631087	Silver Dollar	460176	5621731	1873	Chip	Qtz	Wht	Med gr.	Chip sample 1.2m across face of vein exposure. Qtz containing pyrite and galena.
29	SD12-R29	E5631088	Silver Dollar	460176	5621731	1873	Chip	Qtz	Wht	Med gr.	Chip sample 1.6m across face of vein exposure ~2m to right of #5631087. Qtz containing pyrite and galena.
30	SD12-R30	E5631089	Silver Dollar	460176	5621731	1873	Chip	Qtz	Wht	Med gr.	Chip sample 1.8m across face of vein exposure ~2m to right of #5631088. Includes some hanging wall schist.
31	SD12-R31	E5631090	Silver Dollar	460163	5621786	1875	Chip	Qtz	Org/brn	Coarse	Chip sample across 1.5m vein exposure. No visible mineralization.
32	SD12-R32	E5631091	Silver Dollar	460163	5621786	1875	Chip	Qtz	Org/brn	Coarse	Chip sample across 1.5m vein exposure ~3m to the right of #5631090. No visible mineralization.
33	SD12-R33	E5631092	Silver Dollar	460163	5621786	1875	Grab	Qtz	Wht/org	Coarse	Coarse grained qtz with pyrite veins and carbonaceous schist. From pile of rock at toe of vein in #5631091, but appears to be different. Possibly from cliffs far above.
34	SD12-R34	E5631093	Gillman	459777	5622120	1760	Chip	Qtz	Wht-brn	Med gr.	Fractured qtz vein material containing gray sulphide veinlets. Chipped across 50 cm vein exposure from previously blasted excavation on roadside. Sample contains some schist wall rock. Vein strike 320°, dip 40°.
35	SD12-R35	E5631094	Gillman	459777	5622120	1760	Chip	Qtz	Wht-brn	Med gr.	Fractured qtz vein material containing gray sulphide veinlets. Chipped across 35 cm vein exposure from middle of roadbed approximately 15m south of sample #5631093 (same vein).
36	SD12-R36	E5631095	Gillman	459782	5622062	1750	Chip	Qtz	Wht	Fine gr.	White fine grained quartz vein material with pervasive, massive pyrite and lesser amount galena. Chipped from 40 cm wide vein exposure 8m above creek, below road. Same vein as in samples #5631094 and #5631095.
37	SD12-R37	E5631096	Gillman	459805	5622078	1748	Chip	Qtz	Wht-red	Coarse	Rusty qtz in parallel 1 to 5 cm veins interlayed in graphitic schist. Chipped from bedrock in active creekbed 30m south of sample #5631095.
38	SD12-R38	E5631097	Gillman	459805	5622078	1748	Chip	Qtz	Wht	Coarse	White qtz chipped from 6 cm qtz vein in creekbed bedrock adjacent to #5631096. Contains schist wall rock with small qtz stringers. No visible mineralization int qtz or schist.

	Silver Do	ollar Roo	ck Samples	Sodium Pe	əroxide F	usion, IC	P	4 Acid D	igest-ICP	Fire Assay Gravimetric	Fire Assay Gravimetric	Fire Assay,ICP- OES		
					Cu	Pb	Zn	Sb	Ag	Ag	Au	Au		
#	Sample ID	Sample Lab No.	Claim Area	Sample Type	%	%	%	ppm	ppm	G/t	ppm	ppm		
1	SD12-R1	E5631060	Silver Dollar	Chip	0.006	<0.005	0.021	0.49	0.13	12	<0.05	0.002		
2	SD12-R2	E5631061	Silver Dollar	Chip	0.006	< 0.005	0.019	1.37	0.17	<5	<0.05	0.001		
3	SD12-R3	E5631062	Wheelbarrow	Grab	0.070	11.600	1.910	293	>100	213	4.02	7.56		
4	SD12-R4	E5631063	Wheelbarrow	Grab	0.053	22.500	0.348	434	>100	369	1.45	1.98		
5	SD12-R5	E5631064	Wheelbarrow	Grab	0.002	0.075	0.008	2.62	7.45	6	4.82	5.46		
6	SD12-R6	E5631065	Gillman	Grab	0.083	0.718	1.150	470	27.5	27	38.2	37		
7	SD12-R7	E5631066	Gillman	Grab	0.147	0.386	0.097	1000	57.7	97	34.2	36.2		
8	SD12-R8	E5631067	Gillman	Grab	0.016	2.360	0.397	95.7	35.4	37	1.96	2.79		
9	SD12-R9	E5631068	Silver Dollar	Chip	0.012	0.012	0.342	11.9	3.11	7	0.59	0.78		
10	SD12-R10	E5631069	Silver Dollar	Grab	3.200	1.600	8.270	>10000	>100	4496	3.57	4.49		
11	SD12-R11	E5631070	Silver Dollar	Grab	0.066	0.147	2.460	861	>100	349	1.86	1.74		
12	SD12-R12	E5631071	Silver Dollar	Grab	0.816	18.100	4.350	4310	>100	2219	3.64	3.57		
13	SD12-R13	E5631072	Silver Dollar-Gillman	Chip	0.050	0.128	0.206	20.9	8.52	<5	0.63	0.331		
14	SD12-R14	E5631073	Silver Dollar-Gillman	Grab	0.156	0.742	0.491	103	25.6	42	0.43	0.47		
15	SD12-R15	E5631074	Silver Dollar-Gillman	Grab	0.040	0.238	0.465	132	13.6	15	12.9	12.7		
16	SD12-R16	E5631075	Silver Dollar-Gillman	Chip	0.003	< 0.005	0.027	6.91	1.66	<5	0.2	0.15		
17	SD12-R17	E5631076	Silver Dollar-Gillman	Grab	0.059	13.200	0.045	285	>100	567	0.23	0.351		
18	SD12-R18	E5631077	Silver Dollar	Grab	0.067	0.184	2.330	174	62.5	88	0.1	0.18		
19	SD12-R19	E5631078	Silver Dollar	Grab	0.090	16.000	0.138	851	>100	687	2.67	2.91		
20	SD12-R20	E5631079	Silver Dollar	Grab	0.061	18.700	0.015	681	>100	706	1.26	0.919		
21	SD12-R21	E5631080	Silver Dollar	Grab	0.180	0.799	4.340	494	72.9	99	0.2	0.291		
22	SD12-R22	E5631081	Silver Dollar	Grab	0.157	2.810	0.700	1170	>100	374	2.76	3.51		
23	SD12-R23	E5631082	Silver Dollar	Chip	0.005	0.087	0.018	16.3	7.18	13	0.13	0.223		
24	SD12-R24	E5631083	Silver Dollar	Chip	0.005	0.157	0.030	30.4	20.8	31	0.33	0.454		
25	SD12-R25	E5631084	Silver Dollar	Grab	0.069	27.000	0.022	583	>100	985	0.53	0.338		
26	SD12-R26	E5631085	Silver Dollar	Chip	0.014	1.780	1.450	82.6	63.4	68	0.96	1.58		
27	SD12-R27	E5631086	Silver Dollar	Grab	0.082	1.410	0.822	728	>100	216	44.4	50.3		
28	SD12-R28	E5631087	Silver Dollar	Chip	0.303	4.070	16.100	731	>100	280	0.72	0.943		
29	SD12-R29	E5631088	Silver Dollar	Chip	0.003	0.020	0.038	7.33	2.94	61	0.59	0.595		
30	SD12-R30	E5631089	Silver Dollar	Chip	0.237	3.920	16.800	907	>100	241	1.29	1.67		
31	SD12-R31	E5631090	Silver Dollar	Chip	0.004	0.040	0.026	48.4	42.5	53	0.8	0.708		
32	SD12-R32	E5631091	Silver Dollar	Chip	0.004	0.148	0.016	142	>100	117	0.79	0.273		
33	SD12-R33	E5631092	Silver Dollar	Grab	0.026	0.351	0.061	105	36.9	60	8.56	10.1		
34	SD12-R34	E5631093	Gillman	Chip	0.011	0.033	0.112	21.5	2.99	9	0.89	2.09		
35	SD12-B35	E5631094	Gillman	Chip	0.157	0.111	0.442	527	20.7	23	7.19	8.42		
36	SD12-B36	E5631095	Gillman	Chip	0.116	1.650	0.432	22	49.1	53	34.7	40.7		
37	SD12-B37	E5631096	Gillman	Chip	0.005	0.007	0.040	2.41	0.66	12	< 0.05	0.048		
38	SD12-R38	E5631097	Gillman	Chip	0.003	< 0.005	0.013	0.85	0.19	<5	< 0.05	0.006		

Table 4, Summary of Rock samples Assay

Figures











Fig.5



Fig.5a



Fig. 5b





Fig.5d



Fig.5e

g.5e







Fig.6e

Appendix 1

Heli-GT, 3 Axis Magnetic Gradient and Spectrometer Survey

Happy Creek Minerals Ltd.

Heli-GT, 3 Axis Magnetic Gradient and Spectrometer Survey

Silver Dollar Project, Revelstoke, British Columbia

Operations and Processing Report

BY

SCOTT HOGG & ASSOCIATES LTD

August 2012

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1 INTRODUCTION

In August, 2012, Happy Creek Minerals Ltd. contracted Scott Hogg & Associates Ltd. to carry out a helicopter towed aeromagnetic gradient and spectrometer survey over their Silver Dollar property near Revelstoke, British Columbia. On August 16th and 17th, 2012, a total of 346.5 km of data was collected. Details of the airborne survey and compilation are documented in this report.

2 LOCATION

The survey area was located approximately 50 km southeast of Revelstoke, British Columbia. See figure 1 below.

Figure 1 - Survey Location Map.

3 AIRBORNE SURVEY

The airborne survey was based out of Revelstoke airport and was carried out on August 16th and August 17th, 2012. The main survey block was comprised of 245 line kilometers. Within the limits of the survey, topographic relief varied by nearly 2000m. Due to the extremely rugged terrain, it was difficult to safely maintain a consistent survey altitude. There was concern that detail within the central area of interest would be missed, due to survey segments with high altitude. Twelve additional survey lines were flown, parallel to the control lines of the main. The additional lines ran roughly parallel to the terrain and a lower, consistent altitude was possible. The additional lines added 101.5 line km to make a total of 346.5 km of magnetic gradiometer and spectrometer data collected and compiled.

3.1 Flight Specifications

<u>Main Survey</u>	<u>Additional Lines</u>
UTM 90° – 270°	UTM 135° – 315°
100 m	100 m
UTM 135° – 315°	n/a
2000 m	n/a
n/a	~50m
	<u>Main Survey</u> UTM 90° – 270° 100 m UTM 135° – 315° 2000 m n/a

3.2 Helicopter

Helicopter Owner / Operator	TRK Helicopters
Helicopter Model	AStar 350BA
Helicopter Registration	C-GTXK

3.3 Personnel

The following personnel were involved in the survey:

Field

Geophysical Technician	John Charlton
Operators	Ruth Charlton
	Frazer Hogg
Pilot	Roy Stevenson
Engineer	Andrew Hawkins

<u>Office</u>

Compilation and Reporting	Steve Munro
Project Management	Scott Hogg

4 GEOPHYSICAL SYSTEM

The airborne geophysical Heli-GT system consists of a towed bird that contains all of the geophysical sensors as well as altimeter and GPS antennae. A computer based recording and navigation system is located in the helicopter.

The Heli-GT bird is towed 25 m. below the helicopter. The basic orthogonal magnetic gradients G1, G2 and G3 are measured on 3 metre baselines. A radar altimeter and 4 GPS antennae are mounted on the towed bird. In the helicopter a computer logs the data and a touch screen display directs navigation.

4.1 Bird

All of the geophysical and ancillary equipment is housed in a towed bird designed by Scott Hogg & Associates Ltd. The bird is manufactured from non-magnetic FRP and breaks down for ease of transportation.

4.2 Magnetic sensors

Four Scintrex CS-3 cesium sensors are arranged in an orthogonal array with 3 m. sensor separation from the nose sensor to those at the end of each arm. The output from each sensor was processed by a KSM KMAG4 unit to resolve the magnetometer output to a resolution of about 0.005 nT at a rate of ten samples per second. The Heli-GT bird was flown at a nominal altitude of 60m.

4.3 Radar Altimeter

A Terra TRA 3500 / TR 140 radar altimeter was used to measure bird height above ground. The range of operation was from 0 to 2500 ft.

4.4 Fluxgate Magnetometer

A Billingsley TFM100G2 3-axis fluxgate magnetometer was used to record the orientation of the bird with respect to the earth's magnetic field. The range of each component of the fluxgate was +/- 100,000 nT.

4.5 Analog to Digital ADC

The analog output of the VLF, radar altimeter and fluxgate magnetometer were digitized with a KVS KANA8, eight channel differential ADC. The device provides 24 bit resolution and was operated at 10 Hz.

4.6 GPS System

The GPS was recorded by an array of 4, 12 channel receivers mounted on the Heli-GT bird. In addition to the measurement of Latitude, Longitude and Altitude a calculation of bird pitch, roll and yaw was calculated from differences between antennae. The system used the WAAS signal for real-time correction. The accuracy of the positional measurements is typically in the order of a few metres and the angular measurements in the order of 1 degree.

4.7 Navigation and Recording System

The navigation and recording system was developed by Scott Hogg and Associates. The system uses a PC processor with Linux operating system. The system disk has been replaced with flash memory and all data is logged on a separate flash disk. An LCD touch screen in the cockpit provides an operator interface for monitoring the geophysical and ancillary instrumentation as well as presenting graphic navigation information for the pilot. The pps pulse from the GPS system was recorded and tied to each of the sensors with an accuracy of about +/- 0.05 seconds

Data recorded included the following:

Magnetic sensors:	10 Hz
Fluxgate sensors:	10 Hz
Radar Altimeter:	10 Hz
GPS X/Y/Z:	5 Hz
GPS Pitch/ roll/ Yaw:	5 Hz

4.8 Base Station

A magnetic and GPS base station was established at the base of operations. A GEM SSM19TW proton magnetometer recorded the diurnal magnetic variation at 0.5 Hz with a resolution of 0.1 nT. A UBLOCK 12 channel GPS receiver provided a GPS time reference and recorded a differential correction file.

4.9 Spectrometer System

The spectrometer system was mounted in the helicopter. The spectrometer was a Pico Envirotec GRS410 intelligent spectrometer coupled with two detector arrays each with two 256 cubic inch NaI crystals for a total of 1024 cubic inches. The spectrometer outputs the summed 256 channel spectrums for the downward crystal array once per second.

5 DATA COMPILATION

5.1 Basic Processing

The data collected during flight, in the air and from the base station, was aligned with reference to GPS time. The basic magnetic gradients; G1, G2 and G3, measured from the nose sensor to each of the radial sensors was calculated. Any noise spikes, if present, were identified and edited.

A 0.1 second lag was applied to the nose sensor (mag4) to align the principal magnetic profile with the GPS antennae array. A low-pass filter was applied to the base station data to eliminate small cultural artifacts. A median value was removed from the base station profile to create a diurnal correction profile, which was subtracted from the lagged mag4 profile.

5.2 Gradient Processing

The recorded pitch, roll and yaw of the bird were used to mathematically rotate the measured basic gradients to G-north, G-east and G-down.

The GPS altitude of the bird was used to calculate a smooth drape surface. This is a smooth theoretical surface above the terrain that the bird would follow under ideal conditions. There would be only smooth altitude changes, line to line and along the flight line. The difference between the GPS altitude of this smooth drape surface and the actual GPS altitude was combined with the measured vertical gradient to calculate an altitude correction. In parts of the main survey, eastbound lines were generally, significantly higher than the westbound lines. This was due to a mountain running along the eastern boundary of the survey. The pilot was able to survey down the steep slope closer than he could while coming back up. An additional long-wavelength correction was applied to the magnetic profile of the eastbound lines.

5.3 Magnetic Levelling

The nose sensor magnetic profile (mag4), lagged and corrected for altitude, was used as the input for final levelling. A final microlevel correction was calculated and applied. The correction profile was limited to amplitudes less than 1nT and wavelengths longer than 1km.

5.4 Gradient Tensor Gridding (GT-GRID)

The leveled total field magnetic profile and the G-east and G-north gradient profiles were used by the GT-GRID process to calculate a total field magnetic grid. The grid produced by this technique simultaneously honours the total field as well as the measured gradient profiles. The GT-GRID process was also used to create a grid of the measured vertical gradient.

5.5 Vertical Magnetic Gradient

The vertical gradient accentuates shorter wavelengths and attenuates longer wavelengths. As a result the map enhances the anomalies associated with small near surface magnetic sources while suppressing large-scale regional variations. The vertical gradient presentation provides added visual detail, particularly for small anomalies superimposed on or adjacent to larger anomalies. The measured vertical gradient has been provided as well as a calculated vertical derivative.

5.6 Pole Reduction of the Calculated Vertical Derivative

The anomaly shape associated with a vertically dipping magnetic source varies with the inclination of the earth's magnetic field. At the north and south magnetic pole, the inclination is vertical and the anomaly is positive, symmetrical and centered directly over the source. At the equator, with a horizontal inducing field, the anomaly is negative, symmetrical and centered directly over the source. Between 0 and 90 degrees of inclination the anomaly is asymmetric, with a positive and negative component, and is not centered over the source. The pole reduction process reshapes the anomaly measured at intermediate inclinations to resemble the shape that would have been

measured at vertical inclination. Thus a steeply dipping source, without remanent magnetization, would be transformed to a simple positive peak above the source.

The measured or calculated vertical magnetic gradients are also sensitive to the inclination of the earth's magnetic field. In the same manner as the total field, the asymmetry and peak displacement, arising from an inclined field, is removed by the pole reduction process. The horizontal width of the vertical gradient anomaly is about one half of that of the total field anomaly. If the width of the magnetic source is significant, greater than the sensor height above the source, the zero contour of the pole reduced vertical gradient reflects the location of the magnetic contact and the response peak will lie directly above a steeply dipping source.

5.7 Digital Terrain Model

The digital terrain model was calculated by subtracting the radar altimeter profile from GPS altitude. Slight errors in GPS altitude were corrected by microlevelling.

5.8 Radiometric Corrections

The 256 channel radiometric spectrum was loaded to a database and then processed using the Praga4 full spectrum processing software. The radiometric corrections were to IAEA/GSC standards as follows:

- 1. Dead time correction was not applied as the GRS410 spectrometer dead time is insignificant for counts of 2000 cps or less per each of the four detectors.
- 2. Aircraft and cosmic background correction.
- 3. Compton stripping corrections.
- 4. Height correction to the nominal helicopter height of 100 m. with a maximum correction to 200 m.
- 5. Filtered with the Savitzky-Golay noise reduction filter.
- 6. Lagged 2.5 seconds.

The final processed TC, K, U, and Th channels are in counts per second (cps). The TC, K, and Th processed channels for the east/west lines were micro leveled to reduce the effects of the height differences in the valley between the east flown lines and the west flown lines.

Radiometric Coefficients and factors

Cosmic coefficients :

	а _{тс} =	1.8000
	а _к =	0.1100
	a _U =	0.0890
	а _{ть} =	0.0950
Compton Stripping factors	α = β = γ = a =	0.2875 0.5753 0.7817 0.0400

Altitude attenuation coefficients :

μ _{τc} =	-0.00500	m⁻¹		
μ _κ =	-0.00950	m ⁻¹		
μ ₀ =	-0.00820	m ⁻¹		
$\mu_{Th} =$	-0.00740	m⁻¹		

Nominal helicopter terrain clearance = 100 metres

6 DIGITAL DATA ARCHIVE

All of the maps, grid and profile data have been provided in digital form.

6.1 Profile Data

The profile data is in the Geosoft "gdb" format and includes the following channels.

Channel	Units	Content
gpstime	seconds	GPS time
X	metres	UTM easting WGS84, Zone 10N
У	metres	UTM northing WGS84, Zone 10N
long	degrees	GPS Longitude WGS84
lat	degrees	GPS Latitude WGS84
gpsalt	metres	GPS altitude
GPSAlt_Lev	metres	levelled GPS altitude
Rad_Alt	metres	radar altimeter, bird height
DTM	Metres	levelled Digital Terrain elevation
Fx	nT	Fluxgate axis x (foreward)
Fy	nT	Fluxgate axis y (port)
Fz	nT	Fluxgate axis z (up)
Heading	degrees	Bird heading
Pitch	degrees	Bird pitch
Roll	degrees	Bird roll
basemag	nT	base station magnetometer
Basemagf	nT	Filtered base station magnetometer
mag1	nT	upper port magnetometer
mag2	nT	down magnetometer
mag3	nT	upper starboard magnetometer
mag4	nT	nose magnetometer
G1	nT/m	magnetic gradient: mag4 to mag1
G2	nT/m	magnetic gradient: mag4 to mag2
G3	nT/m	magnetic gradient: mag4 to mag3
Mag4_lag	nT	lagged magnetometer 4 (nose)
Mag_diu	nT	base station – corrected mag
Mag_alt_cor	nT	altitude corrected mag
ML_fin	nT	Final, microlevelled mag
Ge	nT/m	measured magnetic East gradient
Gn	nT/m	measured magnetic North gradient
Gv	nT/m	measured magnetic Vertical gradient

Silver Dollar - Mag

Silver Dollar - Spec

Channel	Units	Content
gpstime	seconds	GPS time
Gpsalt_heli	Metres	GPS altitude of helicopter
Ralt_heli	metres	Height of helicopter above ground
х	metres	UTM easting WGS84, Zone 10N
у	metres	UTM northing WGS84, Zone 10N
DownSp_cps	cps	256 channel raw spectrum
TC_raw	cps	Raw total count
K_raw	cps	Raw potassium
U_raw	cps	Raw uranium
Th	cps	Raw thorium
Cosmic_raw	cps	Raw cosmic channel
TC_proc	cps	Corrected total count
K_proc	cps	Corrected potassium
U_proc	cps	Corrected uranium
Th_proc	cps	Corrected thorium
TC_micro	cps	Microlevelled Total Count (East-West lines only)
K_proc	cps	Microlevelled Potassium (East-West lines only)
Th_proc	cps	Microlevelled Thorium (East-West lines only)

6.2 Gridded Data

The grids are in Geosoft "grd" format. The cell size in all grids is 20 metres. The grids are projected in WGS84 UTM Zone 10n coordinates. A set of grids was made for both the main (east-west) survey as well as the lower altitude detail block. The following is a description of the main grid set.

Grid Name	Units	Description
Silver Dollar DTM	metres	Levelled digital elevation model
Silver Dollar GT_TMI	nT	Total magnetic field GT-Grid
Silver Dollar GT-CVG-RTP	nT/m	Calculated Vertical Derivative GT-Grid reduced to pole.
Silver Dollar TC	cps	Total count
Silver Dollar K	cps	Potassium
Silver Dollar U	cps	Uranium
Silver Dollar Th	cps	Thorium

6.3 Map Files

The following Geosoft format map files have been provided. Using the Geosoft Viewer, also provided, the map layers may be selectively viewed and exported in a variety of formats.

- Flightpath and Topography
- Digital Elevation
- GT Total Magnetic Field
- GT Calculated Vertical Derivative (Reduced to Pole)
- Total Count
- Potassium
- Uranium
- Thorium
- Ternary Image

JPEG images (200 dpi) for each map are also included with this report.

Respectfully submitted,

Steve Munro Scott Hogg & Associates Ltd. Toronto, Ontario September 4, 2012