BC Geological Survey Assessment Report 34492

# **TECHNICAL ASSESSMENT REPORT**

# AIRBORNE GEOPHYSICAL SURVEY (GRIZZLY WEST PROPERTY)

## **GRIZZLY PROJECT**

#### SHESLAY RIVER AREA

NORTHWESTERN BRITISH COLUMBIA

Approximate geographic centre of subject property: Latitude 58.20 degrees and Longitude 131.75 degrees

**Prepared for** 

GARIBALDI RESOURCES CORP.

NTS Mapsheet no: 104J04W Mining Division: Atlin

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#### SOW No: 5469247

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#### **3. SUMMARY**

The Grizzly Property is an early stage porphyry copper-gold prospect located in north western British Columbia approximately 50 kilometres northwest of Telegraph Creek. This area of BC is referred to either as the Golden Triangle or the Stikine Arch and hosts several world class porphyry deposits including Novagold Resources Galore Creek Project (120 kilometers to the south) and Imperial Metals Red Chris deposit (100 kilometers to the southeast) and a large number of copper-gold prospects that have been intermittently explored since the 1960's.

The Property forms a large "L" shaped block (comprising 17,690.668 hectares) that covers potential extensions (to the south and to the west) of a series of advanced porphyry copper-gold prospects referred to as the Copper Creek Property presently being explored by Firesteel Resources and currently under option to Prosper Gold. There is no useable road access to the claims at present however, the road that was constructed from Telegraph Creek to the former Golden Bear Mine in the mid 1980's passes through the southern part of the Grizzly Property. Although this road is not presently in use it would certainly be feasible to rehabilitate it if a significant mineral deposit is defined in the project area. At present the best way to access the claims is by helicopter from either Dease Lake or Bob Quin located 100 kilometres to the east.

Regional geological maps published by the BC Ministry of Energy and Mines (BCMEM) show that the Property is underlain by Late Triassic aged intrusive rocks and by sedimentary and volcanic rocks belonging to the Stuhini Group. According to Barr et al, 1976, these rock units comprise Late Triassic and Early Jurassic aged volcanic island arc assemblages which are the host for all of BC's alkalic porphyry copper-gold deposits. These kinds of deposits tend to occupy brecciated and faulted zones related to extensively altered subvolcanic intrusions and their volcanic host rocks. Alteration patterns are distinctly different from those of classic calcalkaline porphyry deposits which are characterized by concentric phyllic-argillic-propylitic zones. The alkalic deposits typically have a central potassic zone which passes outward into a propylitic zone however these often overlap and are overprinted by retrograde metasomatic alteration. Magnetite breccias and disseminations are associated with the potassic alteration zone which hosts most of the copper and gold mineralization. Disseminated pyrite and minor copper mineralization tend to mantle the propylitic alteration zone.

The copper-gold porphyry prospects located within the adjoining Copper Creek Property are referred to as the Copper Creek, Dick Creek and Pyrrhotite Creek targets. Systematic soil geochemical surveys, geophysical surveys (mag and IP), trenching and drill testing carried out by Firesteel and various previous operators have partially defined these mineralized zones. Within the copper in soil and IP anomalies that define the Dick Creek Prospect Firesteel has reported trench assays of 270 meters grading 0.38% copper and 0.23 g/t gold. DDH CC04-05 completed in 2004 reportedly intersected 242.3 meters grading 0.44% copper and 0.32 g/t gold. The technical information concerning the Copper Creek Property is included to demonstrate that the project area is prospective for alkalic porphyry type copper gold deposits. The reader is

#### cautioned that there is no assurance similar mineralization will be identified on the adjoining Grizzly Property which is the subject of this report.

BC MINFILE data and assessment reports available from BCMEM indicate that there are several known copper and gold prospects in the western part of the Grizzly Property which have been the focus of previous exploration work. The most advanced of these is referred to as the Grizzly Prospect (also referred to as the Grizzley West Prospect) located on the west side of the Sheslay River approximately 5 kilometers northwest of the Pyrrhotite Creek prospect. In the 1960's, 70's and 80's Kennecott, Brascan and Corona completed soil geochemical surveys, IP geophysical surveys and attempted a back pack drill program however no drill results were reported.

The southern part of the Grizzly property covers an extensive area of low relief separated from the Copper Creek Property by the Hackett River. This area is heavily forested and exhibits little bedrock exposure. To determine if there was potential for alkalic porphyry type mineralization in this part of the Grizzly Property Garibaldi carried out an airborne magnetic survey in 2006. For comparative purposes this magnetic survey covered the southern part of Firesteel's Copper Creek Property (including coverage of the Pyrrhotite Creek and Copper Creek Prospects). Results of the airborne magnetic survey showed that the rock units and structures which underlie the Copper Creek prospects appear to continue into the large area of low relief within the Garibaldi claims and identified several magnetic anomalies which are similar to the magnetic anomalies that are associated with the mineralized zones which comprise the Copper Creek Property. Between 2009 and 2012 Garibaldi has completed various soil sampling programs and one limited geophysical survey program within the area of interest defined by the 2006 airborne survey.

Between May 01, 2012 and October 29, 2012 Garibaldi completed a comprehensive soil geochemical and rock sampling program in the area referred to as the Grizzley West Prospect. The objectives of the soil and rock sampling program carried out in the area of the Grizzley Prospect was to identify the exact location of the mineralized zones and geochemically anomalous areas identified by Corona and to confirm that the Grizzley West Prospect has potential to host significant alkalic type porphyry copper mineralization. This exploration work was carried out pursuant to SOW No.s 5390476 and 5413815.

On September 12 and 13, 2013 Precision Geosurveys completed a total of 339 line kilometers of airborne magnetic and radiometric surveys in the western part of thje Grizzley Property. Precision Geosurveys mobilized to the Grizzley Property from Dease Lake. Helicopter fuel was mobilized to the airstrip at Sheslay River. The total cost of the airborne survey was \$27,200.00. This exploration work was submitted for assessment credit on SOW No.5469247.

#### 4. INTRODUCTION AND TERMS OF REFERENCE

This report summarizes the results of a helicopter borne magnetic and radiometric survey completed by Precision Geosurveys on September 12 and 13, 2013 in the western part of the Grizzly Property. The cost of the survey was funded by Garibaldi Resources Corp.

The available historic technical data for the Grizzly Property consists of regional geological information compiled by the BC Ministry of Energy and Mines and assessment reports completed by Kennecott, Brascan, Corona Corporation, Firesteel Resources, Garibaldi Resources, Skyline Explorations and various other previous operators which are on file with the BC Ministry of Energy and Mines. Sources are listed in the References section of this report and are cited where appropriate in the body of this report.

The technical reports concerning interpretations for the Grizzly Property airborne geophysical survey were provided by Precision Geosurveys.

#### 5. DISCLAIMER

The author has prepared this report based on information believed to be accurate at the time of completion but which is not guaranteed. The author has relied on the geophysical survey work completed by Precision Geosurveys and the geophysical survey work completed by Fugro Airborne Surveys in 2006 and the various assessment reports completed on the property or portions thereof by various mining companies and on publically available federal and provincial government documents such as geological maps and reports on the project area.

Garibaldi Resources has provided a compilation on legal title and ownership of the claims. To the best of the author's knowledge at the time of writing of this report, the subject property(s) is free of any liens or pending legal actions and is not subject to any underlying royalties, back-in rights, payments or other encumbrances. To the best of the author's knowledge, there are no known existing environmental liabilities to which the property is subject, other than the requirement to mitigate any environmental impact on the claims that may arise in the course of normal exploration work and the requirement to remove any camps constructed on the Grizzly Property or any equipment used in exploration of the claims in the event that exploration work is terminated.

#### 6. PROPERTY DESCRIPTION AND LOCATION

The property is located approximately 50 kilometres northwest of the community of Telegraph Creek and approximately 120 kilometres north of Novagold's Galore Creek Project. The approximate geographic centre of the property is situated at Latitude 58.20 degrees North and Longitude 131.75 degrees West.

The location of the project area relative to other mining claims, access roads and other developed alkalic porphyry copper-gold prospects is illustrated in Figure 1. Regional geological information is illustrated in Figure 2.

The property consists of 45 contiguous map staked mineral titles comprising 17,690.668 hectares. The claims form an irregular, "L" shaped block extending for roughly 15 kilometres east west and 10 kilometres north south. Figure 3 shows the location of each of the mineral claims that comprise the Grizzly Property relative to generalized topographic features and also shows the location of the Firesteel Resources Copper Creek Property.

Tomura Numelese			Anos (1)
Tenure Number	Owner	Good To Date	Area (ha)
521137	239201 (100%)	2014/aug/10	358.021
532129	239201 (100%)	2014/aug/10	426.247
532131	239201 (100%)	2014/aug/10	426.595
532133	239201 (100%)	2014/aug/10	426.422
532135	239201 (100%)	2014/aug/10	392.321
532136	239201 (100%)	2014/aug/10	409.320
532137	239201 (100%)	2014/aug/10	409.856
532138	239201 (100%)	2014/aug/10	426.396
532139	239201 (100%)	2014/aug/10	426.505
532140	239201 (100%)	2014/aug/10	409.581
532141	239201 (100%)	2014/aug/10	375.384
532143	239201 (100%)	2014/aug/10	409.638
532144	239201 (100%)	2014/aug/10	409.695
532146	239201 (100%)	2014/aug/10	426.859
532147	239201 (100%)	2014/aug/10	426.938
532148	239201 (100%)	2014/aug/10	427.059
532150	239201 (100%)	2014/aug/10	425.766
532151	239201 (100%)	2014/aug/10	306.627
532152	239201 (100%)	2014/aug/10	427.152
537287	239201 (100%)	2014/aug/10	409.070
537288	239201 (100%)	2014/aug/10	426.253
537289	239201 (100%)	2014/aug/10	425.668
538012	239201 (100%)	2014/aug/10	289.891
538013	239201 (100%)	2014/aug/10	426.368
538014	239201 (100%)	2014/aug/10	375.205

Table 1: List of mineral claims comprising the Grizzly Property

538015	239201 (100%)	2014/aug/10	409.436
538016	239201 (100%)	2014/aug/10	409.537
556527	239201 (100%)	2014/aug/10	68.148
556574	239201 (100%)	2014/aug/10	17.036
556575	239201 (100%)	2014/aug/10	34.068
556576	239201 (100%)	2014/aug/10	34.080
556577	239201 (100%)	2014/aug/10	17.036
557775	239201 (100%)	2014/aug/10	340.836
557777	239201 (100%)	2014/aug/10	425.752
559901	239201 (100%)	2014/aug/10	68.138
559964	239201 (100%)	2014/aug/10	426.111
1010655	239201 (100%)	2014/aug/10	442.629
1010659	239201 (100%)	2014/aug/10	1690.187
1010670	239201 (100%)	2014/aug/10	1484.843
1010677	239201 (100%)	2014/aug/10	136.535
1010678	239201 (100%)	2014/aug/10	238.908
1010679	239201 (100%)	2014/aug/10	17.058
1010687	239201 (100%)	2014/aug/10	853.401
1010688	239201 (100%)	2014/aug/10	341.536
1010689	239201 (100%)	2014/aug/10	136.556

#### Total area of Grizzly Property (hectares)

#### 17690.668

#### 6.1 Provincial Mining Regulations

All of the claims which comprise the Grizzly Property were staked pursuant to the BC Ministry of Energy and Mines MTO system (Mineral Titles Online System). Prior to July 1, 2012 BC Ministry of Mines regulations required that title to the claims be maintained through the performance of annual assessment work filings and payment of required fees. Title to the claims was maintained through the performance of annual assessment filings and payment of required fees. For the first three years a total of \$4.00 per hectare in eligible exploration expenditures must be incurred. For all subsequent years a minimum of \$8.00 per hectare in eligible expenditures must be incurred.

Effective July 1, 2012 new regulations came into effect that changed the requirements from a 2tier system to a 4-tier system and have significantly increased the minimum exploration expenditures that are required to maintain mineral tenures in good standing. Under the new regulations all mineral tenures are deemed to be in their first anniversary year and the new minimum exploration expenditures will be \$5.00 per hectare for anniversary years 1 and 2, \$10.00 per hectare for anniversary years 3 and 4; \$15.00 per hectare for anniversary years 5 and 6 and \$20.00 per hectare for each subsequent anniversary year. Prior to July 1, 2012 holders of mineral tenures had the option of making payments equivalent to the minimum exploration and development expenditures (referred to as PIED) required by the Ministry of Mines instead of incurring the required expenditures. Under the old regulations a minimum of one day and a maximum of one year of PIED could be applied to mineral tenures. Under the regulations which come into effect July 1, 2012 the holders of mineral tenures will still have the option of making payments instead of exploration and development work however, the new PIED rate will be set at double the value of the minimum exploration and development expenditures required. In addition to the changes in the PIED rate tenure holders who elect to make payments instead of incurring expenditures will need to pay for a minimum of 6 months which under the new regulations will be equivalent to the minimum expenditures for an entire year. Similar to the assessment work requirements, if a recorded holder wishes to register PIED, the claim will also be treated as if it is in its first anniversary year for the purpose of calculating the assessment requirement, as of the date of implementation (July 1, 2012).

To the best of the author's knowledge, government permits will be required to carry out any follow up ground geophysical or diamond drilling programs recommended after completion of this program. These programs will require application to the Ministry of Energy and Mines for permits and the Issuer may be required to post security equivalent to the estimated costs of any reclamation work which will be required after completion of the proposed exploration work. The reader is cautioned that there is no guarantee that the Issuer will be able to obtain the permits required to carry out the proposed work program. However, the author is not aware of any problems encountered by other junior mining companies in obtaining the permits required to carry out similar programs in nearby areas.

To the best of the author's knowledge approval from local First Nations communities may also be required to carry out the proposed Stage 2 exploration program. The reader is cautioned that there is no guarantee that the Issuer will be able to obtain approval from local First Nations. However, the author is not aware of any problems encountered by other junior mining companies in obtaining approval to carry out similar programs in nearby areas nor is the author aware of any instances where local First Nations communities have objected to exploration work in the general project area.

To the best of the author's knowledge, none of the claims which comprise the Grizzly Property have surface rights. In the event that a significant mineralized zone is identified detailed environmental impact studies will need to be completed prior to initiation of any advanced exploration or mining activities. The reader is cautioned that there is no guarantee that areas for potential mine waste disposal, heap leach pads, or areas for processing plants will be available within the Grizzly Property claim area.

#### 7. ACCESSIBILITY, CLIMATE, INFRASTRUCTURE AND PHYSIOGRAPHY

There is no useable road access to the claims at present however there is an airstrip located at the Sheslay River ten kilometres to the north of the property and the road to the former Golden Bear Mine passes through the southern part of the property. There are a series of skid roads that extend from the airstrip to the main prospects located within the Copper Creek Property. Figure 3. shows the location of the Golden Bear mine road relative to claim locations. The Golden Bear mine road is not currently in use but does represent a potential access route to the Grizzly Property. At present the best way to access the property is by helicopter from the either community of Dease Lake or from Bob Quin approximately 100 kilometres east.

The project area is in the rain shadow of the Coast Range Mountains and annual precipitation is 425 mm including average snowfall of 218 cm. The Grizzly Property is generally free of snow for approximately six months of the year. In general, exploration work in this area is carried out from June until October however snow cover is relatively light compared to the Galore Creek project area and most exploration work could be carried out from April through to November.

There is no existing camp or other significant infrastructure within the Grizzly Property.

The Grizzly property is subdivided into two geographically distinct areas referred to as the Western Block and the Southern Block. The Western Block covers the main part of a prominent topographic feature formed by the Kaketsa Pluton (Kaketsa Mtn. elevation – 1900 m) and straddles the Sheslay River Valley (from 600 meter elevation to 1600 meter elevation) along the western side of the Copper Creek Property. The Southern Block covers an area of subdued topography ranging from (900 to 1100 meters in elevation) separated from the main part of the Copper Creek Property by the Hackett River.

#### 8.0 HISTORY OF EXPLORATION

According to published technical data copper mineralization in the Sheslay River / Hackett River area was first identified in the 1950's and was explored by Kennecott and Newmont Exploration in the early 1960's. Kennecott completed soil geochemical surveys and IP surveys in the area of the Kid and Grizzly Prospects and reportedly attempted a "back pack drilling program" but were unable to penetrate overburden.

During the late 1960's and early 1970's Skyline Explorations Ltd. explored the area covered by the present Copper Creek Property and began evaluating several copper occurrences. This work identified three main areas of mineralization referred to as Copper Creek (Minfile 104J – 005), Star, Dick Creek (Minfile 104J-035) and Pyrrhotite Creek (Minfile 104J-018). Figure 4 shows the location and reference numbers of all of the MINFILE occurrences within the project area.

During this time Skyline also completed reconnaissance work to the west of the Pyrrhotite Creek Prospect (the area between the present Copper Creek Property boundary and the Sheslay River) and reportedly discovered at least two mineralized areas (referred to as the "West Kaketsa" and "Ho" Prospects). At West Kakesta mineralization reportedly consists of highly altered and sheared volcanic and intrusive rocks containing disseminated and fracture controlled chalcopyrite over exposed widths of at least 24 meters. According the Darney, R. and Gutrah, G., 1971 the mineralized area referred to as West Kaketsa was considered a high priority target because the observed mineralization closely resembles that seen at the Pyrrhotite Creek Prospect. This prospect has not been field verified.

In 1974 Brascan Resources and Ducanex Resources optioned the area referred to as the Grizzly Prospect (also referred to as the Grizzley West Prospect) and completed three widely spaced holes that confirmed the presence of potassic alteration and low grade copper mineralization. However, none of the drill core or rock samples from this program were assayed for gold. In 1988 Corona Corporation acquired the ground around the Grizzly Prospect and completed prospecting, rock sampling and a much more extensive soil geochemical survey than that originally completed by Kennecott. Corona's work confirmed that significant gold values (approximately 50% of the samples returned values ranging from 0.1 to more than 1.0 g/t gold) are associated with the copper mineralization in the area of the Grizzly prospect and defined several copper and gold geochemical anomalies which are similar in amplitude to the soil geochemical anomalies reported by Firesteel but do not appear to have been adequately tested by the limited drill program completed in the 1970's.

In March 2002 the present Copper Creek Property was optioned to Firesteel Resources Ltd. In 2004 Firesteel Resources carried out a program of geological mapping, trenching, soil geochemistry and 1,555 meters of diamond drilling focusing on the DK (Dick Creek) Zone. The best hole of the program, CUCR 04-05 was angled to the north and cut 0.44 per cent copper and 0.32 g/t gold averaged over its full length of 242 meters.

According to published technical reports there are at least two areas of porphyry style mineralization referred to as the Kid and Grizzley Prospects located on the west side of the Sheslay River at elevations of between 800 and 1,000 meters. In 1988 Corona Corporation acquired the ground around the Grizzly Prospect and completed prospecting, rock sampling and a much more extensive soil geochemical survey (1,307 soil sample sites) than that originally completed by Kennecott. In addition Corona reported 84 rock sample assays. Corona's exploration work confirmed that significant gold values are associated with the observed mineralization (approximately 50% of the rock samples returned values ranging from 0.1% to more than 1.0% copper and from 0.1 to more than 1.0 g/t gold). The geochemical survey completed by Corona in 1989 defined several copper and gold geochemical anomalies which are similar in amplitude to the soil geochemical anomalies reported by Firesteel at the adjoining Copper Creek Property but do not appear to have been accurately located on the base maps

provided in the technical reports filed for assessment credit.

The southern part of the Grizzly property covers an extensive area of low relief separated from the Copper Creek Property by the Hackett River. This area is heavily forested and exhibits little bedrock exposure. To determine if there was potential for alkalic porphyry type mineralization in this part of the Grizzly Property Garibaldi carried out an airborne magnetic survey in 2006. For comparative purposes this magnetic survey covered the southern part of Firesteel's Copper Creek Property (including coverage of the Pyrrhotite Creek and Copper Creek Prospects). Results of the airborne magnetic survey showed that the rock units and structures which underlie the Copper Creek prospects appear to continue into the large area of low relief within the Garibaldi claims and identified several magnetic anomalies which are similar to the magnetic anomalies that are associated with the mineralized zones which comprise the Copper Creek Property. Between 2009 and 2012 Garibaldi has completed various soil sampling programs and one limited geophysical survey program within the area of interest defined by the 2006 airborne survey.

Between May 01, 2012 and October 29, 2012 Garibaldi completed a comprehensive soil geochemical and rock sampling program in the area referred to as the Grizzley West Prospect. The objectives of the soil and rock sampling program carried out in the area of the Grizzley Prospect was to identify the exact location of the mineralized zones and geochemically anomalous areas identified by Corona. This exploration work was carried out pursuant to SOW No.s 5390476 and 5413815.

#### 9. GEOLOGICAL SETTING

The project area is located in the north western part of of the Stikine Arch near its contact with the Coast Plutonic Complex. Upper Triassic aged Stuhini Group island arc volcanic and sedimentary rocks unconformably overlie a sequence of Paleozoic to Middle Triassic marine sediments. These rock units have been intruded by Upper Triassic to Lower Jurassic aged syenitic stocks and by Jurassic to Lower Cretaceous aged diorite and granodiorite plutons of the Coast Plutonic Complex. The geological map from BCMEM is reproduced in Figure 4.

The oldest rocks comprise Devonian to Permian aged limestones, cherts, volcanic and epiclastics which host the Golden Bear Mine located approximately 50 kilometers to the west the of the Grizzly Property. Unconformably overlying these rocks are augite andesite breccias, conglomerates and volcaniclastic rocks belonging to the Stuhini Group. Small oval shaped syenite, pyroxenite and orthoclase porphyry stocks dated as Late Triassic to Early Jurassic (190-210 ma., Souther, 1971) intrude the Stuhini group volcanic rocks. According to Barr et al, 1976 these Late Triassic and Early Jurassic aged volcanic island arc assemblages are the host for all of BC's alkalic type porphyry copper-gold deposits and form a class distinct from the calcalkaline porphyry deposits. Upper Triassic aged volcanic intruded by syenitic stocks host the Galore Creek, Red Chris and Copper Canyon alkalic copper-gold porphyry deposits.

The Grizzly / Copper Creek area is underlain by a broad belt of Upper Triassic intermediate volcanic andesites, tuffaceous andesite and tuffs with interbedded clastic sediments. The best known intrusive rock unit is the Kaketsa Pluton which is an elliptical, north trending intrusion approximately 4 by 5.6 kilometers in size dated at 218.8 million years. A number of potentially economic copper prospects occur near the contacts of the Kaketsa Pluton and its related smaller stocks and these prospects are described in the text of this report.

A thick sequence of basalts belonging to the Tertiary Aged Level Mountain Group covered the area during Tertiary time however, subsequent glaciations and erosion has removed these basalts from the Hackett River valley and much of the surrounding area which has exposed the older volcanics and intrusives.

No past production is recorded for the map area although large copper, gold and silver reserves have recently been defined at Galore Creek (proven and probable reserves effective October 5, 2006 as per Novagold News Release: 540.7 million tons containing 6.6 billion pounds of copper, 5.3 million ounces of gold and 92.6 million ounces of silver. Although alkalic porphyry coppergold deposits may have been sub-economic in the late 1970's sustained increases in copper and gold prices since 2002 and the potential for large sized deposits have resulted in increasing industry interest in these types of occurrences. The generalized geology of the project area is shown in Figure 2 which shows the main alkalic copper-gold prospects and known deposits in the project area.

#### **10. DEPOSIT TYPES**

For the subject property alkalic porphyry copper-gold deposits are believed to be the most important potential target. Alkalic porphyry copper-gold deposits tend to occupy brecciated and faulted zones related to extensively altered subvolcanic intrusions and their volcanic host rocks. Alteration patterns are distinctly different from those of classic calcalkaline porphyry deposits which are characterized by concentric phyllic-argillic-propylitic zones. The alkalic deposits typically have a central potassic zone which passes outward into a propylitic zone however these often overlap and are overprinted by retrograde metasomatic alteration. Magnetite breccias and disseminations are associated with the potassic alteration zone which hosts most of the copper and gold mineralization. Disseminated pyrite and minor copper mineralization tend to mantle the propylitic alteration zone.

Mineralization occurs in alkaline magmatic centers that are characterized by alkaline intrusions and comagmatic subalkaline to alkaline and shoshonitic volcanic rocks (de Rosen- Spence, 1985,). Crowded feldspar porphyritic textures are characteristic of both the intrusives and the volcanics; pyroxene-phyric basalts are typical. The alkaline intrusions evolved from crystalfractionated, volatile and metal-enriched magmas (Fox, 1989; Mutschler *et al.*,1990) that were emplaced rapidly and often intrude their volcanic edifice. Multiple intrusions of crystal-rich magma produce porphyritic textured intrusives, intrusive breccias and hydrothermal breccias. These intrusive pulses predate, coincide with and postdate alteration and mineralization related to the magmatic centers.

#### 11. MINERALIZATION

The BC Ministry of Energy and Mines (BCMEM) Minfile database identifies five known mineral prospects within the Grizzly property including four alkalic porphyry copper type occurrences including the Kid Prospect (Minfile 104J-004), Grizzly 4,13 Prospect (Minfile 104J-016), Ho Prospect (Minfile 104J-023), and the West Kaketsa Prospect (Minfile 104J-024). The Al 9 Prospect (Minfile 104J-060) is classed as a vein, breccia, stock work type occurrence. The reference numbers and locations of these Minfile occurrences are shown in Figure 4.

#### 11.1 Kid Prospect (Minfile 104J-004), Grizzly 4,13 Prospect (Minfile 104J-016)

According to published technical reports these prospects comprise at least two areas of porphyry style mineralization located on the west side of the Sheslay River at elevations of between 800 and 1,000 meters.

During the early 1960's Kennecott completed soil geochemical surveys and IP surveys in the area of the Kid and Grizzly Prospects and in 1974 Brascan Resources and Ducanex Resources completed three widely spaced holes. The drilling reportedly confirmed the presence of potassic alteration and low grade copper mineralization but no gold values were reported.

In 1988 Corona Corporation acquired the ground around the Grizzly Prospect and completed prospecting, rock sampling and a much more extensive soil geochemical survey (1,307 soil sample sites) than that originally completed by Kennecott. In addition Corona reported 84 rock sample assays. Corona's exploration work confirmed that significant gold values are associated with the observed mineralization (approximately 50% of the rock samples returned values ranging from 0.1% to more than 1.0% copper and from 0.1 to more than 1.0 g/t gold). The geochemical survey completed by Corona in 1989 defined several copper and gold geochemical anomalies which are similar in amplitude to the soil geochemical anomalies reported by Firesteel but do not appear to have been adequately tested by the limited drill program completed in the 1970's.

Alteration in the area of the occurrences reportedly consists of linear zones of strong K-feldspar flooding with associated magnetitie, epidote and carbonate. Chalcopyrite – pyrite mineralization is reportedly closely associated with the K-feldspar flooding and is finely disseminated in the intrusive rocks and also occurs as veinlets and fracture fillings in shear zones along the intrusive contacts.

Between May 01, 2012 and October 29, 2012 Garibaldi completed an extensivesoil geochemical and rock sampling program in the area referred to as the Grizzley West Prospect. The objectives of the soil and rock sampling program carried out in the area of the Grizzley Prospect was to identify the exact location of the mineralized zones and geochemically anomalous areas identified by Corona and to confirm that the property has potential to host significant alkalic type porphyry copper mineralization.

#### 11.2 Ho Prospect (Minfile 104J-023), West Kaketsa Prospect (Minfile 104J-024)

During the late 1960's and early 1970's Skyline Explorations Ltd. explored the area covered by the present Copper Creek Area and began evaluating the Pyrrhotite Creek and Copper Creek prospects. During this time Skyline also completed reconnaissance work to the west of the Pyrrhotite Creek Prospect (the area between the present Copper Creek Property boundary and the Sheslay River) and reportedly discovered at least two mineralized areas (referred to as the "West Kaketsa" and "Ho" Prospects).

At the West Kaketsa Prospect mineralization reportedly consists of highly altered and sheared volcanic and intrusive rocks containing disseminated and fracture controlled chalcopyrite over exposed widths of at least 24 meters. According to Darney and Gutrah, 1971 the mineralized area referred to as West Kaketsa was considered a high priority target because the observed mineralization closely resembles that seen at the Pyrrhotite Creek Prospect. No sample assays were reported and there are no reports of any other exploration work completed on the West Kaketsa Prospect.

#### 12. EXPLORATION WORK

#### 12.1 Exploration work carried out by Garibaldi Resources (September 2013)

On September 12 and 13, 2013 Precision Geosurveys completed a total of 339 line kilometers of airborne magnetic and radiometric surveys in the western part of thje Grizzley Property. Precision Geophysical mobilized to the Grizzley Property from Dease Lake. Helicopter fuel was mobilized to the airstrip at Sheslay River. The total cost of the airborne survey was \$27,200.00. This exploration work was submitted for assessment credit on SOW No.5469247.

#### **1 3.** STATEMENT OF COSTS

# Garibaldi Resources Inc Grizzly Project SOW No. 5469247

### For the period ended September 26, 2013

#### **Cost Statement**

	CDN
Geological Field Work and Subcontractors	-
Field Equipment Rentals and Helicopter Charter Expenses	27,200.00
Auxilliary Field Equipment Rentals	-
Geological and GIS technical mapping / Technical Reporting	-
Geochemical Analyses and Petrographic work	-
Total	27,200.00

#### **Cost Statement - Detail**

Airborne Geophysical Survey at Grizzly Project, B.C.

23,000.00
-
1,200.00
3,000.00

Standby time

-

12.2 Precision Geosurveys Report on the Grizzly property



# AIRBORNE GEOPHYSICAL SURVEY REPORT



# Grizzly Survey Block Prepared for Garibaldi Resources Corp.

# Jenny Poon, B.Sc., G.I.T.

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September 2013

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# 1.0 Introduction

This report outlines the survey operations and data processing procedures taken during the airborne geophysical survey flown at the Grizzly survey block. The survey area is located northwest of Telegraph Creek, BC (Figure 1). The airborne geophysical survey was flown by Precision GeoSurveys Inc. for Garibaldi Resources Corp. The geophysical survey was carried out on September 12, 2013 and complete on September 13, 2013. This survey saw to the acquisition of high resolution magnetic and radiometric data.



Figure 1: Block location map.



# 1.1 Survey Area

The Grizzly survey block is located approximately 55 km northwest of Telegraph Creek, BC. The southeast corner of the survey block covers the Kaketsa Mountain (Figure 2).



Figure 2: Grizzly survey block location relative to Telegraph Creek, BC on Google Earth.

The Grizzly survey block is approximately 7.9 km by 9.0 km (Figure 3). A total of 339 line kilometers of magnetic and radiometric data were flown for this survey; this total includes tie lines and survey lines.





Figure 3: Grizzly survey block boundary in red.

The Grizzly block survey lines were flown at 200 meter spacing at a  $090^{\circ}/270^{\circ}$  heading; the tie lines were flown at 2000 meter spacing at a heading of  $000^{\circ}/180^{\circ}$  (Figures 4 and 5).





Figure 4: Plane View – Grizzly survey block with actual survey and tie lines outlined in yellow, and the survey block boundary in red.





Figure 5: Terrain View – Grizzly survey block with actual survey and tie lines outlined in yellow, and the survey boundary in red.

# 1.2 Survey Specifications

The geodetic system used for this survey is WGS 84 and the area is contained in zone 9N (Figure 6). The survey data acquisition specifications and coordinates for the Grizzly survey block are specified as follows (Tables 1 and 2).





Figure 6: Survey map of Grizzly survey block showing proposed survey lines (blue), tie lines (red), and the survey boundary (brown).

Survey Block	Line Spacing m	Planned Survey Line km	Planned Tie Line km	Survey Line Orientation	Nominal Survey Height m	Actual Survey Height	Total Planned Line km	Total Actual Flown km
Grizzly	200	298	30	090°/270°	40	43	328	339
Total							328	339

Table 1: Grizzly survey block acquisition specifications.

Longitude	Latitude	Easting	Northing	N/S	E/W
131.79277096	58.26936850	336192	6462097	Ν	W
131.79454537	58.24231638	335963	6459091	Ν	W
131.83039037	58.24152684	333856	6459091	N	W
131.82916836	58.18767910	333676	6453096	N	W
131.92876782	58.18543114	327812	6453096	Ν	W
131.93350402	58.23935212	327795	6459108	N	W
131.92851511	58.23961044	328089	6459124	Ν	W
131.92933269	58.26645365	328171	6462113	N	W

Table 2: Grizzly block survey polygon coordinates using WGS 84 in zone 9N.



# 2.0 Geophysical Data

Geophysical data are collected in a variety of ways and are used to aid in exploration and determination of geology, mineral deposits, oil and gas deposits, contaminated land sites and UXO detection.

For the purposes of this survey, airborne magnetic and radiometric data were collected to serve in the exploration of Grizzly survey block potential of copper and gold deposits.

# 2.1 <u>Magnetic Data</u>

Magnetic surveying is probably the most common airborne survey type to be conducted for both mineral and hydrocarbon exploration. The type of survey specifications, instrumentation, and interpretation procedures, depend on the objectives of the survey. Typically magnetic surveys are performed for:

- 1. Geological Mapping to aid in mapping lithology, structure and alteration in both hard rock environments and for mapping basement lithology, structure and alteration in sedimentary basins or for regional tectonic studies.
- 2. Depth to Basement mapping for exploration in sedimentary basins or mineralization associated with the basement surface.

# 2.2 <u>Radiometric Data</u>

Radiometric surveys detect and map natural radioactive emanations, called gamma rays, from rocks and soils. All detectable gamma radiation from earth materials come from the natural decay products of three primary elements; uranium (U), thorium (Th), and potassium (K). The purpose of radiometric surveys is to determine either the absolute or relative amounts of U, Th, and K in surface rocks and soils which are then useful in mapping lithology, alteration, and structure.

### 3.0 <u>Survey Operations</u>

Precision GeoSurveys flew the survey out of Sheslay airstrip, BC. The experience of the pilot helped to ensure that the data quality objectives were met and that the safety of the flight crew was never compromised given the potential risks involved in airborne surveying. Field processing and quality control checks were done daily.



# 3.1 Operations Base and Crew

The base of operation for this survey was at a camp located not far from Sheslay airstrip, BC. It is approximately less than 1 km east of the Grizzly survey block (Figure 7).



Figure 7: Base of operation at a camp located near the Sheslay airstrip.

The Precision crew consisted of three members:

Harmen Keyser – Pilot Stian Vaage – Operator Jenny Poon – Geophysicist

The survey was started on September 12, 2013 and completed on September 13, 2013. The survey did not encounter any delays.



# 3.2 Base Station Specifications

Two magnetic base stations were set up before the survey to ensure that diurnal activity was recorded during the survey flight. In this case, two GEM GSM 19T base stations (Figure 8) GEM 3 (Serial # 5081669) and GEM 4 (Serial # 2065370) were set west of the Grizzly survey block (see Table 3).

Station name	Easting/ Northing	Longitude/ Latitude	Datum/
			Projection
GEM 3 (Serial #	0340380E,	131° 43' 8.220" W	WGS 84, Zone
5081669)	6458442N	58° 14' 17.080" N	9N
GEM 4 (Serial #	0340360E,	131° 43' 9.501" W	WGS 84, Zone
2065370)	6458465N	58° 14' 17.797" N	9N

Table 3: Base station specifications.

Base station readings were reviewed at regular intervals to ensure that no data were collected during periods with high diurnal activity (greater than 5 nT per minute). The magnetic base stations were installed at a magnetically noise-free area, away from metallic items such as steel objects, vehicles, or power lines that could affect the survey data.



Figure 8: GEM 3 (left) and GEM 4 (right) magnetic base station locations.



The diurnal magnetic variations recorded from the stationary base station was removed from the magnetic data recorded in flight to ensure that the anomalies seen were real and not due to solar activity.

# 3.3 Field Processing and Quality Control

On a flight-by-flight basis, the survey data were transferred from the helicopter's data acquisition system onto a USB flash drive and copied onto a field data processing laptop. The raw data files were in PEI binary data format and were converted into Geosoft GDB database format. Using Geosoft Oasis Montaj 8.0.1, the quality of the data was inspected to see if it met the contract specifications (see Table 4). If survey and tie lines exhibit excessive navigational deviation (left/right or up/down) from the contract specifications, or were considered to be inferior quality, the lines were re-flown. All suspect anomalies, especially those found on a single flight line, were re-flown. Any re-flight lines were a minimum of 2000 m long, survey line re-flights crossed at least two tie lines, and tie line re-flights crossed at least 10 survey lines where applicable. All data were confirmed and verified by a geophysicist before the survey helicopter and crew demobilized on September 14, 2013.

Specification	Technology	Details	
Line Spacing		Flight line deviation from flight path by more than +/-	
Line Spacing	Position	10 m left/ right for 1 km or more.	
Height		Flight line deviation from height by more than +/- 15	
		up/down with a nominal flight height of 40 m above	
		ground for 1 km or more.	
GPS		Any flight lines where 3 or less GPS satellites	
		received for distances of greater than 1 km, provided	
		signal loss is not due to topography	
Diurnal		Non-linear magnetic diurnal variations exceed 10nT	
Variations		from a linear chord of length one (1) minute	
Normalized 4 <sup>th</sup> Difference	Magnetics	Magnetic data exceeding 0.30 nT peak to peak for	
		distances greater than 1 km or more (provided noise is	
		not due to geological or cultural features).	
	Radiometrics	If signal from the four spectrometer windows (K, Th,	
Test Line Data		U, and TC) over the test line exceed by more than	
		12%, the flights shall be re-flown or suspended.	

Table 4: Contract re-flight specifications.



## 4.0 Aircraft and Equipment

All geophysical and subsidiary equipment are carefully installed on Precision GeoSurvey's aircraft. For this survey, a magnetometer, spectrometer, a data acquisition system, base stations, laser altimeter, and a pilot guidance unit (PGU) were required to carry out the survey and collect quality, high resolution data. The survey magnetometer was carried in an approved "stinger" configuration to enhance flight safety and improve data quality in this mountainous terrain.

# 4.1 Aircraft

Precision GeoSurveys flew the Grizzly survey block using a Eurocopter AS350 helicopter (Figure 9), registration C-GOHK. The survey lines were flown at a nominal line spacing of two hundred (200) meters and the tie lines were flown at two (2) kilometers spacing for both the magnetometer and spectrometer. The average survey elevation was 43 meters vertically above ground.



Figure 9: Eurocopter AS350 equipped with mag stinger for magnetic data acquisition, and internal spectrometer crystals for radiometric data acquisition.



# 4.2 Equipment

# 4.2.1 <u>AGIS</u>

The Airborne Geophysical Information System, AGIS, (Figure 10), is the main computer used in data recording, data synchronizing, displaying real-time QC data for the geophysical operator, and the generation of navigation information for the pilot and operator display system. Information such as magnetic field, total count, counts of various radioelements (K, U, Th, etc.), temperature, cosmic radiation, barometric pressure, atmospheric humidity and survey altitude can all be monitored on the AGIS screen for immediate QC.



Figure 10: AGIS operator display installed in the Eurocopter AS350B2.

The AGIS was manufactured by Pico Envirotec; therefore the system uses standardized Pico software and external sensors are connected to the system via RS-232 serial communication cables. The AGIS data format is easily converted into Geosoft or ASCII file formats by a supplied conversion program called PEIView. Additional Pico software allows for post real time magnetic compensation and survey quality control procedures.

# 4.2.2 <u>Magnetometer</u>

The airborne magnetic sensor used by Precision GeoSurveys is a Scintrex cesium vapor CS-3 magnetometer. The system was housed in a front mounted "stinger" (Figure 11). The CS-3 is a high sensitivity/low noise magnetometer with automatic hemisphere switching and a wide voltage range, the static noise rating for the unit is  $\pm$  0.01 nT. On the AGIS screen the operator can view the raw magnetic response, the magnetic fourth difference, compensated and uncompensated data, aircraft position, and the survey altitude for immediate QC of the magnetic data. The magnetic data are recorded at 10 Hz.



A magnetic compensator is also used to remove noise created by the movement of the helicopter as it pitches, rolls and yaws within the Earth's geomagnetic field.



Figure 11: View of the mag stinger.

# 4.2.3 <u>Spectrometer</u>

The IRIS, or Integrated Radiometric Information System, is a fully integrated, gamma radiation detection system containing 16.8 litres of NaI (T1) synthetic downward looking crystals and 4.2 litres of NaI (T1) synthetic upward looking crystals (Figure 12) with 256 channel output at 1 Hz sampling rate. The downward-looking crystals are designed to measure gamma rays from below the aircraft and are equipped with upward-shielding high density RayShield® gamma-attenuating blankets to minimize cosmic and solar gamma noise. The upward looking crystal measures solar gamma radiation from above the survey helicopter and a 6 mm thick lead plate is used for downward-shielding. Real time data acquisition, navigation and communication tasks are integrated into a single unit that is installed in the rear of the aircraft as indicated below.





Figure 12: IRIS strapped in the back seat of the Eurocopter AS350.

# 4.2.4 Base Station

For monitoring and recording of the Earth's diurnal magnetic field variation, Precision GeoSurveys operates two magnetometer base stations continuously throughout the airborne data acquisition survey. Precision GeoSurveys operates a GEM GSM-19T magnetometer base station. The base stations were positioned northeast of the survey block, and in an area with low magnetic gradient, to give accurate magnetic field data. The base stations were located in an area away from electric transmission power lines and moving ferrous objects, such as aircraft and motor vehicles that could affect the survey data integrity.

The GEM GSM-19T magnetometer with integrated GPS (Figure 13) or time synchronization uses the proton precession technology sampling at a rate of 0.5 Hz. The GSM-19T has an accuracy of  $\pm 0.2$  nT at 1 Hz. Base station data are recorded on the solid-state memory of the base station, and downloaded onto a field laptop computer using a serial cable and GEMLink 5.0 software. Profile plots of the base station readings are generated and updated at the end of each survey day.




Figure 13: GEM GSM-19T proton precession magnetometer.

# 4.2.5 Laser Altimeter

The pilot is provided with terrain guidance and clearance information from an Opti-Logic RS800 laser altimeter (Figure 14). This is attached at the aft end of the magnetometer boom. The RS800 sensor is a time-of-flight sensor that measures distance by a rapidly-modulated and collimated laser beam that creates a dot on the target surface. The maximum range of the laser altimeter is 700 m off of natural surfaces with an accuracy of +/-1 meter on 1 x 1 m<sup>2</sup> diffuse target with 50% (+/-20%) reflectivity. Within the sensor unit, reflected signal light is collected by the lens and focused onto a photodiode. Through serial communications and digital outputs, the ground clearance data are transmitted to an RS-232 compatible port and recorded and displayed by the AGIS and PGU at 10 Hz.



Figure 14: Opti-Logic RS800 laser altimeter.



## 4.2.6 Pilot Guidance Unit

The PGU (Pilot Guidance Unit) is a graphical display type unit that provides continuous steering and elevation information to the pilot (Figure 15). It is mounted remotely from the data system on top of the instrument panel. The PGU assists the pilot to keep the helicopter on the flight path and at the desired ground clearance.



Figure 15: Pilot Guidance Unit.

The LCD monitor measures 7 inches, with a full VGA 800 x 600 pixel display. The CPU for the PGU is housed in the PC-104 console and uses Windows XP Embedded operating system control, with input from the GPS antenna, laser altimeter, and AGIS.

#### 4.2.7 GPS Navigation System

A Hemisphere GPS Mini Max navigation system integrated with the pilot display (PGU) and AGIS provided navigational information and control. The Hemisphere GPS Mini Max is composed of a receiver with an MGL-3 antenna (Figure 16). It has a position accuracy to within 1 meter and supports SBAS (WAAS, EGNS, and others), Beacon, and Satloc's patented e-Dif.





Figure 16: Hemisphere GPS – Mini Max

A differential correction signal (DGPS –Differential GPS) is applied to the GPS signal received through the MGL-3 antenna and can be applied up to 5 times per second (5 Hz). Therefore, the high- performance Mini Max differential correction provides positional accuracy on the order of 1 meter or less.

#### 5.0 Data Acquisition Equipment Checks and Calibration

Airborne equipment tests were conducted at the start of the survey. There are three tests conducted for the airborne magnetometer: compensation flight, lag test, and the heading error test (clover leaf test). Gamma ray spectrometer checks and calibrations are also conducted prior to the start of the survey. The three tests conducted were the calibration pad test, cosmic flight test, and the Breckenridge test range.

#### 5.1 Magnetometer Checks

#### 5.1.1 Compensation Flight Test

During aeromagnetic surveying a small but significant amount of noise is introduced to the magnetic data by the aircraft itself, as the magnetometer is within the helicopter's magnetic field. Movement of the aircraft (roll, pitch and yaw) and the permanent magnetization of the aircraft parts (engine and other ferric objects) are large contributing factors to this noise. To remove this noise a process called magnetic compensation is implemented. The magnetic compensation process starts with a test flight at the beginning of the survey where the aircraft flies in the four orthogonal headings required for the survey (000<sup>'</sup>/180<sup>°</sup> and 090<sup>'</sup>/270<sup>°</sup> in the case of this survey) at an altitude (typically > 1,500 m AGL) where there is no ground effect in the magnetic data. In each heading, three specified roll, pitch, and yaw maneuvers are performed by the pilot at constant elevation so that any magnetic variation recorded by the airborne magnetometer can be attributed to the aircraft movement. The variations recorded by these maneuvers provide the data that are required to calculate the necessary parameters for compensating the magnetic data and removing the aircraft noise.



## 5.1.2 <u>Lag Test</u>

A lag test was performed to determine the relationship between the time the digital reading was recorded by the instrument magnetic sensor and the time for the position fix that the fiducial of the reading was obtained by the GPS system.

The test was flown in the four orthogonal headings over an identifiable magnetic anomaly (ie. Truck, Trailer, etc.) at survey speed and height. A lag of 10 fiducials (1.0 seconds) was determined from the lag test.

## 5.1.3 <u>Heading Error Test</u>

To determine the magnetic heading effect a cloverleaf pattern flight test was conducted. The cloverleaf test was flown in the same orthogonal headings as the survey and tie lines at >1000 m AGL in area with low magnetic gradient. For all four directions it must pass over the same mid-point all four times at the same elevation.

Line Number	Fiducials	Heading	Mag (nT)	Average (nT)
L0	499.5	N - 000°	56667.0872	
L090	697.2	E - 090°	56687.8058	
L180	423.7	S - 180°	56688.9774	
L270	634.6	W - 270°	56666.0820	
		1		56677.4881

Table 5: Heading error test data format flown on September 12, 2013.





Figure 17: Heading data results in .tbl format in Geosoft table.

#### 5.2 Gamma-ray Spectrometer Checks and Calibrations

Pre-survey calibrations and testing of the GRS-10 airborne gamma-ray spectrometry system were carried out prior to the start of the survey. The calibration of the spectrometer system involved three tests which enabled the conversion of airborne data to ground concentration of natural radioactive elements. These tests were the calibration pad test, cosmic flight test, and the Breckenridge test range. The measurements were made in accordance with IAEA technical report series No. 323, "Airborne Gamma Ray Spectrometer Surveying", and AGSO Record 1995/60, "A Guide to the Technical Specification for Airborne Gamma-Ray Surveys".

#### 5.2.1 Calibration Pad Test

The calibration pad test was conducted by Pico Envirotec at the GSC (Geological Survey of Canada) testing facility in Ottawa, Ontario over the approved GSC calibration pad. It is a slab of concrete containing known concentrations of the radioelements (K, Th, and U) and is ideally used to simulate a geological source of radiation. The measurements collected from the calibration pad test are used to determine the Compton scattering and Grasty Backscatter (spectral overlap between element windows) coefficients.



## 5.2.2 Cosmic Flight Test

As the height of the aircraft increases, cosmic radiation in each spectral window increases exponentially due to radiation of cosmic origin. Also, the background source of radiation from the aircraft itself is constant. The cosmic flight test is conducted to determine the aircraft's background attenuation coefficients for the detector crystal packs and the cosmic coefficients. The pilot is required to fly over the same location repeatedly in opposite directions starting from 1,500 m to 3,000 m at every 500 m interval for approximately 2 minutes each.

## 5.2.3 Breckenridge Test Range

The Breckenridge test range is very similar to the cosmic flight test but is conducted at lower elevations (from ground level). The pilot is required to fly over the same location at the following elevations in meters above ground; 30, 50, 100, 150, 200, 250, and 300. As the distance of the aircraft increases away from the radioactive source, the source signature exponentially degrades. As a result, this test is used to determine the altitude attenuation coefficients and the radio-element sensitivity of the airborne spectrometer system.

#### 6.0 Data Processing

After all the data were collected from a survey flight several procedures were undertaken to ensure that the data met a high standard of quality. All data were processed using Pico Envirotec software and Geosoft Oasis Montaj 8.0.1 geophysical processing software along with proprietary processing algorithms.

#### 6.1 <u>Magnetic Processing</u>

The data obtained from the compensation flight test was applied to the raw magnetic data before any further processing and editing. The computer program called PEIComp was used to create a model from the compensation flight test for each survey to remove the noise induced by aircraft movement; this model was applied to each survey flight so the data can be further processed.

Over water or fog, the laser altimeter is unable to record a valid reading and a zero is recorded; therefore all data points recorded at zero were replaced with a nominal height of 40 m. Filtering was then applied to the laser altimeter data to remove vegetation clutter and to show the actual ground clearance. To remove vegetation clutter a Rolling Statistic filter was applied to the laser altimeter data and a low pass filter was used to smooth out the laser altimeter profile to eliminate isolated noise. As a result, filtering the data will yield a more uniform surface in close conformance with the actual terrain. A digital terrain model channel was calculated by subtracting the filtered laser altimeter data from the filtered GPS altimeter data defined by the WGS 84 ellipsoidal height.

The processing of the magnetic data first involved the correction for diurnal variations. Out of the two base stations that were set up, GEM 3 was chosen and used for diurnal



corrections. The base station data were edited, plotted and merged into a Geosoft (.gdb) database on a daily basis. The airborne magnetic data were corrected for diurnal variations by subtracting the observed magnetic base station deviations. Following the diurnal correction, a lag correction was applied. A lag correction of 1.0 seconds was applied to the total magnetic field data to compensate for the combination of lag in the recording system and the magnetometer sensor flying 5.70 m ahead of the GPS antenna. Lastly, a heading correction was applied to the data. As a result, after all corrections have been applied the initial Total Magnetic Intensity (TMI) data was generated.

The initial Total Magnetic Intensity (TMI) data from the survey and tie lines were used to level the entire survey dataset. Two forms of leveling were applied to the corrected data: conventional leveling and micro-leveling. There were two components to conventional leveling; the first involved statistical leveling of magnetic data to correct miss ties (intersection errors) followed by specific patterns or trends. For the second component, tie lines were brought to a common regional base value using the mean value of the cross-level error. To obtain the best possible leveled data, individual corrections were edited at selected intersections. Lastly, micro-leveling was applied to the corrected conventional leveled data. This will remove any residual noise related to flight line direction, and any low amplitude component of flight line noise, that still remained in the data after tie line leveling.

## 6.1.1 IGRF Removal and Calculation of the First Vertical Derivative

The International Geomagnetic Reference Field (IGRF) model is the empirical representation of the Earth's magnetic field (main core field without external sources) collected and disseminated from satellites and from observatories around the world. The IGRF is generally revised and updated every five years by a group of modelers associated with the International Association of Geomagnetism and Aeronomy (IAGA). In this case, the IGRF values were calculated from model year 2010 and the actual survey dates were obtained from the "Date" channel.

With the removal of the IGRF from the observed Total Magnetic Intensity (TMI) a Residual Magnetic Intensity (RMI) was generated. This created a more valid model of individual near surface anomalies and the data will not be referenced to a time which can be easily incorporated into databases of magnetic data acquired in the past or in the future.

The first vertical derivative was computed from the Total Magnetic Intensity (TMI) data. Long wavelengths and vertical rate of change were suppressed in the magnetic field. Therefore, the edges of magnetic anomalies were highlighted and spatial resolution was increased.



## 6.2 <u>Radiometric Processing</u>

Radiometric surveys map the concentration of radioelements at or near the earth's surface; typically up to 1.5 meters below surface. Thus, the first and vital step before processing of the airborne radiometric data is to calibrate the spectrometer system. Once calibration of the system has been completed, the radiometric data was processed by windowing the full spectrum to create channels for U, K, Th and total count. A 5-point Hanning filter was applied to the Cosmic window before going any further with processing the radiometric data.

Aircraft background and cosmic stripping corrections were applied to all three elements, and total count using the following formula:

$$C_{ac} = C_{lt} - (a_c + b_c * \operatorname{Cos}_f)$$

where:  $C_{ac}$  is the background and cosmic corrected channel  $C_{lt}$  is the live time corrected channel  $a_c$  is the aircraft background for this channel  $b_c$  is the cosmic stripping coefficient for this channel  $Cos_f$  is the filtered cosmic channel

The radon backgrounds were first removed followed by Compton stripping. Spectral overlap corrections were applied on to potassium, uranium, and thorium as part of the Compton stripping process. This was done by using the stripping ratios that have been calculated for the spectrometer by prior calibration; this breaks the corrected elemental values down into the apparent radioelement concentrations. Lastly, attenuation corrections were applied to the data which involves nominal survey altitude corrections, in this case 43 metres is applied to total count, potassium, uranium, and thorium data.

With all corrections applied to the radiometric data, the final step is to convert the corrected potassium, uranium, and thorium to apparent radioelement concentrations using the following formula:

$$eE = C_{cor}/s$$

where: eE is the element concentration K(%) and equivalent element concentration of U(ppm) & Th(ppm) s is the experimentally determined sensitivity  $C_{cor}$  is the fully corrected channel



Finally, the natural air exposure rate is determined using the following formula:

 $E = \left[ (13.08 * K + 5.43 * eU + 2.69 * eTh) / 8.69 \right]$ 

where: E is the absorption dose rate in µR/h
K is the concentration of potassium (%)
eU is the equivalent concentration of uranium (ppm)
eTh is the equivalent concentration of thorium (ppm)

To calculate for radiometric ratios the guidelines of the IAEA were followed. Due to statistical uncertainties in the individual radioelement measurements, some care was taken in the calculation of the ratio in order to obtain statistically significant values. Following IAEA guidelines, the method of determining ratios of the eU/eTh, eU/K and eTh/K was as follows:

- 1. Any data points where the potassium concentration was less than 0.25% were neglected.
- 2. The element with the lowest corrected count rate was determined.
- 3. The element concentrations of adjacent points on either side of each data point were summed until they exceeded a pre-determined threshold value. This threshold was set to be equivalent to 100 counts of the element with the lowest count rate. Additional minimum thresholds of 1.6% for potassium, 20 ppm for thorium, and 30 ppm for uranium were set up to ensure meaningful ratios.
- 4. The ratios were calculated using the accumulated sums.

With this method, the errors associated with the calculated ratios were minimized and comparable for all data points.

#### 7.0 <u>Deliverables</u>

The magnetic data collected by Fugro in 2006 are merged and leveled with the Grizzly block data. Both survey data are presented as a single merged digital database and maps are generated which are included into the final logistic report.

All digital data are presented on a compact disc (CD) and USB stick with the logistic report. The survey data are presented as digital databases, maps, and a report.

#### 7.1 <u>Digital Data</u>

The file format will be provided in two (2) formats, the first will be a .GDB file for use in Geosoft Oasis Montaj, the second format will be a .XYZ file, this is text file. A complete file provided in each format will contain both magnetic and radiometric data. Full description of the digital data and contents are included in the report (Appendix B).



The digital data are represented into grids. The following grids are prepared for the Grizzly survey block at 50 m cell size listed below:

- Digital terrain model (DTM)
- Total magnetic intensity (TMI)
- Residual magnetic intensity (RMI) removal of IGRF from TMI
- Calculated vertical gradient (CVG) first vertical derivative of TMI
- Potassium (%K) radiometric data in percentage
- Thorium (eTh) radiometric data in concentrations
- Uranium (eU) radiometric data in concentrations
- Total count (TCcor) radiometric data in equivalent dose rate
- Total count (TCexp) radiometric data in exposure rate
- Thorium over Potassium ratio (eTh/%K) radiometric ratios
- Uranium over Potassium ratio (eU/%K) radiometric ratios
- Uranium over Thorium ratio (eU/eTh) radiometric ratio

The following grids are prepared for the merged Fugro 2006 dataset at 50 m cell size listed below:

- Digital terrain model (DTM)
- Total magnetic intensity (TMI)
- Residual magnetic intensity (RMI) removal of IGRF from TMI
- Calculated vertical gradient (CVG) first vertical derivative of TMI

#### 7.2 KMZ Grids

The digital data represented into grids were exported into kmz files which can be displayed using Google Earth. The grids can be draped onto topography and rendered to give a 3D view.

#### 7.3 <u>Maps</u>

Digital maps were created for the Grizzly survey block. The following map products were prepared:

Survey Overview Maps (colour images with elevation contour lines):

- Flight lines
- Digital terrain model

Magnetic Maps (colour images with elevation contour lines):

- Total magnetic intensity
- Total magnetic intensity with plotted flight lines



- Residual magnetic intensity
- Calculated vertical gradient of the total magnetic intensity

Radiometric Maps (colour images with elevation contour lines):

- Potassium percentage
- Thorium equivalent concentration
- Uranium equivalent concentration
- Total Count equivalent dose rate
- Total Count exposure rate
- Thorium over Potassium ratio
- Uranium over Potassium ratio
- Uranium over Thorium ratio
- Ternary an element ratio map of K, Th, and U

Digital maps were created for the merged Fugro 2006 and Grizzly survey block. The following map products were prepared:

Survey Overview Maps (colour images with elevation contour lines):

- Flight lines
- Digital terrain model

Magnetic Maps (colour images with elevation contour lines):

- Total magnetic intensity
- Total magnetic intensity with plotted flight lines
- Residual magnetic intensity
- Calculated vertical gradient of the total magnetic intensity

All maps were prepared in World Geodetic System (WGS 84) and UTM zone 9N.

#### 7.4 <u>Report</u>

The report provides information about the acquisition procedures, magnetic and radiometric processing, and presentation of the Grizzly survey block data. A pdf copy of the report is included along with the digital data and maps that are provided on the CD and USB stick.



# Appendix A

**Equipment Specifications** 

- GEM GSM-19T Proton Precession Magnetometer (Base Station)
- Hemisphere GPS Mini Max
- Opti-Logic RS800 Laser Altimeter
- Scintrex CS-3 Survey Magnetometer
- Bartington Mag-03 three-axis fluxgate magnetic field sensor
- Pico Envirotec GRS-10 Gamma Spectrometer
- Pico Envirotec AGIS data recorder system (for Navigation, Gamma spectrometer, VLF-EM and Magnetometer Data Acquisition)



<b>Configuration Options</b>	15
Cycle Time	999 to 0.5 sec
Environmental	-40 to +60 ° Celsius
Gradient Tolerance	7,000 nT/m
Magnetic Readings	299,593
<b>Operating Range</b>	10, 000 to 120,000 nT
Power	12 V @ 0.62 A
Sensitivity	0.1 nT @ 1 sec
Weight (Console/ Sensor)	3.2 Kg
Integrated GPS	Yes

## GEM GSM-19T Proton Precession Magnetometer (Base Station)



## Hemisphere GPS – Mini Max

	Receiver Type	LI, C/A code, with carrier phase
	Channels	I2-channel, parallel tracking (10-channel when tracking SBAS)
	WAAS Tracking	2-channel_parallel_tracking
GPS Sensor Specifications	Undate Rate	1 Hz default 5 Hz max
	Horizontal Accuracy	< 1 m 95% confidence (DGPS) < 5 m 95% confidence (autonomous, no
	Cold Start	SA)
	Antenna Input	
	Impedance	50 Ω
	Channels	2-channel, parallel tracking
	Frequency Range	283.5 to 325 kHz
	Channel Spacing	500 Hz
	MSK Bit Rates	50, 100, and 200 bps
	Operating Modes	Manual, automatic, semi-automatic
Bascon Sonsor	Cold Start Time	< 1 minute typical
Specifications	Reacquisition Time	< 2 seconds typical
specifications	Demodulation	Minimum shift keying (MSK)
	Sensitivity	2.5µV for 6dB SNR @ 200 bps
	Dynamic Range	100dB
	Frequency Offset	±8 Hz (~ 27 ppm)
	Adjacent Channel Rejection	$61 \text{ dB} \pm 1 \text{ dB}$ @ fo $\pm 400 \text{ Hz}$
	Serial ports	2 full duplex
	Interface Level	RS-232C
	Baud Rates	4800, 9600, 19200
Communications	Correction Input/ Output Protocol	RTCM SC-104
	Raw Measurement Data	Proprietary binary (RINEX utility available)
	Timing Output	1 PPS (HCMOS, active high, rising edge svnc, $10k\Omega$ , $10pF$ load)
	Operating Temperature	-32°C to +74°C
	Storage Temperature	-40°C to +85°C
Environmental	Humidity	95% non-condensing
	EMC	FCC Part I 5, Subpart B, Class B CISPR 22
	Input Voltage Range	9 to 32 VDC
	Reverse Polarity Protection	Yes
Power	Power Consumption	3W
	Current Consumption	<250 mA @ 12 VDC
	Antenna Short Circuit Protection	Yes



# **Opti-Logic RS800 Laser Altimeter**

Accuracy	+/- 1 yard
Com. Protocol	RS232-8,N,1
Baud Rate	19200
Raw Data Rate	~200 Hz
Calibrated Data Rate	~10 Hz
Laser	Class I (eye-safe) 905nm +/- 10nm
Power	7-to-9 Vdc
Typical Range	400 yards
Laser Wavelength	905 nm +/- 10 nm
Laser Divergence	Vertical axis 3.5 mrad half- angle divergence Horizontal axis 1 mrad half- angle divergence (Approximate beam footprint at 100 m is 5 cm x 5 cm)
Data Rate	~200 Hz raw counts for un-calibrated operation ~10 Hz for calibrated operation (averaging algorithm seeks 8 good readings)
Dimensions	32 x 78 x 84 mm (lens face cross section is 32 x 78 mm)
Casing	RS100/RS400/RS800 units are supplied as OEM modules consisting of an open chassis containing optics and circuit boards. Custom housings can be designed and built on request.



# Scintrex CS-3 Survey Magnetometer

<b>Operating Principal</b>	Self-oscillation split-beam Cesium Vapor (non-radioactive Cs- 133)	
<b>Operating Rage</b>	15,000 to 105,000 nT	
Gradient Tolerance	40,000 nT/metre	
<b>Operating Zones</b>	10° to 85° and 95° to 170°	
Hemisphere Switching	a) Automatic b) Electronic control actuated by the control voltage levels (TTL/CMOS) c) Manual	
Sensitivity	0.0006 nT $\sqrt{\text{Hz}}$ rms.	
Noise Envelope	Typically 0.002 nT P-P, 0.1 to 1 Hz bandwidth	
Heading Error	+/- 0.25 nT (inside the optical axis to the field direction angle range 15° to 75° and 105° to 165°)	
Absolute Accuracy	<2.5 nT throughout range	
Output	a) continuous signal at the Larmor frequency which is proportional to the magnetic field (proportionality constant 3.49857 Hz/nT) sine wave signal amplitude modulated on the power supply voltage b) square wave signal at the I/O connector, TTL/CMOS compatible	
Information Bandwidth	Only limited by the magnetometer processor used	
Sensor Head	Diameter: 63 mm (2.5") Length: 160 mm (6.3") Weight: 1.15 kg (2.6 lb)	
Sensor Electronics	Diameter: 63 mm (2.5") Length: 350 mm (13.8") Weight: 1.5 kg (3.3 lb)	
Cable, Sensor to Sensor Electronics	3m (9' 8''), lengths up to $5m (16' 4'')$ available	
<b>Operating Temperature</b>	-40°C to +50°C	
Humidity	Up to 100%, splash proof	
Supply Power	24 to 35 Volts DC	
Supply Current	Approx. 1.5A at start up, decreasing to 0.5A at 20°C	
Power Up Time	Less than 15 minutes at -30°C	



Number of Axes	3
Bandwidth	0 to 3kHz at 50µT peak
Internal Noise: Basic version Standard version Low Noise version	>10 to 20pTrms/√Hz at 1Hz 6 to ≤10pTrms/√Hz at 1Hz <6pTrms/√Hz at 1Hz
Scaling error (DC)	<±0.5%
Orthogonality error	<0.1°
Alignment error (Z axis to reference face)	<0.1°
Linearity error	<0.0015%
Frequency response	0 to 1kHz maximally flat, ±5% maximum at 1kHz
Input voltage	$\pm 12V$ to $\pm 17V$
Supply current	+30mA, -10mA (+1.4mA per 100 $\mu$ T for each axis)
Power supply rejection ratio	5µV/V (-106dB)
Analog output	±10V (±12V supply) swings to within 0.5V of supply voltage
Output impedance	10 Ω
<b>Operating temperature range</b>	-40°C to +70°C
<b>Environmental protection</b>	IP51
Dimensions (W x H x L)	32 x 32 x 152mm
Weight	160g
Enclosure material	Reinforced epoxy
Connector	ITT Cannon DEM-9P-NMB
Mating connector	ITT Cannon DEM-9S-NMB
Mounting	2 x M5 fixing holes

## Bartington Mag-03 three-axis fluxgate magnetic field sensor



Crystal volume	16.8 litres of NaI (T1) synthetic downward looking crystals and 4.2 litres of NaI (T1) synthetic upward looking crystals
Resolution	256/512 channels
Tuning	Automatic using peak determination algorithm
Detector	Digital Peak
Calibration	Fully automated detector
Real Time	Linearization and gain stabilization
Communication	RS232
Detectors	Expandable to 10 detectors and digital peak
Count Rate	Up to 60,000 cps per detector
Count Capacity per channel	65545
Energy detection range:	36 KeV to 3 MeV
Cosmic channel	Above 3 MeV
Upward Shielding	RayShield <sup>®</sup> non-radioactive shielding on downward looking crystals
Downward Shielding	6 mm thick lead plate is used for downward-shielding
Spectra	Collected spectra of 256/512 channels, internal spectrum resolution 1024
Software	Calibration: High voltage adjustment, linearity correction coefficients calculation, and communication test support Real Time Data Collection: Automatic Gain real time control on natural isotopes, and PC based test and calibration software suite
Sensor	Each box containing two (2) gamma detection NaI(Tl) crystals – each 4.2 liters. (256 cu in.) (approx. 100 x 100 x 650 mm) Total volume of approx 8.4 litres or 512 cu in with detector electronics
Spectra Stabilization	Real time automatic corrections on radio nuclei: Th, Ur, K. No implanted sources.

#### Pico Envirotec GRS-10 Gamma Spectrometer



#### Pico Envirotec AGIS data recorder system

(for Navigation, Gamma spectrometer, VLF-EM and Magnetometer Data Acquisition)		
Functions	Airborne Geophysical Information System (AGIS) with integrated Global Positioning System Receiver (GPS) and all necessary navigation guidance software. Inputs for geophysical sensors - portable gamma ray spectrometer GRS-10, MMS4 Magnetometer, Totem 2A EM, A/D converter, temperature probe, humidity probe, barometric pressure probe, and laser altimeter. Output for the 2 line Pilot Indicator	
Display	Touch screen with display of 800 x 600 pixels; customized keypad and operator keyboard. Multi-screen options for real-time viewing of all data inputs, fiducial points, flight line tracking, and GPS channels by operator.	
GPS Navigation	Garmin 12-channel, WAAS-enabled	
Data Sampling	Sensor dependent	
Data Synchronization	Synchronized to GPS position	
Data File	PEI Binary data format	
Storage	80 GB	
Supplied Software	PEIView: Allows fast data Quality Control (QC) Data Format: Geosoft GBN and ASCII output PEIConv: For survey preparation and survey plot after data acquisition	
Software	Calibration: High voltage adjustment, linearity correction coefficients calculation, and communication test support Real Time Data Collection: Automatic Gain real time control on natural isotopes and PC based test and	
	calibration software suite	
Power Requirements	calibration software suite 24 to 32 VDC	



# Appendix B

Digital File Descriptions

- Magnetic database description
- Radiometric database description
- Grids
- Maps



# Magnetic Database:

Abbreviations used in the GDB files listed below:

Channel	Units	Description
X_WGS84	m	UTM Easting – WGS 84 Zone 9 North
Y_WGS84	m	UTM Northing – WGS 84 Zone 9 North
Lon_deg	deg	Longitude
Lat_deg	deg	Latitude
Date	yyyy/mm/dd	Dates of the survey flight(s)
FLT		Flight Line numbers
STL		Number of satellite(s)
LineNo		Line numbers
GPSfix		GPS fix
GPStime	Hours:min:secs	GPS time (UTC)
Galt	m	GPS height – WGS 84 Zone 9 North
Lalt	m	Laser Altimeter readings
DTM	m	Digital Terrain Model
basemag	nT	Base station diurnal data
IGRF		International Geomagnetic Reference Field 2010
Declin		Calculated declination of magnetic field
Inclin		Calculated inclination of magnetic field
TMI	nT	Total Magnetic Intensity
RMI	nT	Residual Magnetic Intensity



# Radiometric Database:

Abbreviations used in the GDB files listed below:

Channel	Units	Description
X_WGS84	m	UTM Easting – WGS 84 Zone 9 North
Y_WGS84	m	UTM Northing – WGS 84 Zone 9 North
Lon_deg	deg	Longitude
Lat_deg	deg	Latitude
Date	yyyy/mm/dd	Dates of the survey flight(s)
FLT		Flight numbers
STL		Number of satellite(s)
LineNo		Line numbers
GPStime	Hours:min:sec s	GPS time (UTC)
Geos_m	m	Geoidal separation
GPSFix		GPS fix
Galt	m	GPS height – WGS 84 Zone 9 North
Lalt	m	Laser Altimeter readings
DTM	m	Digital Terrain Model
BaroSTP_Kp	KiloPascal	Barometric Altitude (Press and Temp Corrected)
Temp_degC	Degrees C	Air Temperature
Press_kP	KiloPascal	Atmospheric Pressure
COSFILT	counts/sec	Spectrometer - Filtered Cosmic
UPUFILT	counts/sec	Spectrometer - Filtered Upward Uranium
Kcor	%	Equivalent Concentration - Potassium
THcor	ppm	Equivalent Concentration - Thorium
Ucor	ppm	Equivalent Concentration - Uranium
TCcor	μR	Equivalent Dose Rate
ТСехр	µR/hour	Exposure Rate - SUM(%k, eU, eTh) * determined factors
THKratio		Spectrometer – eTh/%K ratio
UKratio		Spectrometer – eU/%K ratio
UTHratio		Spectrometer – eU/eTh ratio



# Grids: Grizzly Survey Block, WGS 84 Datum, Zone 9N

FILE NAME	DESCRIPTION
Grizzly_OverviewMap_DTM.grd	Grizzly survey block digital terrain model gridded at 50 m cell size
Garibaldi_Grizzly_SurveyBlock_TMI_5 0m.grd	Grizzly survey block total magnetic intensity gridded at 50 m cell size
Garibaldi_Grizzly_SurveyBlock_RMI_5 0m.grd	Grizzly survey block residual magnetic intensity gridded at 50 m cell size
Garibaldi_Grizzly_SurveyBlock_CVG_5 0m.grd	Grizzly survey block calculated vertical gradient gridded at 50 m cell size
Grizzly_RadiometricMap_Kcor.grd	Grizzly survey block potassium (Kcor) percentage gridded at 50 m cell size
Grizzly_RadiometricMap_THcor.grd	Grizzly survey block Thorium (Thcor) equivalent concentration gridded at 50 m cell size
Grizzly_RadiometricMap_Ucor.grd	Grizzly survey block Uranium (Ucor) equivalent concentration gridded at 50 m cell size
Grizzly_RadiometricMap_TCcor.grd	Grizzly survey block Total Count (TCcor) equivalent dose rate gridded at 50 m cell size
Grizzly_RadiometricMap_TCexp.grd	Grizzly survey block Total Count (TCexp) exposure rate gridded at 50 m cell size
Grizzly_RadiometricMap_THKratio.grd	Grizzly survey block thorium over potassium ratio (eTh/%K) gridded at 50 m cell size
Grizzly_RadiometricMap_UKratio.grd	Grizzly survey block uranium over potassium ratio (eU/%K) gridded at 50 m cell size
Grizzly_RadiometricMap_UTHratio.grd	Grizzly survey block uranium over thorium ratio (eU/eTh) gridded at 50 m cell size



<u>Grids:</u> Merged Fugro 2006 and Grizzly Survey Block, WGS 84 Datum, Zone 9N

FILE NAME	DESCRIPTION
Fugro2006_and_Grizzly2013_DTM_50m.grd	Merged Fugro 2006 and Grizzly survey block digital terrain model gridded at 50 m cell size
Fugro2006_and_Grizzly2013_TMI_50m.grd	Merged Fugro 2006 and Grizzly survey block total magnetic intensity gridded at 50 m cell size
Fugro2006_and_Grizzly2013_RMI_50mv	Merged Fugro 2006 and Grizzly survey block residual magnetic intensity gridded at 50 m cell size
Fugro2006_and_Grizzly2013_CVG_50m.grd	Merged Fugro 2006 and Grizzly survey block calculated vertical gradient gridded at 50 m cell size



Maps: Grizzly Survey Block, WGS 84 Datum, Zone 9N (jpegs and pdfs)

FILE NAME	DESCRIPTION
GaribaldiResources_GrizzlySurveyBloc k_OverviewMap_FlightLines	Grizzly survey block plotted actual flight lines
GaribaldiResources_GrizzlySurveyBloc k_OverviewMap_DigitalTerrainModel	Grizzly survey block digital terrain model
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block total magnetic
k_MagneticMap_TMI	intensity
GaribaldiResources_GrizzlySurveyBloc k_MagneticMap_TMI_wFL	Grizzly survey block total magnetic intensity with plotted actual flight path
GaribaldiResources_GrizzlySurveyBloc k_MagneticMap_RMI	Grizzly survey block residual magnetic intensity
GaribaldiResources_GrizzlySurveyBloc k_MagneticMap_CVG	Grizzly survey block calculated vertical gradient
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block potassium (Kcor)
k_RadiometricMap_K%	percentage
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block Thorium (Thcor)
k_RadiometricMap_eTH	equivalent concentration
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block Uranium (Ucor)
k_RadiometricMap_eU	equivalent concentration
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block Total Count (TCcor)
k_RadiometricMap_TCcor	equivalent dose rate
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block Total Count (TCexp)
k_RadiometricMap_TCexp	exposure rate
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block thorium over
k_RadiometricMap_eTH_%K_ratio	potassium ratio (eTh/%K)
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block uranium over
k_RadiometricMap_eU_%K_ratio	potassium ratio (eU/%K)
GaribaldiResources_GrizzlySurveyBloc k_RadiometricMap_eU_eTH_ratio	Grizzly survey block uranium over thorium ratio (eU/eTh)
GaribaldiResources_GrizzlySurveyBloc	Grizzly survey block displaying ratios of
k_RadiometricMap_TernaryMap	all three elements (%K, eTh, eU)



<u>Maps:</u> Merged Fugro 2006 and Grizzly Survey Block, WGS 84 Datum, Zone 9N (jpegs and pdfs)

FILE NAME	DESCRIPTION
GaribaldiResources_Fugro2006_Over viewMap_ActualFlightLines	Merged Fugro 2006 and Grizzly survey block plotted actual flight lines
GaribaldiResources_Fugro2006_Over viewMap_DTM	Merged Fugro 2006 and Grizzly survey block digital terrain model
GaribaldiResources_Fugro2006_Magn eticMap_TMI	Merged Fugro 2006 and Grizzly survey block total magnetic intensity
GaribaldiResources_Fugro2006_Magn eticMap_TMI_with_FlightLines	Merged Fugro 2006 and Grizzly survey block total magnetic intensity with plotted actual flight path
GaribaldiResources_Fugro2006_Magn eticMap_RMI	Merged Fugro 2006 and Grizzly survey block residual magnetic intensity
GaribaldiResources_Fugro2006_Magn eticMap_CVGjpg	Merged Fugro 2006 and Grizzly survey block calculated vertical gradient



# Appendix C

Grizzly survey block Maps

Survey Overview Maps (colour image with elevation contour lines):

- Flight Lines (FL)
- Digital Terrain Model (DTM)

Magnetic Maps (colour image with elevation contour lines):

- Total Magnetic Intensity (TMI)
- Total Magnetic Intensity (TMI\_wFL) with flight lines
- Residual Magnetic Intensity (RMI)
- Calculated Vertical Gradient (CVG)

Radiometric Maps (colour image with elevation contour lines):

- Potassium Equivalent Concentration (%K)
- Thorium Equivalent Concentration (eTh)
- Uranium Equivalent Concentration (eU)
- Total Count Equivalent Dose Rate (TCcor)
- Total Count Exposure Rate (TCexp)
- Thorium over Potassium Ratio Spectrometer eTh/%K ratio
- Uranium over Potassium Ratio Spectrometer eU/%K ratio
- Uranium over Thorium Ratio Spectrometer eU/eTh ratio
- Ternary (TM)





Map 1: Grizzly survey block actual flight lines.



Map 2: Grizzly survey block digital terrain model.





Map 3: Grizzly survey block total magnetic intensity.



Map 4: Grizzly survey block total magnetic intensity with plotted actual flight lines.





Map 5: Grizzly survey block residual magnetic intensity.



Map 6: Grizzly survey block calculated vertical gradient of the total magnetic intensity.





Map 7: Grizzly survey block potassium – (percentage) equivalent concentration.



Map 8: Grizzly survey block thorium - equivalent concentration.





Map 9: Grizzly survey block uranium – equivalent concentration.



Map 10: Grizzly survey block total count – equivalent dose rate.





Map 11: Grizzly survey block total count-exposure rate.



Map 12: Grizzly survey block thorium over potassium ratio.





Map 13: Grizzly survey block uranium over potassium ratio.



Map 14: Grizzly survey block uranium over thorium ratio.





Map 15: Grizzly survey block ternary map.



# Appendix D

Merged Fugro 2006 and Grizzly survey block Maps

Survey Overview Maps (colour image with elevation contour lines):

- Flight Lines (FL)
- Digital Terrain Model (DTM)

Magnetic Maps (colour image with elevation contour lines):

- Total Magnetic Intensity (TMI)
- Total Magnetic Intensity (TMI\_wFL) with flight lines
- Residual Magnetic Intensity (RMI)
- Calculated Vertical Gradient (CVG)




Map 16: Merged Fugro 2006 and Grizzly survey block actual flight lines.



Map 17: Merged Fugro 2006 Grizzly survey block digital terrain model.





Map 18: Merged Fugro 2006 and Grizzly survey block total magnetic intensity.



Map 19: Merged Fugro 2006 and Grizzly survey block total magnetic intensity with plotted actual flight lines.





Map 20: Merged Fugro 2006 and Grizzly survey block residual magnetic intensity.



Map 21: Merged Fugro 2006 and Grizzly survey block calculated vertical gradient.



## 14. SAMPLE METHOD AND APPROACH

The subject work program did not involve collection of field samples.

### 15. SAMPLE PREPARATION, ANALYSES AND SECURITY

The subject work program did not involve collection of field samples.

### 16. DATA VERIFICATION

The subject work program did not involve collection of field samples.

## **17.** ADJACENT PROPERTIES

Firesteel Resources' Copper Creek Property (currently optioned to Prosper Gold Corp.) adjoins the Grizzly Property on its western and southern boundaries. Reported Minfile Occurrences and areas of interest on both properties are shown in 4 of this report,

According to Firesteel Resources the Copper Creek Property covers a series of alkalic, porphyry copper-gold targets analogous to that which hosts the Galore Creek (measured and indicated resources are 785.7 million tonnes grading 0.52% copper ("Cu"), 0.29 grams per tonne ("g/t") gold ("Au") and 4.9 g/t silver ("Ag") plus 357.7 million tonnes of inferred resources at 0.36% Cu, 0.18 g/t Au and 3.7 g/t Ag) and Red Chris (measured and indicated resources are 446.1 million tonnes at 0.36% Cu and 0.29 g/t Au, plus inferred resources at 268.7 million tonnes grading 0.30% Cu and 0.27 g/t Au). Firesteel has invested approximately \$4 million to date in direct expenditures acquiring, exploring and evaluating this Property. Firesteel believes that this Property is one of the most highly prospective copper-gold alkalic porphyry targets in BC and warrants a significant exploration program to test its potential.

Exploration work on the Copper Creek Property has identified several significant targets all of which are accessible by existing trails from the Sheslay River airstrip located immediately north of the Copper Creek Property.

The Copper Creek target comprises a 530 by 940 meter Cu-in-soil anomaly (>350 ppm) with coincident gold values up to 230 ppb. An open-ended IP chargeability anomaly and magnetic anomaly is coincident with this Cu-in-soil anomaly. Six holes were drilled in this area prior to 1970. The best intersection graded 0.49% copper over 43.6 meters including a 1.37 meter intersection of 2.6% copper and 4 g/t gold. The geochemical and geophysical anomalies are open to the north, east and south.

The Dick Creek Target (DK) exhibits a 540 by 320 meter Cu-in-soil anomaly (>350 ppm) with coincident gold-in-soil values up to 200 ppb. This geochemical anomaly is coincident with an IP chargeability anomaly and a magnetic anomaly. Trench sampling of the "Upper Main Trench" produced 270 meters averaging 0.38% copper and 0.23 g/t gold.

The Dick Creek North Target exhibits a 700m by 500 m IP Chargeability anomaly that may be an extension of the Sevensma target and is open to the north. The eastern flank of this IP anomaly displays a very strong copper-in-soil anomaly with several values greater than 1.0% copper. A high-order magnetic anomaly also coincides with the copper geochemical anomaly.

The Sevensma (Dick Creek East) target is 960 meters long, open ended with Cu-in-soil values greater than 300 ppm and scattered gold-in-soil values up to 490 ppb. It is located on a magnetic and IP chargeability anomaly. No trenching or drilling has been done to test this target.

The Pyrrhotite Creek target lies within the eastern part of the property. Previous workers have outlined an altered and mineralized zone, which is 1800 meters long and 750 meters wide. Several extensive copper-in-soil geochemical anomalies occur on the flanks of a broad (1500 by 300 meter and open-ended) IP chargeability anomaly.

The road to Pyrrhotite Creek provides access to the numerous mineralized zones as well as large IP, magnetic and soil geochemical anomalies defined in this area. The largest of the mineralized zones is 1700 meters long and 800 meters wide. A composite chip sample from trenches in the main zone is reported by previous workers to have returned 0,48% copper over 157 meters. In 1972, a previous operator drilled 7 holes in this area – the most significant result of which was an intercept of 113 meters grading 0.35% copper.

A 1520.6-meter drilling program was carried out at the Dick Creek Prospect in 2004. This program was concentrated on the northern part of a monzonite intrusion where the encouraging trench results were obtained. Assay results indicate that the mineralized (and altered) zone is at least 270 meters long, 200 meters wide and 400 meters deep. The zone is completely open in every dimension. The upper 50 to 60 meter- thick supergene zone hosts abundant secondary copper minerals, which are commonly amenable to leaching.

During the spring of 2005, twelve drill holes totaling 1524 meters were drilled on the Dick Creek Zone (also referred to as the DK Zone). Eleven of the holes intersected significant (>0.3% Copper Equivalent) mineralization from the surface to the bottom of each hole. Nine of these holes intersected copper-gold mineralization throughout which assayed greater than 0.4% Cu equivalent. Eighteen trenches have traced the zone over a 400 meter by 400 meter area.

## 18. MINERAL PROCESSING AND METALLURGICAL TESTING

No mineral processing or metallurgical testing has been carried out on the Grizzly Property.

## **19. MINERAL RESOURCE AND RESERVE ESTIMATES**

No mineral resource or reserve estimates have been completed for the Grizzly Property.

### 20. OTHER RELEVENT INFORMATION

There is no other relevant technical information concerning the Grizzly Property.

### 21. CONCLUSIONS AND RECOMMENDATIONS

On September 12 and 13 2013 Precision Geosurveys completed a total of 339 line kilometers of airborne magnetic and radiometric surveys in the western part of thje Grizzley Property. Precision Geosurveys mobilized to the Grizzley Property from Dease Lake. Helicopter fuel was mobilized to the airstrip at Sheslay River. The total cost of the airborne survey was \$27,200.00. This exploration work was submitted for assessment credit on SOW No.5469247.

### 23. REFERENCES

### Publications

Barr D.A. and Lawrence, E.A., ARIS Assessment report No. 349. Report on Geological and geochemical Surveys for the Kid 1-12 claims for Kennco Explorations Limited dated May 9, 1961

Gutrath, G.C. and Darney, R.J., ARIS Assessment report No. 3514. Report on the Geology and Geochemistry of the Kaketsa Mountain Area for Skyline Explorations Inc., January, 1972

Gutrath, G.C. and Darney, R.J., ARIS Assessment report No. 3515. Report on the Geology and Geochemistry of the Pyrrhotite Creek Project for Skyline Explorations Inc., November, 1971

Johnson, D., ARIS Assessment report No. 5231, Report on Diamond Drilling, Grizzly Claims, for Brascan Resources and Ducanex Resources Ltd., October 14, 1974

Johnson, D., ARIS Assessment report No. 19805, Geochemical Report on the Shell 1-4 Claim Group for Corona Corp, March 9, 1990

Jones, P., ARIS Assessment report No. 18421, Prospecting Report on the Shell 1-4 Claim Group for Corona Corp, January, 1989

Pezzot, T., Unpublished Memorandum on the Exploration Potential of the Grizzly Property based on an Interpretation of 2006 Fugro Airborne Magnetic Survey data, dated March 23, 2009

Pezzot, T., Unpublished Memorandum on the 3D IP Test Survey Results for the Grizzly Property, dated April 3, 2009

Travis, A., Keewatin Consultants, ARIS Assessment Report No. 27,435: Geochemical and Geohysical Report on the Copper Creek Property for Firesteel Resources Ltd., dated March 31, 2004

Unpublished Memorandum Concerning Technical Summary of the Copper Creek Property provided by Firesteel resources in March 2009.

Internet Sites

Note: all data from BC Ministry of Mines downloaded from: http://www.em.gov.bc.ca/Mining/Geolsurv/MapPlace/geoData.htm

## 24. DATE AND CERTIFICATE OF AUTHOR

I, Carl von Einsiedel, 8888 Shook Rd., Mission, British Columbia, V2V-7N1, hereby certify that:

- 1) I am an independent consulting geologist with an office at 8888 Shook road, Mission, BC, V2V-7N1.
- 2) I am a graduate of Carleton University in Ottawa, Ontario, Canada in 1987 with a BSc. in Geology. This certificate applies to the "Technical Assessment Report on the Grizzly Property" north western British Columbia dated December 30, 2013 prepared for Garibaldi Resources Corp.
  - 3) I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia. I have practiced my profession as a geologist throughout the world continuously since 1987.
  - 4) I have worked as an exploration geologist for a total of 25 years since graduation from University. I have extensive work experience in western and northern Canada and in Mexico . I have worked on several copper - gold projects in north western British Columbia. I visited the Grizzly Property in 2007, 2008 and again in September 2010.
  - 5) I have read the definition of "qualified person" set out in National Instrument 43-101 and certify that by reason of education, experience, independence and affiliation with a professional association, I meet the requirements of a non-Independent Qualified Person as defined in National Policy 43-101.
  - 6) I am responsible for the preparation of all sections of the technical report titled "Technical Assessment Report for the Grizzly Property, north western British Columbia dated December 30, 2013.
  - 7) I have had extensive prior involvement with the Property that is the subject of this report.
  - 8) I am not aware of any material fact or material change with respect to the subject matter of the technical report that is not reflected in the Technical Report.
  - 9) As of the date of this certificate, to my the best of my qualified knowledge, information and belief, this technical report contains all the scientific and technical information that is required to be disclosed to make the report not misleading.

Dated at Vancouver, B.C. this 30th day of December, 2013

### Carl von Einsiedel

Carl von Einsiedel, P.Geo.











Central Meridian: 231 Zone 9N Datum: WGS 84



Survey Dates: Survey Base: Helicopter Type Registration: Survey Technology

#### SURVEY PARAMETERS

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

#### Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: Tie Line Direction:

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer 16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals Sample Rate:



Grizzly Survey Block Actual Flight Lines Created By: Precision GeoSurveys Inc. September 25, 2013

Precision GeoSurveys Inc.



Projection: Universal Transverse Mercator



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

1 HZ

# Garibaldi Resources Corp. **Overview Map**

FL



1000





#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Survey Dates:

Survey Base:

Registration:

Helicopter: Magnetometer

Spectrometer:

Survey Line Spacing:

Survey Line Direction Tie Line Spacing:

**Tie Line Direction** 

Helicopter Type

Survey Technology SURVEY PARAMETERS

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer 16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals Sample Rate:



1000 2000 3000 4000 (meters) WGS 84 / UTM zone 9N

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N Datum: WGS 84

LEGEND Map Projection



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

1 HZ

## Garibaldi Resources Corp. **Overview Map**

DTM

Grizzly Survey Block Digital Terrain Model Created By: Precision GeoSurveys Inc. September 25, 2013



WGS 84 / UTM zone 9N



Map Projection:
Projection: Universa
Central Meridian: 2
Datum: WGS 84
1
Survey Dates:
Survey Base:
Helicopter Type:
Registration:
Survey Technology:
SURVEY PARAMETE
Helicopter:
Magnetometer:
Spectrometer:
Actual Mean Terrai
Grizzly Survey Block

Actual Mean Terrain Clearance: Grizzly Survey Block (Garibaldi Resources Corp.): Survey Line Spacing:

Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



LEGEND

Central Meridian: 231 Zone 9N Datum: WGS 84

ojection: Universal Transverse Mercator



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensatio 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

## Garibaldi Resources Corp. **Magnetic Map**

TMI

Grizzly Survey Block Total Magnetic Intensity Created By: Precision GeoSurveys Inc. September 20, 2013





LEGEND
Map Projection:
Projection: Universa
Central Meridian: 23
Datum: WGS 84
X
-
Survey Dates:
Survey Base:
Helicopter Type:
Registration:
Survey Technology:
SURVEY PARAMETE
Helicopter:
Magnetometer:
Spectrometer:
Actual Mean Terrain

#### Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



al Meridian: 231 Zone 9N m: WGS 84

tion: Universal Transverse Mercator



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

Mean Terrain Clearance:

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

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43 meters

Stinger with 3 axis compe 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

Precision

## Garibaldi Resources Corp. **Magnetic Map**

Grizzly Survey Block Total Magnetic Intensity with Actual Flight Lines Created By: Precision GeoSurveys Inc. September 27, 2013

GeoSurveys Inc.

TMI\_wFL



WGS 84 / UTM zone 9N



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		2
		1

Survey Dates: Survey Base: Helicopter Type Registration: Survey Technology

### SURVEY PARAMETER

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

### Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



Grizzly Survey Block Residual Magnetic Intensity Created By: Precision GeoSurveys Inc. September 20, 2013

Precision GeoSurveys Inc.

sal Transverse Mercator 231 Zone 9N



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensatio 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

## Garibaldi Resources Corp. **Magnetic Map**

RMI



(meters) WGS 84 / UTM zone 9N

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0.29	
0.20	
0.11	
0.02	
-0.06	-
-0.15	
-0.24	
-0.32	
-0.50	
-0.61	
-0.71	
-0.83	
-0.94	
-1.07	
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-1.73	
-1.95	
-2.22	
-2.60	
-3.10	
-3.84	
-5.12	
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Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: Tie Line Direction:

Survey Dates:

Survey Base:

Registration:

Helicopter:

Magnetometer

Spectrometer:

Helicopter Type:

Survey Technology SURVEY PARAMETERS

### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer 16.8 litres of Nal(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals Sample Rate:



Grizzly Survey Block Calculated Vertical Gradient Created By: Precision GeoSurveys Inc. September 20, 2013

Precision GeoSurveys Inc.

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N Datum: WGS 84



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

Actual Mean Terrain Clearance:

200 meters 090°-270° 2000 meters 000°-180°

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43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

1 HZ

# Garibaldi Resources Corp. **Magnetic Map**

CVG





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Projection:	Universal
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Survey Dates: Survey Base: Helicopter Type Registration: Survey Technology

SURVEY PARAMETER

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



LEGEND

ransverse Mercator Zone 9N



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**

Grizzly Survey Block Potassium - Equivalent Concentration (%) Created By: Precision GeoSurveys Inc. September 25, 2013









Survey Base: Helicopter Type Registration: Survey Technology

SURVEY PARAMETERS

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



LEGEND

Map Projection

Central Meridian: 231 Zone 9N



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**

Grizzly Survey Block Thorium - Equivalent Concentration Created By: Precision GeoSurveys Inc. September 25, 2013









Helicopter Type Registration: Survey Technology

#### SURVEY PARAMETERS

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

#### Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer 16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals Sample Rate:



Grizzly Survey Block Uranium - Equivalent Concentration Created By: Precision GeoSurveys Inc. September 25, 2013



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**





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12.95 12.73 12.49 12.25 12.01 11.74 11.47 11.22 10.94 10.65 10.34 9.97 9.48 8.87 8.04 6.95 <b>TCcor (</b>	

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10
16
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Survey Dates:
Survey Base:
Unlighter Tor
Hencopter Typ

Registration Survey Technology:

### SURVEY PARAMETERS

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

#### Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: Tie Line Direction:

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



Map Projection

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N Datum: WGS 84



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**

TCcor

Grizzly Survey Block Total Count - Equivalent Dose Rate Created By: Precision GeoSurveys Inc. September 25, 2013







Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



Grizzly Survey Block Total Count - Exposure Rate Created By: Precision GeoSurveys Inc. September 25, 2013

Map Projection

LEGEND

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**



TCexp







Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



Grizzly Survey Block Thorium over Potassium Ratio Created By: Precision GeoSurveys Inc. September 25, 2013

LEGEND

Survey Dates:

Survey Base:

Registration:

Helicopter:

Magnetometer

Spectrometer:

Survey Line Spacing:

Survey Line Direction

AIRBORNE SYSTEMS:

Configuration

Sample Rate:

Sensitivity:

Tie Line Spacing:

**Tie Line Direction** 

Helicopter Type

Survey Technology

SURVEY PARAMETERS

Map Projection

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N Datum: WGS 84



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Scintrex CS-3 Magnetometer Senso

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

## Garibaldi Resources Corp. **Radiometric Map**



eTh/%K



LEGEND

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N Datum: WGS 84



Survey Dates: Survey Base: Helicopter Type Registration: Survey Technology

SURVEY PARAMETERS

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer Sample Rate:



Grizzly Survey Block Uranium over Potassium Ratio Created By: Precision GeoSurveys Inc. September 25, 2013







September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**



eU/%K







Survey Dates: Survey Base: Helicopter Type Registration: Survey Technology

SURVEY PARAMETERS

Helicopter: Magnetometer Spectrometer: Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

Survey Line Spacing: Survey Line Direction Tie Line Spacing: **Tie Line Direction** 

#### AIRBORNE SYSTEMS:

Scintrex CS-3 Magnetometer Senso

Configuration Sample Rate: Sensitivity:

Gamma Ray Spectrometer

Pico Envirotec GRS-10 Gamma Spectrometer and 4.2 litres of Nal (T1) synthetic "upward looking" crystals Sample Rate:



Grizzly Survey Block Uranium over Thorium Ratio Created By: Precision GeoSurveys Inc. September 25, 2013



September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Stinger with 3 axis compensation 10 Hz 0.01 nT

16.8 litres of NaI(T1) synthetic "downward looking" crystals.

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**



eU/eTh

Survey Dates:

Survey Base:

Registration:

Helicopter:

Magnetometer

Spectrometer:

Survey Line Spacing:

Survey Line Direction

AIRBORNE SYSTEMS:

Gamma Ray Spectrometer

Configuration

Sample Rate:

Sample Rate:

Sensitivity:

Tie Line Spacing:

Tie Line Direction:

Helicopter Type

Survey Technology SURVEY PARAMETERS

LEGEND

Projection: Universal Transverse Mercator Central Meridian: 231 Zone 9N Datum: WGS 84





September 12, 2013 to September 13, 2013 Sheslay Airstrip, BC Eurocopter AS350 C-GOHK Magnetic and Radiometric survey.

Actual Mean Terrain Clearance:

Grizzly Survey Block (Garibaldi Resources Corp.):

200 meters 090°-270° 2000 meters 000°-180°

40 meters

40 meters

40 meters

43 meters

Scintrex CS-3 Magnetometer Senso

Stinger with 3 axis compensation 10 Hz 0.01 nT

Pico Envirotec GRS-10 Gamma Spectrometer 16.8 litres of NaI(T1) synthetic "downward looking" crystals. and 4.2 litres of Nal (T1) synthetic "upward looking" crystals

1 HZ

# Garibaldi Resources Corp. **Radiometric Map**

TM

Grizzly Survey Block Ternary Map Created By: Precision GeoSurveys Inc. September 25, 2013