# Memorandum Report of Exploration Work 2018
# Jaycee Tin Property

**JC 1 to JC 54 (YF59611 to YF59664)**
**JC 55 to JC 101 (YD117245 to YD117291)**

**in the**

**Watson Lake Mining District, Yukon**

**NTS Sheet 105B04**
**60°12' N. Lat., 131°44' W. Long.**

**Operator**

**Jaycee Prospecting Syndicate (100%)**

**by**

**Mark Fekete, P.Geo. and Marty Huber, P.Geo.**

**November 1, 2018**



BREAKAWAY EXPLORATION MANAGEMENT INC.

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## Certificate of Qualifications

I, Mark Fekete, having my place of residence at 178 Dennison Boulevard in Val d'Or in the Province of Quebec do hereby certify that:

1. I obtained a Bachelor of Science Degree in Geology from the University of British Columbia (1986), I have been engaged as a Geologist continuously since 1986, I am a Member in good standing of the Order of Geologists of Quebec (OGQ #553) and the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC #31440), and I am a "qualified person" as defined in Section 1.2 in and for the purposes of National Instrument 43-101;

2. I have not visited the Jaycee Tin property;

3. I co-wrote this technical report entitled "Memorandum Report of Exploration Work 2018, Jaycee Tin Property, JC1 to JC54 (YF59611 to YF59664), JC55 to JC101 (YD117245 to YD117291), in the Watson Lake Mining District, Yukon, NTS Sheet 105B04, 60°12' N. Lat., 131°44' W. Long.," based on my professional experience, a review of relevant reports and maps made available to me from government and corporate sources and my participation in the work programs described in the report;

4. I am not aware of any material fact or material change with respect to the subject matter of the report that is not disclosed in the report which, by its omission, makes the report misleading;

5. I hold a direct interest in the Jaycee Tin property as a result of my current involvement with the Property; and

7. I have read, and this report has not been prepared for the purposes, nor in full compliance with, National Instrument 43-101 and according to Form 43-101F1.

Respectfully submitted this 1st day of November 2018,

***(s) "Mark Fekete"***

_____

Mark Fekete, P.Geo.

## Certificate of Qualifications

I, Marty Huber, having my place of residence at 16 Flax Mill Drive in Conestogo in the Province of Ontario do hereby certify that:

1. I obtained a Bachelor of Science Degree in Geology from Acadia University (2011) and a Master of Science Degree in Mineral Exploration from Laurentian University (2018), I have been engaged as a Geologist in continuously since May 2011, I am a Member in good standing of the Association of Professional Geoscientists of Nova Scotia (#232), and I am a "qualified person" as defined in Section 1.2 in and for the purposes of National Instrument 43-101;

2. I have not visited the Jaycee Tin property;

3. I co-wrote this technical report entitled "Memorandum Report of Exploration Work 2018, Jaycee Tin Property, JC1 to JC54 (YF59611 to YF59664), JC55 to JC101 (YD117245 to YD117291), in the Watson Lake Mining District, Yukon, NTS Sheet 105B04, 60°12' N. Lat., 131°44' W. Long.," based on my professional experience, a review of relevant reports and maps made available to me from government and corporate sources and my participation in the work programs described in the report;

4. I am not aware of any material fact or material change with respect to the subject matter of the report that is not disclosed in the report which, by its omission, makes the report misleading;

5. I hold a direct interest in the Jaycee Tin property as a result of my current involvement with the Property; and

7. I have read, and this report has not been prepared for the purposes, nor in full compliance with, National Instrument 43-101 and according to Form 43-101F1.

Respectfully submitted this 1st day of November 2018,

(s) "Marty Huber"

_____

Marty Huber, P.Geo.

## Introduction and Terms of Reference

This report describes work done in 2018 on the Jaycee Tin property (the "Property") and surrounding Crown land in the Teslin area of Yukon. It was prepared by Breakaway Exploration Management Inc. ("Breakaway") on behalf of the Jaycee Prospecting Syndicate (the "Syndicate"), an informal entity that includes Mark Fekete and Marty Huber (the "Authors"). The main purpose of the Report is to complete statutory assessment work filings required under the Yukon Quartz Mining Act. It is not intended to and does not fully comply with National Instrument 43-101. The work was done under Class I activity that did not require a Quartz Mining Land Use Permit. The work was partially funded by the Yukon Mineral Exploration Program Focused Regional module (YMEP No. 18-073), for which the Syndicate is extremely grateful.

The work included limited rock geochemistry on the Property, and an airborne geophysical survey flown over the Property and surrounding un-staked Crown land. The goal of the rock geochemistry was to confirm copper, silver and tin values previously reported on the Property. The goals of the airborne survey were to trace possible strike extensions of a 900m long skarn horizon that hosts the "JC Tin" deposit, and to determine if any of the other carbonate horizons mapped in the area are similarly magnetic thereby suggesting the potential for skarn development and similar copper, silver and tin mineralization.

## Location, Claim Information and Access

The Jaycee property is located approximately 60 kilometers east of Teslin in southern Yukon (Figure 1). The approximate center of the Property is described by, 60°12' N. Lat., 131°44' W. Long. and appears on NTS Sheet 105B04. The Property covers an approximate area of 2,111 hectares within the Watson Lake Mining Division and includes 101 un-surveyed mineral titles (Figure 2) more fully described in Table 1 below. The claims are recorded 100% to Mark Fekete, and held 100% by the Jaycee Prospecting Syndicate. The JC 55 to JC 101 claims were staked subsequent to the work described in this report. Accordingly assessment credits are being applied for only the JC 1 to JC 54 claims.

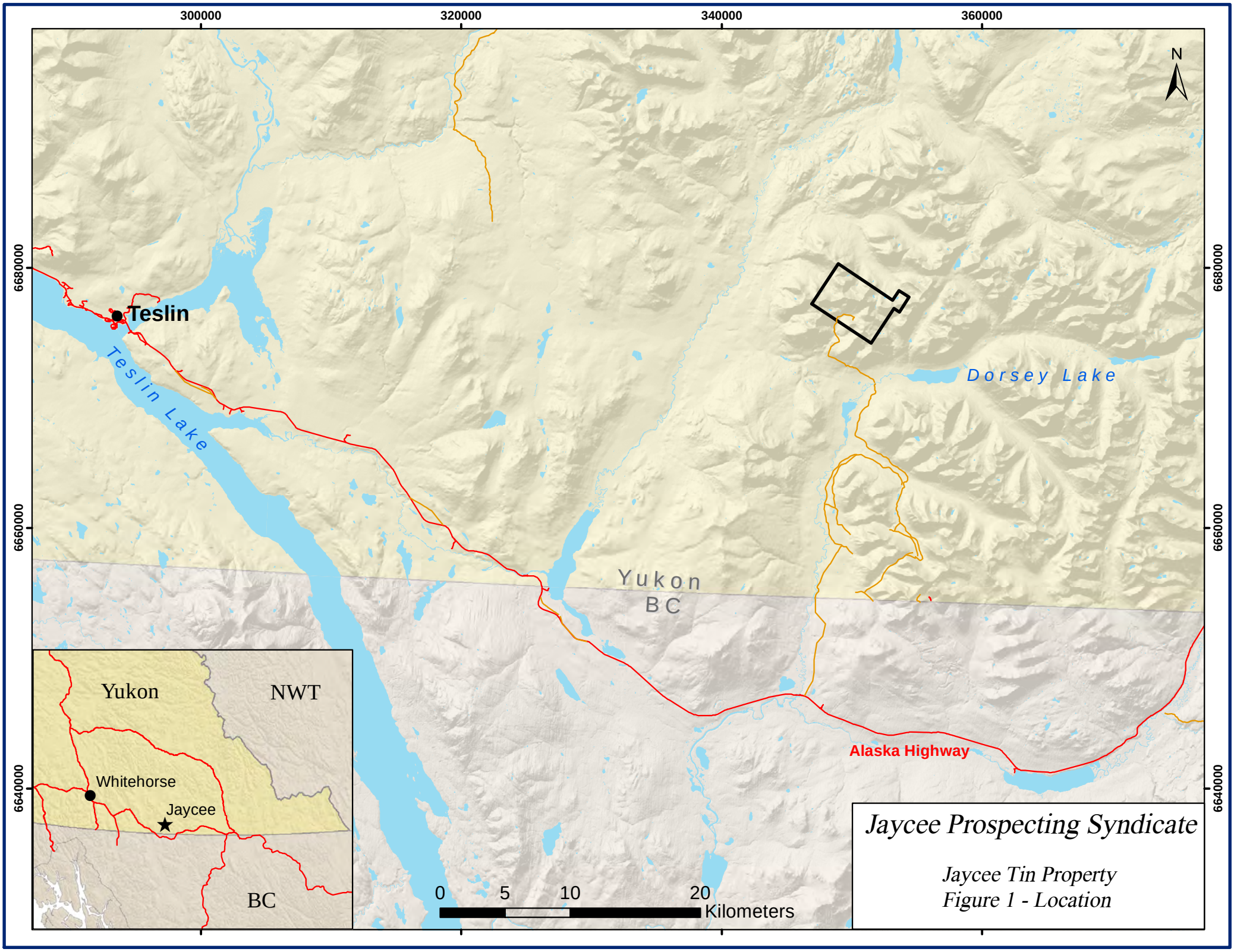
**Table 1 - List of Claims**

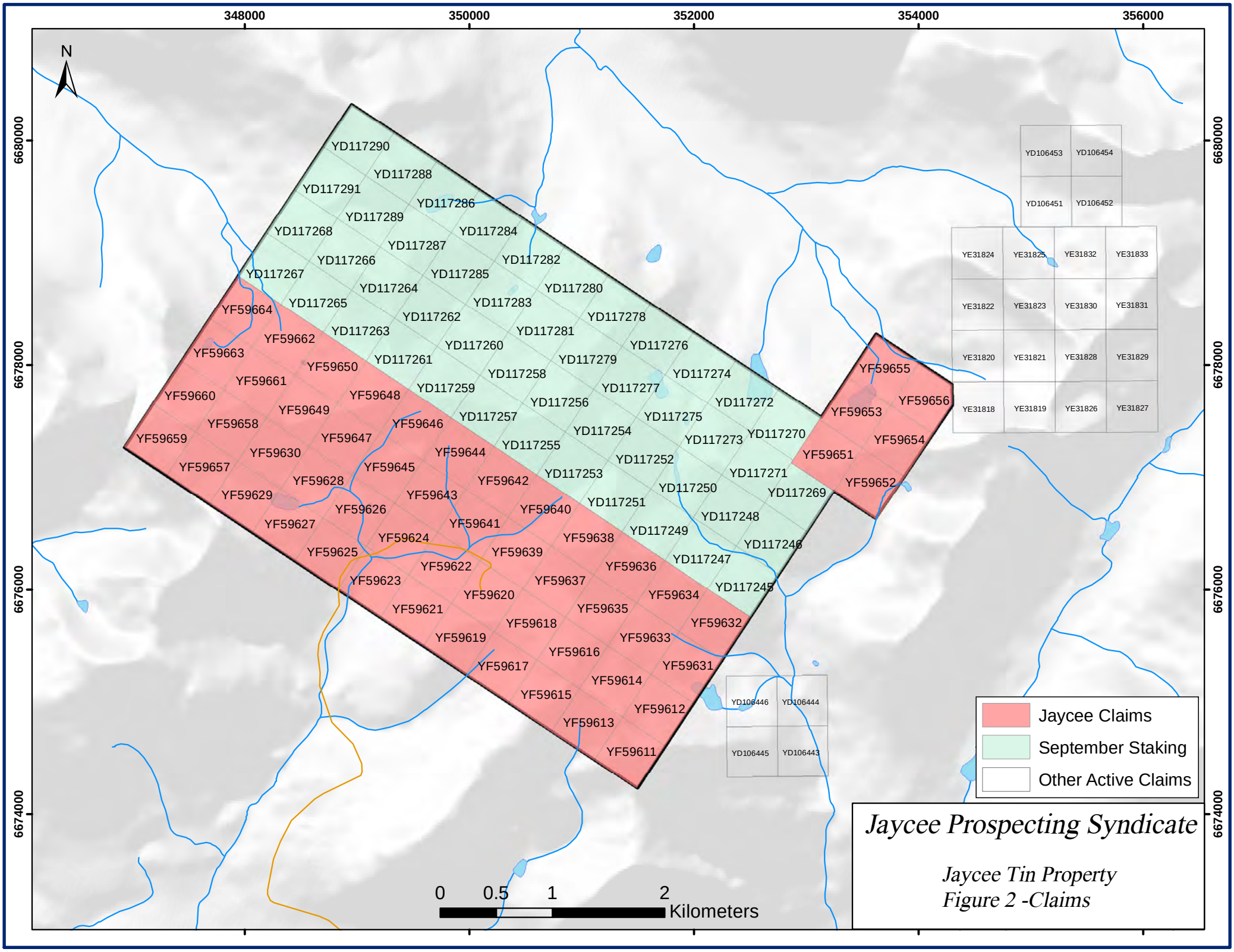
| Claim Name No. | Tag No. | Expiry Date | # |
|---|---|---|---|
| JC 1 to 54 | YF59611 to YF59664 | 2019-Feb-16 | 54 |
| JC 55 to 101 | YD117245 TO YD117291 | 2019-Sept-17 | 47 |

The Property lies 30km north of the Alaska Highway. From the highway there is an old Cat trail to the Property but the condition of this trail is uncertain. For the time being access is by helicopter from Teslin. There is an excellent spot for an exploration camp located between two small lakes at the centre of the Property. The City of Whitehorse, located 190km west-northwest of the Property, provides full services to the mineral exploration industry. Yukon is generally a mining friendly jurisdiction and there are no restrictions on exploration in the Teslin area.

## Exploration History

Previous work on the property is documented from 1967 to 2006 (Turna, 2006). From 1967 to 1974 Cypress Resources Ltd. carried out surface work and two shallow drill holes (50.3m). In 1977 the area was staked by the DC Syndicate ("DC") to cover a scheelite (tungsten) and malayaite (tin) skarn showing that returned up to 4.4% WO3 and 0.96% Sn in grab samples. In 1978 DC completed geological mapping, magnetic and soil geochemical surveys, as well as 18 hand trenches. A 900m skarn horizon with significant tin mineralization was outlined on surface. From 1979 to 1982, DC drilled 36 holes (4,117.6m) and outlined the "JC Tin" deposit approximately 750m along strike and varying from 23m to 38m thick. In 2006 Brett Resources cleaned out and sampled the old trenches over the JC zone and did a surface magnetic survey in an attempt to trace the zone to the southeast. Of the 54 samples collected, 16 returned tin values >0.50% Sn. One chip sample returned 4.04% Sn over 0.15m. The magnetic survey outlined two magnetic trends. The southernmost "Trend B" extends approximately 1,200m southeast from the JC zone and corresponds with the same host carbonate horizon. Several other mineral showings have been located on the Property (Figure 4).


300000
320000
340000
360000
6680000
6660000
6640000
N
Teslin
Teslin Lake
Dorsey Lake
Yukon
BC
Alaska Highway
Yukon
NWT
Whitehorse
Jaycee
BC
0
5
10
20
Kilometers
Jaycee Prospecting Syndicate
Jaycee Tin Property
Figure 1 - Location


348000
350000
352000
354000
356000
6680000
6678000
6676000
6674000
N
YD117290
YD117288
YD117291
YD117286
YD117289
YD117268
YD117284
YD117287
YD117266
YD117282
YD117267
YD117285
YD117264
YD117280
YD117265
YD117283
YF59664
YD117262
YD117278
YD117263
YD117281
YF59662
YD117260
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YD117261
YD117279
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YD117258
YD117274
YF59661
YD117259
YD117277
YF59660
YF59648
YD117256
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YD117257
YD117275
YF59658
YF59646
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YD117255
YD117273
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YD117271
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YF59639
YD117247
YF59622
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YF59637
YD117245
YF59620
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YE31821
YE31828
YE31829
YE31818
YE31819
YE31826
YE31827
YD106446
YD106444
YD106445
YD106443
0
0.5
1
2
Kilometers
Jaycee Claims
September Staking
Other Active Claims
Jaycee Prospecting Syndicate
Jaycee Tin Property
Figure 2 -Claims

## Geological Setting and Mineralization

Roots et al. (2004) indicate that the Jaycee property is located in an area regionally underlain by Lower Carboniferous and older Smart River Greenstone (DBb) intermediate to mafic, choritic meta-basalts and meta-tuffs, and Swift River Group (PSR) meta-sediments within the Yukon-Tanana Terrane of the Intermontane Tectonic Belt of the Canadian Cordillera (Figure 3). These rocks are overlain by Permian and older Klinkit Group meta-clastics (CPf), carbonates (CPc) and intermediate meta-volcaniclastics (CPv), and minor Lower to Middle Triassic shales, sandstones and conglomerates (TL) of the post terrane accretionary Overlap Assemblages. These stratigraphic groups are intruded by mid-Cretaceous age Seagull Suite (mKqS) granites and monzonites.

Locally on the Jaycee property, a thick sequence of quartzite (CPf) is intruded by a narrow, ridge like lobe of granite (mKqS) that is not exposed at surface. A 30 to 40m thick carbonate horizon (CPc) lies within the quartzite just above and in contact with the granite (Figure 4). The carbonate horizon strikes southeast and dips shallowly to the south. All the rocks are disrupted by northeast striking, sub-vertical faults.

Portions of the carbonate horizon have been altered to skarn and are tin-bearing. The skarn zone is traceable intermittently for 900m on surface. In drilling it varies from 20 to 38m thick. It is marked on surface by pale orange to dark red limonite staining. Green malachite staining has also been noted. The skarn shows zoning and has been variously described as pale green diopside to dark green diopside-magnetite-actinolite. Pervasive, fine-grained, garnet is disseminated throughout. Mineralization within the skarn includes lenses containing various amounts of magnetite, arsenopyrite and pyrite, with lesser amounts of pyrrhotite, chalcopyrite and sphalerite. The tin minerals cassiterite and malayaite have been identified in grab samples as well as the tungsten minerals scheelite and wolframite. The tin mineralization occurs mainly as fine-grained cassiterite associated with various sulphides within actinolite-bearing zones of the skarn.

## Drilling

Table 1 below sets out the known drill holes historically completed on the Jaycee property to date (Turna, 2006). The majority of the drill collars have been reliably located (Figure 5).

**Table 2 - Previous drill holes**

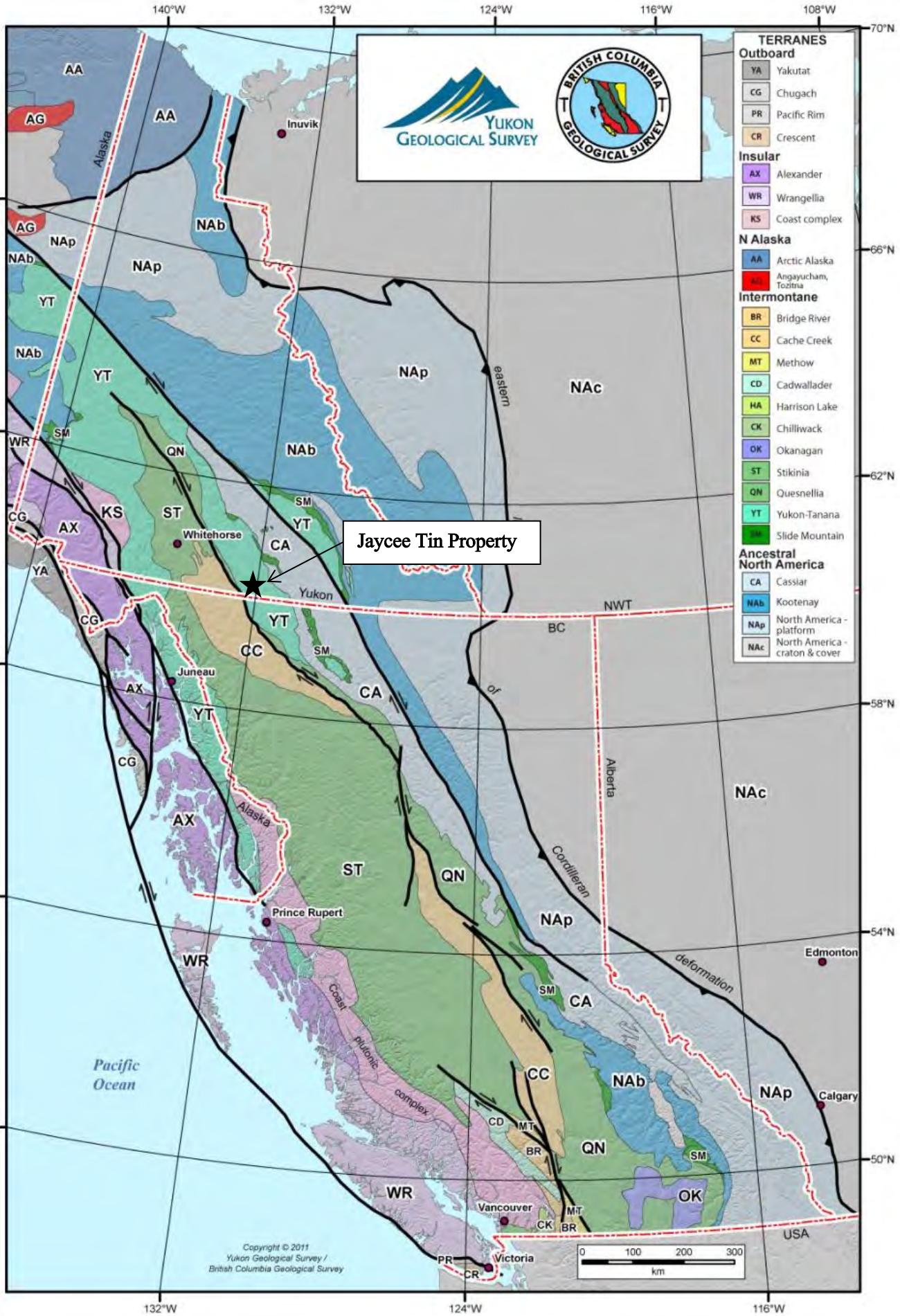
| Year | Company | # Holes | Metres | Zone | Collar located |
|---|---|---|---|---|---|
| 1974 | Cypress Res. Ltd. | 2 | 50.3 | Recce | No |
| 1981 | DC Syndicate | 1 | 145.4 | Recce | No |
| 1979 | DC Syndicate | 8 | 804.7 | JC | Yes |
| 1980 | DC Syndicate | 14 | 915.3 | JC | Yes |
| 1981 | DC Syndicate | 8 | 1,527.1 | JC | Yes |
| 1982 | DC Syndicate | 5 | 725.1 | JC | Yes |
| | Total | 38 | 4,167.9 | | |

## Mineral Resource Estimate

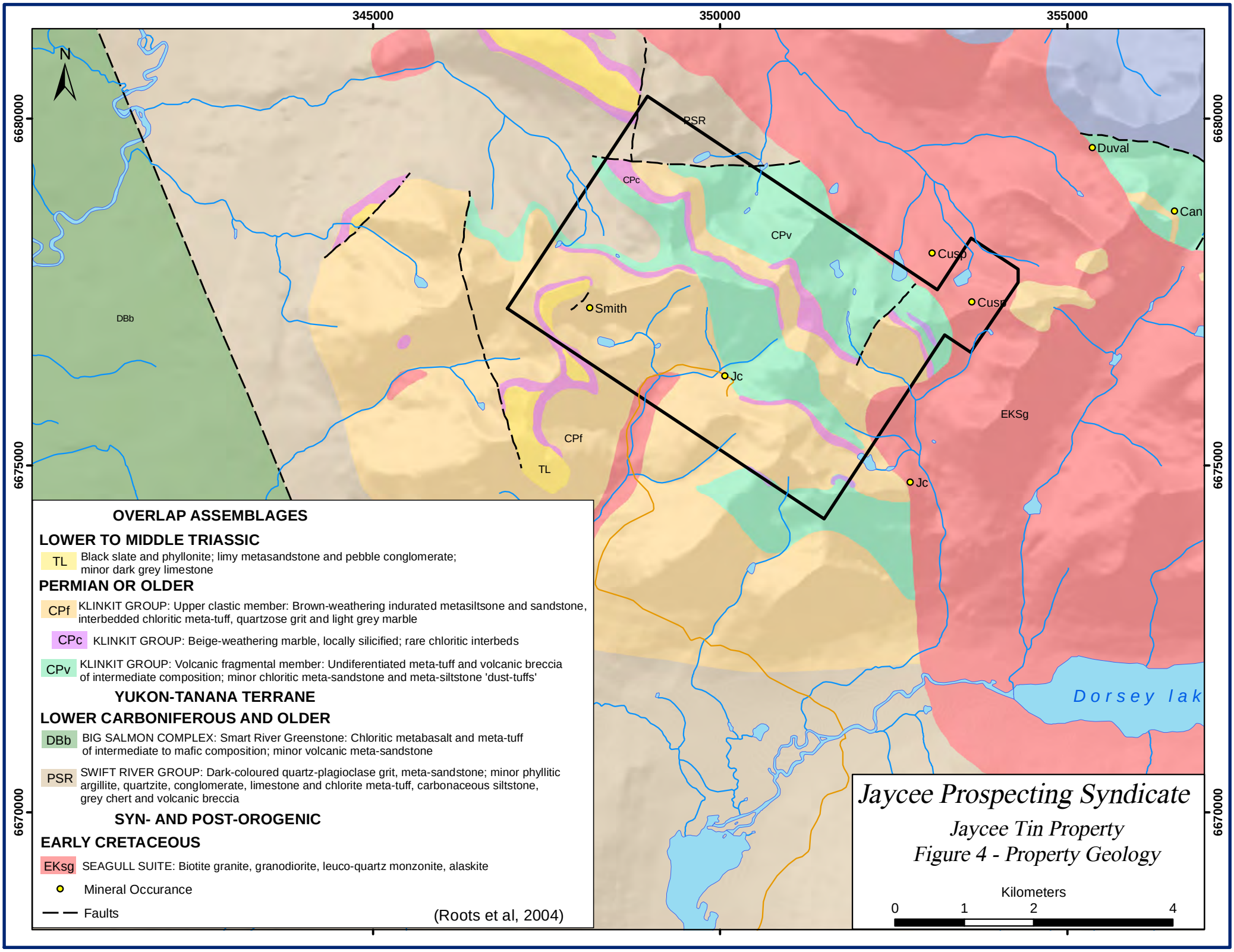
In 1981 a tin mineral resource based on 30 diamond drill holes (3247.1m) drilled from 1979 to 1981 was calculated at various cut-off grades as follows in Table 2 below (Layne, 1981). This historic estimate is not compliant with National Instrument 43-101 and should not be relied upon.

**Table 3 - JC Tin deposit, 1981 resource estimate**

| Metric Tonnes | Grade | Cut-off Grade |
|---|---|---|
| 4,489,000 | 0.28% Sn | 0.10% Sn |
| 2,001,500 | 0.41% Sn | 0.20% Sn |
| 1,250,000 | 0.54% Sn | 0.30% Sn |
| 1,957,500 | 0.45% Sn | not specified |




Jaycee Prospecting Syndicate
Jaycee Tin Property
Figure 3 – Regional Geology


345000
350000
355000
6680000
6675000
6670000
N
PSR
CPc
CPv
DBb
Smith
Jc
CPf
TL
Cusp
Cusp
Duval
Can
EKSg
Jc
Dorsey lak
OVERLAP ASSEMBLAGES
LOWER TO MIDDLE TRIASSIC
TL Black slate and phyllonite; limy metasandstone and pebble conglomerate; minor dark grey limestone
PERMIAN OR OLDER
CPf KLINKIT GROUP: Upper clastic member: Brown-weathering indurated metasiltsone and sandstone, interbedded chloritic meta-tuff, quartzose grit and light grey marble
CPc KLINKIT GROUP: Beige-weathering marble, locally silicified; rare chloritic interbeds
CPv KLINKIT GROUP: Volcanic fragmental member: Undiferentiated meta-tuff and volcanic breccia of intermediate composition; minor chloritic meta-sandstone and meta-siltstone 'dust-tuffs'
YUKON-TANANA TERRANE
LOWER CARBONIFEROUS AND OLDER
DBb BIG SALMON COMPLEX: Smart River Greenstone: Chloritic metabasalt and meta-tuff of intermediate to mafic composition; minor volcanic meta-sandstone
PSR SWIFT RIVER GROUP: Dark-coloured quartz-plagioclase grit, meta-sandstone; minor phyllitic argillite, quartzite, conglomerate, limestone and chlorite meta-tuff, carbonaceous siltstone, grey chert and volcanic breccia
SYN- AND POST-OROGENIC
EARLY CRETACEOUS
EKsg SEAGULL SUITE: Biotite granite, granodiorite, leuco-quartz monzonite, alaskite
Mineral Occurance
Faults
(Roots et al, 2004)
Jaycee Prospecting Syndicate
Jaycee Tin Property
Figure 4 - Property Geology
Kilometers
0
1
2
4

## Deposit Model

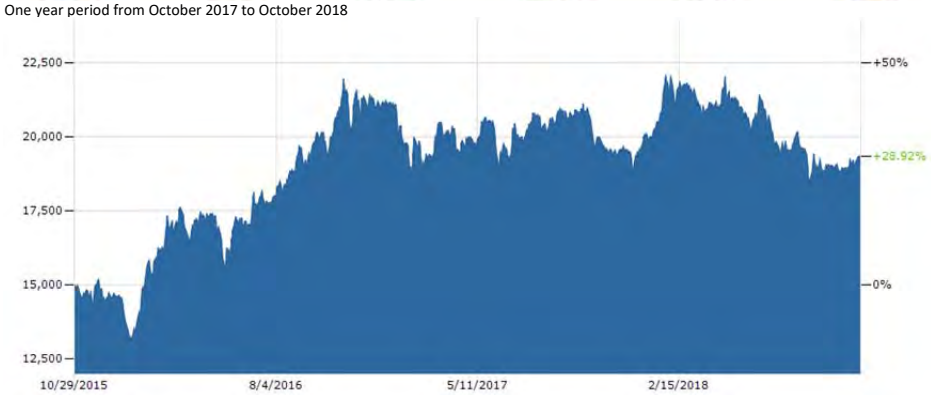
Sinclair (1996) classified the JC deposit as a vein-stockwork tin-tungsten deposit. Vein-stockwork tin-tungsten deposits are related to granitic intrusions and may occur as veins, sheeted veins, breccias and stockworks. The size of this type of deposit varies from very small (i.e. >10,000 tonnes) up to tens of millions of tonnes. Tin grades vary from 0.5 to 2.0% Sn and tungsten grades vary from 0.3 to 1.5% tungsten oxide. They may be tin only, tungsten only or contain both metals. Canadian tin-bearing examples of this type include East Kemptville, Nova Scotia (83.0Mt of 0.17% Sn plus copper and zinc), and Mount Pleasant, New Brunswick (5.1Mt of 0.79% Sn). Foreign deposits include Aberfoyle (1.6Mt of 0.84% Sn plus $WO_3$) and Ardlethan (9.0Mt of 0.50% Sn) in Australia, and Wheal Jane (5.0Mt of 1.2% Sn), South Crofty (3.9Mt of 1.6% Sn) and Geevor (5.0Mt of 0.65% Sn) in Cornwall, United Kingdom.

Layne and Spooner (1988a) suggested that the JC deposit is instead a tin-rich skarn deposit based on the fact that it is hosted in skarn-altered carbonate immediately adjacent to a granite intrusion. Tungsten skarns are very common in Yukon with several significant deposits including Mactung (32.0Mt at 0.92% $WO_3$) and Cantung (9.0Mt of 1.42% $WO_3$). Cantung, located 275km northeast of the Property, was mined as recently as 2015. Abbott (1981) noted that tungsten-bearing skarns in Yukon are associated with deeper level Cassiar Suite quartz monzonites whereas tin-bearing skarns are related to high level Seagull suite granites. Relative to vein-stockwork deposits, skarns are much larger and more amenable to bulk mining methods, and present a better exploration target.

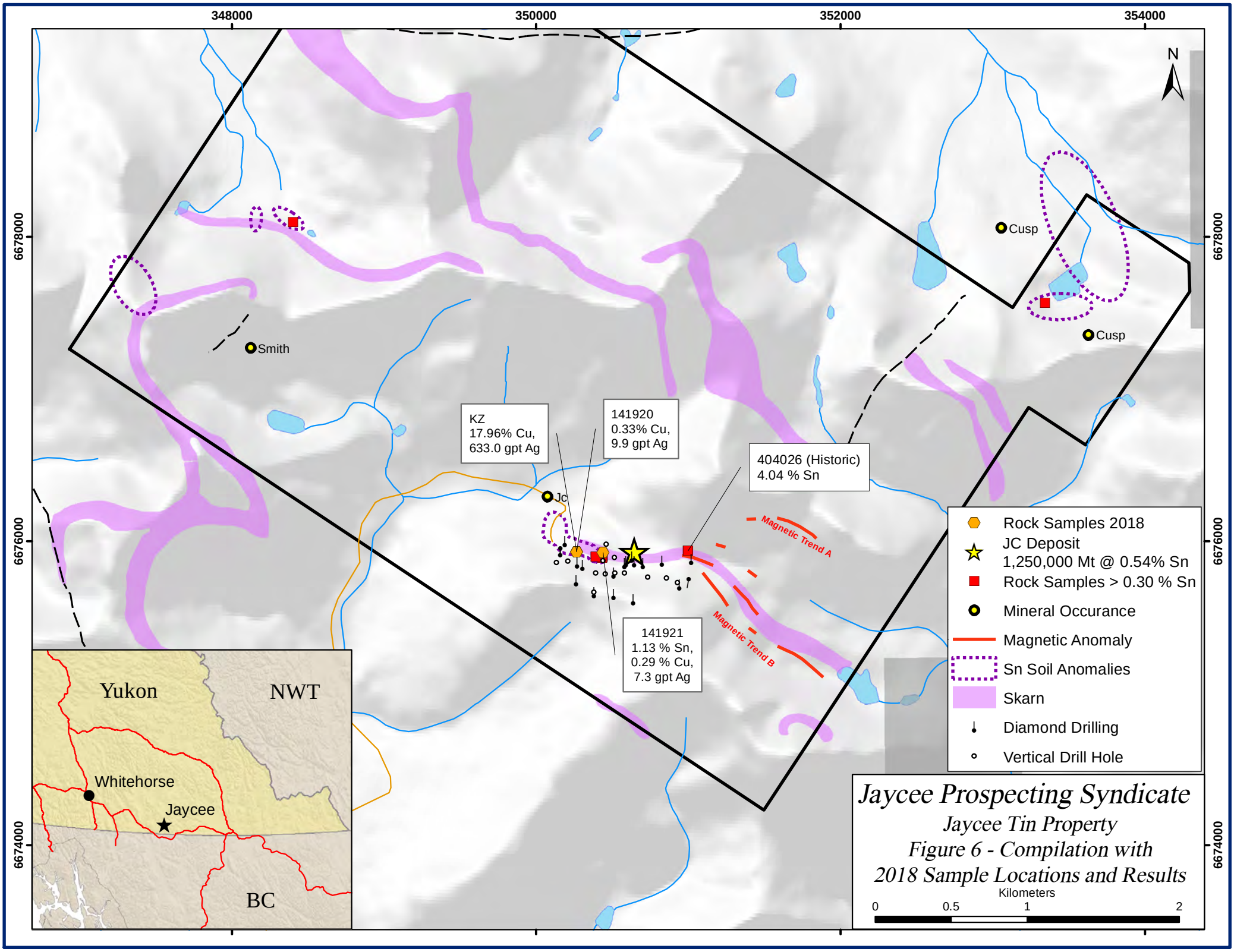
The spot price for tin is relatively strong at $US 19,325 per tonne as of October 29, 2018 (London Metal Exchange, 2018).

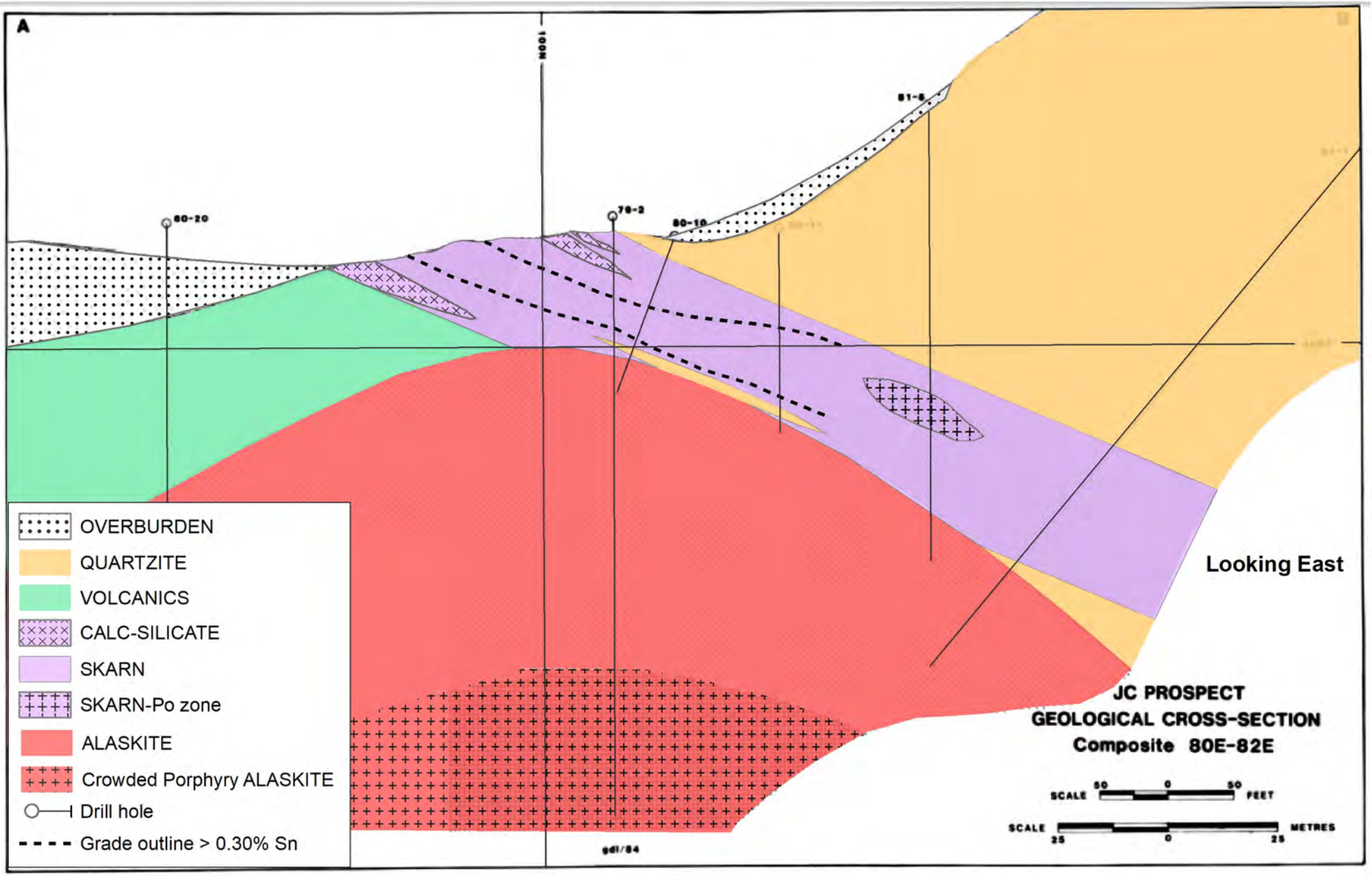
**Figure 5 - Tin Spot Price charts (LME) for 99.85% purity $US per tonne**

One year period from October 2017 to October 2018




Three year period from October 2015 to October 2018
Source: London Metal Exchange (2018)


348000
350000
352000
354000
6678000
6676000
6674000
N
Smith
Cusp
Cusp
JC
KZ
17.96% Cu,
633.0 gpt Ag
141920
0.33% Cu,
9.9 gpt Ag
404026 (Historic)
4.04 % Sn
141921
1.13 % Sn,
0.29 % Cu,
7.3 gpt Ag
Magnetic Trend A
Magnetic Trend B
Rock Samples 2018
JC Deposit
1,250,000 Mt @ 0.54% Sn
Rock Samples > 0.30 % Sn
Mineral Occurance
Magnetic Anomaly
Sn Soil Anomalies
Skarn
Diamond Drilling
Vertical Drill Hole
Yukon
NWT
Whitehorse
Jaycee
BC
Jaycee Prospecting Syndicate
Jaycee Tin Property
Figure 6 - Compilation with
2018 Sample Locations and Results
Kilometers
0
0.5
1
2




*Jaycee Prospecting Syndicate*
*Figure 7 - Jaycee Tin Deposit Cross Section*
*(Modified after Layne and Spooner 1988a)*

## 2018 Work

The work done in 2018 consisted of limited rock geochemical sampling, and a high resolution helicopter-borne aeromagnetic and radiometric survey.

A total of three rock samples were collected at on the Property during a site visit on July 16, 2018 by Yukon Geological Survey geologists Scott Casselman ("Casselman") and Lara Lewis. Casselman collected one sample at the "Camp" showing (Figure 8) and one at the "Lake" showing (Figure 9), whereas the third sample was collected by pilot Karl Ziehe of Heli-Dynamics Ltd. at the Camp showing. Both showings are centred on old hand trenches dug by the DC Syndicate in 1978, and subsequently cleaned out by Brett Resources in 2006. The Camp showing is marked by pervasive malachite staining and disseminated to semi-massive chalcopyrite. The Lake showing is generally a dull rusty colour with patches of malachite and very little visible sulphides. Rock sample locations (Figure •) and descriptions are included herein as Appendix A. Analytical results are included herein as Appendix B.

**Figure 8 - Camp Showing Photo**

**Figure 9 - Lake Showing Photo**

**Figure 10 - Camp Showing Sample No. 141920 Photo**

**Figure 11 - Lake Showing Sample No. 141921 Photo**

The Casselman samples were submitted in person by the Authors to the Bureau Veritas Commodities Canada Ltd. ("BV") facility in Whitehorse, Yukon where they were dried and crushed to ≥70% < 2mm., and a 250g split was pulverized to ≥85% < 75µm (BV Code PRP70-250). The sample pulps were then sent to BV's Vancouver facility where they were analyzed for 53 elements (including gold) by 30g Aqua Regia digestion, ICP-MS finish (BV Code AQ252EXT). The pulps were also analyzed for gold by 30g Fire Assay AAS finish (BV Code FA430). The samples were over limit for tin and tungsten (i.e. > 100ppm), and so were re-analyzed for 31 elements by 0.20g lithium borate fusion for refractory and Rare Earth Elements, ICP-MS finish (BV Code LF100). One sample was over limit for tin (i.e. > 10,000 ppm), and so was re-analyzed by 0.25g sodium peroxide fusion for refractory mineral ores, ICP-ES finish (BV Code PF370). All BV facilities are accredited under BV's ISO 9001:2015 registration.

The Ziehe sample was submitted to Bourlamaque Assay Laboratories Ltd. ("Bourlamaque") in Val-d'Or, Quebec where it was dried and crushed to ≥70% < 1.7mm., and a 250g split was pulverized to ≥85% < 75µm. Copper, cobalt and silver values were geochemically determined on a 0.5g pulp sample using Aqua Regia digestion, atomic absorption spectroscopy (AAS) finish, and gold values were determined using 30g Fire Assay, AAS finish. Copper and silver geochemical values were over limit and subsequently assayed by two-acid digestion, AAS finish. Bourlamaque is not accredited under ISO but it is independent of the Property owners, maintains an internal quality control program and participates annually in CANMET round-robin proficiency testing.

The airborne geophysical survey was completed by Precision GeoSurveys Inc. ("Precision") from July 7 to July 9, 2018. A total of 475 line kilometres of magnetic and radiometric data was collected over a total area of 42.5 $km^2$. The survey was flown at 100 meter line spacing at headings of 030° and 210°. Control tie lines were flown at 1000 meter spacing at headings of 120° and 300°. The full technical specifications of the airborne survey are included in a report provided by Precision included herein as Appendix C. The portion of the survey flown over existing claims JC 1 to JC 54 was 11.3 $km^2$ or 27%.

## Discussion of Results

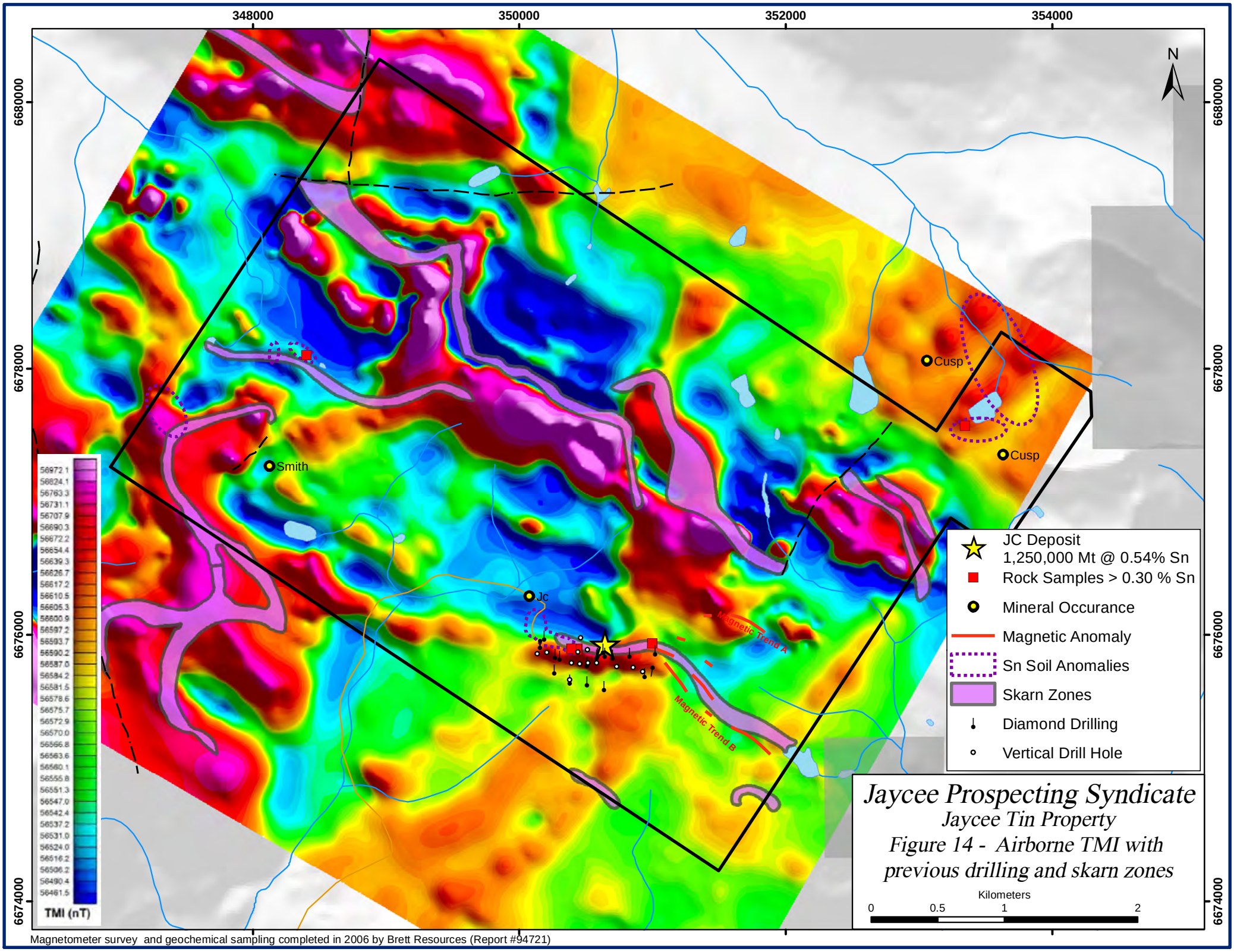
Although limited, the rock samples returned very strong results for copper, silver and tin. The Ziehe sample from the Camp showing retuned 17.96% copper and 633.0gpt silver. This was a selective grab sample containing >30% chalcopyrite. The Casselman sample from the same site (No.141920, Figure 10) returned 0.33% copper and 9.9gpt silver, and is deemed more representative. The Casselman sample from the Lake showing (No.141921, Figure 11) returned 0.29% copper, 7.3gpt silver, and 1.13% tin. This sample also returned relatively strong beryllium (264ppm), cesium (322ppm), lithium (116ppm) and rubidium (1462ppm) values. It was difficult to get a reliable tin value with either Aqua Regia or lithium borate geochemical methods. This is due to its refractory nature. A sodium peroxide assay finally provided a solid tin value.

It was hoped that the JC Zone drill core would be in a sufficient condition to resample the tin-bearing zones and verify the historical resource estimate (Layne, 1981). Although some of the core is relatively intact (Figure 12), much of it has been scattered to the extent that it cannot be reliably be recovered (Figure 13).

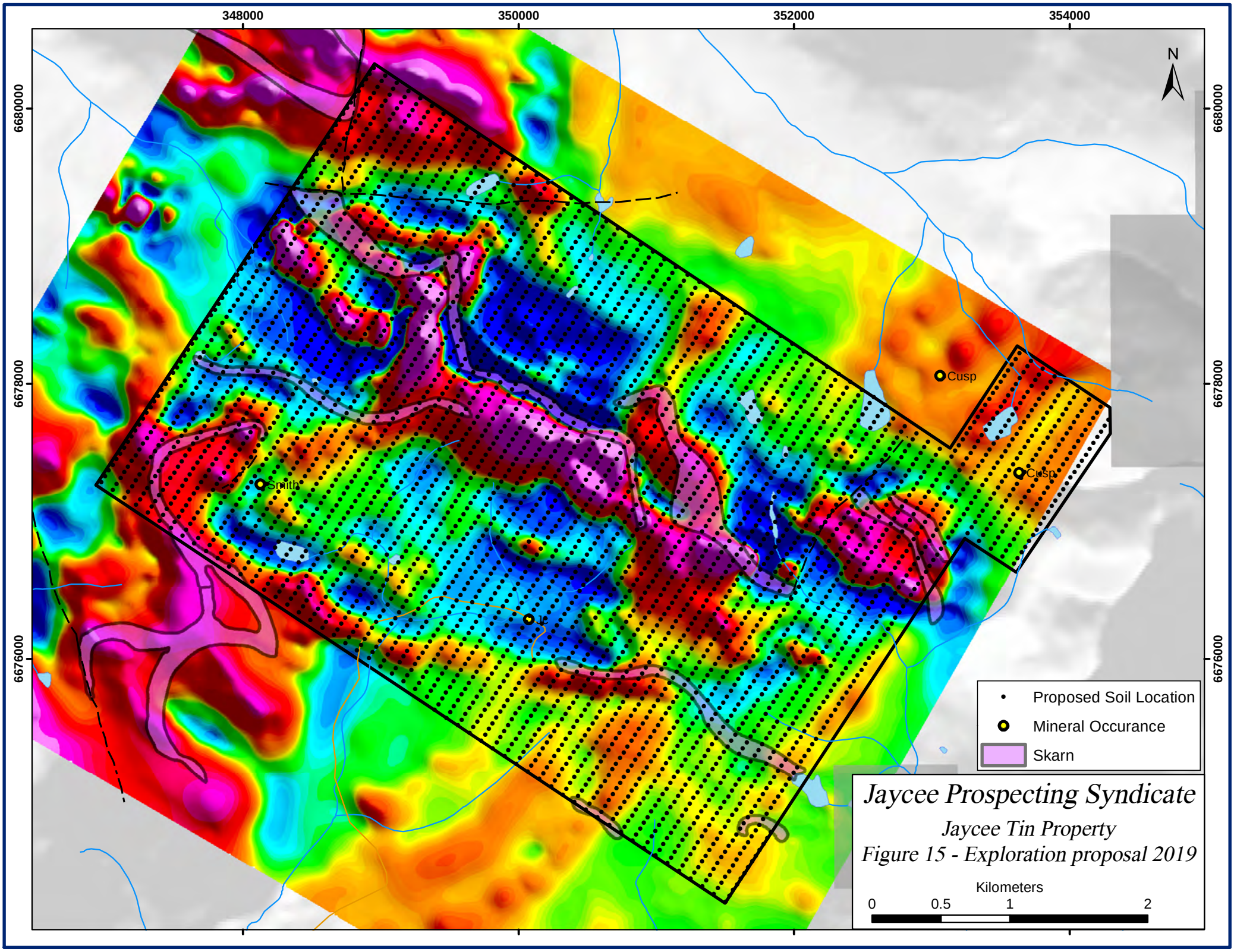
**Figure 12 - JC Zone Drillcore 1 Photo**

**Figure 13 - JC Zone Drillcore 2 Photo**

The airborne geophysical survey provided some very useful results. Turna (2006) suggested that the skarn horizon hosting the JC deposit extended to the southeast at a general strike of 115° azimuth (Figure 6). The airborne magnetic data indicates instead that the tin-bearing skarn unit strikes more westerly at 280° azimuth. Moreover the skarn horizon, interpreted to correspond to the magnetic high coincident with the JC Tin deposit, continues westward for an additional 1.5km from the west limit of the deposit (Figure 14). The survey also delineated an extensive magnetic high on the north margin of the original claim block. Roots et al. (2004) mapped a number of skarn horizons within this magnetic high. Thus this area was deemed prospective for tin mineralization similar to the JC Tin deposit, and the Syndicate staked an additional 47 claims (JC55 to JC101) in September 2018 to cover the area.




Magnetometer survey and geochemical sampling completed in 2006 by Brett Resources (Report #94721)


348000
350000
352000
354000
6680000
6678000
6676000
N
Cusp
Cusp
Smith
Proposed Soil Location
Mineral Occurance
Skarn
Jaycee Prospecting Syndicate
Jaycee Tin Property
Figure 15 - Exploration proposal 2019
Kilometers
0
0.5
1
2

## Conclusions and Recommendations

The 2018 work on the Jaycee property successfully met its objectives. The rock geochemistry, although very limited, returned excellent values for copper, silver and tin, thereby confirming previously metal values on the Property. Unfortunately the condition of the drill core on the Property is very poor and cannot be reliably resampled to verify the historical resource estimate of the JC Tin deposit. The previous drill collars however have been reliably located (Turna, 2006), and these holes could be twinned to determine the validity of the previous results.

The airborne magnetic data does trace the possible strike extensions of a 900m long skarn horizon that hosts the JC Tin deposit. However it suggests that further exploration work should be carried out to the west of the JC deposit, rather than to the southeast as indicated by Turna (2006). The airborne magnetic data also shows that the carbonate horizons mapped generally north of the JC zone (Roots et' al., 2004) are similarly magnetic. This suggests that these horizons contain magnetic minerals such as magnetite and pyrrhotite that are indicative of skarn development. As such they are prospective for copper, silver and tin mineralization similar to that found within the JC zone.

It is recommended that exploration of the Jaycee property continue with soil and rock geochemistry, mapping and prospecting as a first phase. Specifically it is recommended that a soil geochemical survey be completed over magnetic highs at sample intervals of 50 metres on 100 meter line spacing at 030° azimuth. The soil geochemical data then can be used to plan mapping, prospecting and rock sampling. Depending on successful results in this phase, an initial drill program can be executed.

The cost estimate of the recommended work is outlined in Table 4 below:

**Table 4 - Cost Estimate**

| Item | No. | Rate | | | Total |
|---|---|---|---|---|---|
| **Soil Geochemical Survey** | | | | | |
| All-in costs | 5000 | samples @ | $75 | per sample | $375,000 |
| **Mapping, Prospecting, Rock sampling** | | | | | |
| Senior Geologist (GIS Setup) | 2 | mandays @ | $750 | per manday | $1,500 |
| Senior Geologist (Field) | 15 | mandays @ | $750 | per manday | $11,250 |
| Technicians/Prospectors (Field) | 30 | mandays @ | $500 | per manday | $15,000 |
| Camp Expenses | 45 | mandays @ | $200 | per manday | $9,000 |
| Supplies | 1 | total @ | $2,000 | per total | $2,000 |
| Helicopter | 6 | hours @ | $200 | per hour | $1,200 |
| Truck | 15 | days @ | $200 | per day | $3,000 |
| Flights to Yukon | 3 | flights @ | $1,500 | per flight | $4,500 |
| XRF analyzer | 15 | days @ | $150 | per day | $2,250 |
| Sat phone | 15 | days @ | $10 | per day | $150 |
| VHF-FM radios | 45 | days @ | $5 | per day | $225 |
| Field computers | 45 | days @ | $10 | per day | $450 |
| Geological/Geochemical report | 1 | report @ | $5,000 | per report | $2,500 |
| Rock analyses | 150 | samples @ | $46 | per sample | $6,900 |
| Subtotal | | | | | $434,925 |
| 15% Contingency | | | | | $65,239 |
| Total | | | | | **$500,164** |

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# Appendix A - Sample Descriptions

2018 Rocks Jaycee

| Sample No. | UTM Zone | UTMmE | UTMmN | Showing | Description | Ag gpt | Cu % | Sn % |
|---|---|---|---|---|---|---|---|---|
| 141920 | 7N WGS 84 | 350,266 | 6,675,930 | Camp - old trench | Grab - skarn marked by malachite with disseminated chalcopyriute and pyrite trhoughout | 9.9 | 0.33 | 0.03 |
| 141921 | 7N WGS 84 | 350,439 | 6,675,923 | Lake - old trench | Grab - skarn with disseminated sulphides | 7.3 | 0.29 | 1.13 |
| KZ | 7N WGS 84 | 350,266 | 6,675,930 | Camp - old trench | Select grab - chalcopyrite and pyrite stained with malachite | 633.0 | 17.96 | na |

# Appendix B - Analytical Results

# BOURLAMAQUE ASSAY LABORATORIES LTD.

## ANALYSIS REPORT

## B18-0484 Final

| | |
|---|---|
| Client name: | **BREAKAWAY EXPLORATION MANAGEMENT INC.** |
| Submitted by: | Mark Fekete |
| Attention: | Mark Fekete<br>303, 7e Rue<br>Bureau 210<br>Val-d'Or QC J9P 0G5<br>Canada |
| Type(s) of sample(s): | Roche / Rock |
| Number of samples: | 1 |
| Submittal number: | 20180720 |
| Date received: | July 20, 2018 |
| Report date: | August 10, 2018 |
| Analysis instructions: | Code AU020 Au Pyroanalyse-SAA 30g<br>Code GEAG Ag Géochimique<br>Code GECO Co Géochimique<br>Code GECU Cu Géochimique<br>Code SSAG_100 Ag Méthode individuelle<br>Code SSCU_100 Cu Méthode individuelle |

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PO Box 550, Val-d'Or QC J9P 4P5, CANADA, 148, Avenue Perreault, Val-d'Or QC J9P 2G3, CANADA.
Telephone: +1 (819) 824-4337 Fax: +1 (819) 824-4745 lab.bourlamaque@tlb.sympatico.ca

# BOURLAMAQUE ASSAY LABORATORIES LTD.

Client: Breakaway Exploration Management Inc.
Project:
Sample type(s): Roche / Rock
Submitted by: Mark Fekete

ANALYSIS CERTIFICATE
**Report No. B18-0484**
10-août-18

## RESULTS

| | **Analyte Symbol** | Au | Ag | Ag | Co | Cu | Cu | Poids |
|---|---|---|---|---|---|---|---|---|
| | **Unit Symbol** | ppm | ppm | ppm | ppm | ppm | % | Kg |
| | **Detection Limit** | 0.01 | 0.5 | 1 | 5 | 5 | 0.0005 | 0.01 |
| | **Analysis Method** | Py-SAA Au | DIG-AR_Ag_SAA | DIG-2A_Ag_SAA | DIG-AR_Co_SAA | DIG-AR_Cu_SAA | DIG-2A_Cu_SAA | GRAV |
| 1 | 1 | 0.12 | > 100 | 633 | 10 | > 10000 | 17.96 | 0.23 |

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# BOURLAMAQUE ASSAY LABORATORIES LTD.

Client: Breakaway Exploration Management Inc.
Project:
Sample type(s): Roche / Rock
Submitted by: Mark Fekete

ANALYSIS CERTIFICATE
**Report No. B18-0484**
10-août-18

## QUALITY CONTROL

| **Analyte Symbol** | Au | Ag | Ag | Co | Cu | Cu |
|---|---|---|---|---|---|---|
| **Unit Symbol** | ppm | ppm | ppm | ppm | ppm | % |
| **Detection Limit** | 0.01 | 0.5 | 1 | 5 | 5 | 0.0005 |
| **Analysis Method** | Py-SAA Au | DIG-AR_Ag_SAA | DIG-2A_Ag_SAA | DIG-AR_Co_SAA | DIG-AR_Cu_SAA | DIG-2A_Cu_SAA |
| BPREP QC Sample | < 0.01 | < 0.5 | | < 5 | < 5 | |
| OxN117 Meas | 7.71 | | | | | |
| OxN117 Cert | 7.68 | | | | | |
| OREAS 623 Meas | | 19.2 | 19 | 210 | > 10000 | 1.811 |
| OREAS 623 Cert | | 20 | 20 | 216.00 | 17200.000 | 1.720 |
| 1 Orig | 0.12 | > 100 | 633 | 10 | > 10000 | 17.96 |
| 1 Rep Dup | 0.11 | > 100 | 623 | 10 | > 10000 | 18.01 |

## ANALYSIS METHODS

| **Method Code** | **Description** |
|---|---|
| DIG-2A_Ag_SAA | Ag |
| DIG-2A_Cu_SAA | Cu |
| DIG-AR_Ag_SAA | Ag |
| DIG-AR_Co_SAA | Co |
| DIG-AR_Cu_SAA | Cu |
| GRAV | Poids |
| Py-SAA Au | Au |

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# BOURLAMAQUE ASSAY LABORATORIES LTD.

## ANALYSIS REPORT

## B18-0484 Annexe

| | |
|---|---|
| Client name: | **BREAKAWAY EXPLORATION MANAGEMENT INC.** |
| Submitted by: | Mark Fekete |
| Attention: | Mark Fekete<br>303, 7e Rue<br>Bureau 210<br>Val-d'Or QC J9P 0G5<br>Canada |
| Type(s) of sample(s): | Roche / Rock |
| Number of samples: | 1 |
| Submittal number: | 20180720 |
| Date received: | July 20, 2018 |
| Report date: | August 10, 2018 |
| Analysis instructions: | Code AG010 Ag Pyroanalyse-gravimétrie 15 |

Total pages: 3 (including this page)

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# BOURLAMAQUE ASSAY LABORATORIES LTD.

Client: Breakaway Exploration Management Inc.
Project:
Sample type(s): Roche / Rock
Submitted by: Mark Fekete

ANALYSIS CERTIFICATE
**Report No. B18-0484**
10-août-18

## RESULTS

| | | |
|---|---|---|
| | **Analyte Symbol** | Ag |
| | **Unit Symbol** | g/Mt |
| | **Detection Limit** | 1 |
| | **Analysis Method** | PYRO-GRAV |
| 1 | 1 | 620 |

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Client: Breakaway Exploration Management Inc.
Project:
Sample type(s): Roche / Rock
Submitted by: Mark Fekete

ANALYSIS CERTIFICATE
**Report No. B18-0484**
10-août-18

## QUALITY CONTROL

| | |
|---|---|
| **Analyte Symbol** | Ag |
| **Unit Symbol** | g/Mt |
| **Detection Limit** | 1 |
| **Analysis Method** | PYRO-GRAV |
| SI25 Meas | 33 |
| SI25 Cert | 33.25 |
| 1 Orig | 620 |
| 1 Rep Dup | 604 |

## ANALYSIS METHODS

| Method Code | Description |
|---|---|
| PYRO-GRAV | Ag |

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Bureau Veritas Commodities Canada Ltd.
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PHONE (604) 253-3158

**Client:** **Breakaway Expl. Mgmt. Inc.**
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Submitted By: Mark Fekete
Receiving Lab: Canada-Whitehorse
Received: August 07, 2018
Report Date: October 20, 2018


# CERTIFICATE OF ANALYSIS WHI18000594.4

## CLIENT JOB INFORMATION

Project: None Given
Shipment ID:
P.O. Number
Number of Samples: 2

## SAMPLE DISPOSAL

RTRN-PLP Return After 90 days
RTRN-RJT Return After 60 days

Bureau Veritas does not accept responsibility for samples left at the laboratory after 90 days without prior written instructions for sample storage or return.

## SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

| Procedure Code | Number of Samples | Code Description | Test Wgt (g) | Report Status | Lab |
|---|---|---|---|---|---|
| PRP70-250 | 2 | Crush, split and pulverize 250 g rock to 200 mesh | | | WHI |
| SLBHP | 2 | Sort, label and box pulps | | | WHI |
| BAT01 | 2 | Batch charge of <20 samples | | | WHI |
| FA430 | 2 | Lead Collection Fire - Assay Fusion - AAS Finish | 30 | Completed | VAN |
| EN002 | 2 | Environmental disposal charge-Fire assay lead waste | | | VAN |
| AQ252-EXT | 2 | 1:1:1 Aqua Regia digestion Ultratrace ICP-MS analysis | 30 | Completed | VAN |
| SHP01 | 2 | Per sample shipping charges for branch shipments | | | VAN |
| LF100 | 2 | Refractory and REEs by fusion and ICP-MS analysis | 0.2 | Completed | VAN |
| PF370 | 1 | Fusion digestion (Na2O2) to 200 mL, analyzed by ICP-ES. | 0.25 | Completed | VAN |

## ADDITIONAL COMMENTS

Version 2 : AQ252-EXT package included. Version 3: LF100 included. Version 4: PF370 included.

Invoice To: Breakaway Expl. Mgmt. Inc.
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1
Canada

CC:

JEFFREY CANNON
Geochemistry Department Supervisor

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All results are considered the confidential property of the client. Bureau Veritas assumes the liabilities for actual cost of analysis only. Results apply to samples as submitted.
"*" asterisk indicates that an analytical result could not be provided due to unusually high levels of interference from other elements.

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Report Date: October 20, 2018



# CERTIFICATE OF ANALYSIS WHI18000594.4

| | Method | WGHT | FA430 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Wgt | Au | Mo | Cu | Pb | Zn | Ag | Ni | Co | Mn | Fe | As | U | Au | Th | Sr | Cd | Sb | Bi | V |
| | Unit | kg | ppm | ppm | ppm | ppm | ppm | ppb | ppm | ppm | ppm | % | ppm | ppm | ppb | ppm | ppm | ppm | ppm | ppm | ppm |
| | MDL | 0.01 | 0.005 | 0.01 | 0.01 | 0.01 | 0.1 | 2 | 0.1 | 0.1 | 1 | 0.01 | 0.1 | 0.1 | 0.2 | 0.1 | 0.5 | 0.01 | 0.02 | 0.02 | 1 |
| 141920 | Rock | 2.70 | 0.096 | 0.12 | 3266.55 | 3.96 | 293.9 | 9868 | 128.1 | 39.8 | 3973 | 4.67 | 205.8 | 4.3 | 96.8 | 0.1 | 13.9 | 2.40 | 6.53 | >2000 | 4 |
| 141921 | Rock | 2.59 | 0.005 | 0.12 | 3062.83 | 3.83 | 393.4 | 7259 | 5.7 | 2.2 | 1427 | 24.18 | 62.9 | 7.4 | 2.0 | 1.1 | 19.8 | 1.07 | 15.44 | 124.22 | 65 |

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Project: None Given
Report Date: October 20, 2018



# CERTIFICATE OF ANALYSIS WHI18000594.4

| | Method | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Ca | P | La | Cr | Mg | Ba | Ti | B | Al | Na | K | W | Sc | Tl | S | Hg | Se | Te | Ga | Cs |
| | Unit | % | % | ppm | ppm | % | ppm | % | ppm | % | % | % | ppm | ppm | ppm | % | ppb | ppm | ppm | ppm | ppm |
| | MDL | 0.01 | 0.001 | 0.5 | 0.5 | 0.01 | 0.5 | 0.001 | 1 | 0.01 | 0.001 | 0.01 | 0.1 | 0.1 | 0.02 | 0.02 | 5 | 0.1 | 0.02 | 0.1 | 0.02 |
| 141920 | Rock | 7.44 | 0.017 | 0.5 | 0.8 | 0.13 | 1.4 | 0.003 | <1 | 0.19 | 0.020 | 0.01 | >100 | 0.5 | <0.02 | 0.05 | <5 | 2.3 | 2.01 | 1.5 | 0.11 |
| 141921 | Rock | 9.44 | 0.037 | 6.6 | 7.8 | 1.33 | 14.5 | 0.127 | 37 | 3.81 | 0.127 | 2.87 | 56.4 | 8.2 | 13.35 | 0.70 | <5 | 1.8 | 0.03 | 44.3 | 322.15 |

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**Client:** **Breakaway Expl. Mgmt. Inc.**
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# CERTIFICATE OF ANALYSIS WHI18000594.4

| | Method | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | LF100 | LF100 | LF100 | LF100 | LF100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Ge | Hf | Nb | Rb | Sn | Ta | Zr | Y | Ce | In | Re | Be | Li | Pd | Pt | Ba | Be | Co | Cs | Ga |
| | Unit | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppb | ppm | ppm | ppb | ppb | ppm | ppm | ppm | ppm | ppm |
| | MDL | 0.1 | 0.02 | 0.02 | 0.1 | 0.1 | 0.05 | 0.1 | 0.01 | 0.1 | 0.02 | 1 | 0.1 | 0.1 | 10 | 2 | 1 | 1 | 0.2 | 0.1 | 0.5 |
| 141920 | Rock | 0.6 | <0.02 | 0.02 | 0.4 | 74.3 | <0.05 | 0.9 | 0.82 | 1.0 | 10.31 | 2 | 4.5 | 0.8 | <10 | <2 | 1 | 12 | 50.1 | 0.1 | 5.0 |
| 141921 | Rock | 9.2 | 0.48 | 1.54 | 1462.4 | >100 | <0.05 | 15.8 | 16.12 | 12.4 | 15.32 | <1 | 263.9 | 116.4 | <10 | <2 | 13 | 298 | 1.7 | 274.4 | 38.2 |

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**Client:** **Breakaway Expl. Mgmt. Inc.**
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# CERTIFICATE OF ANALYSIS WHI18000594.4

| | Method | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Hf | Nb | Rb | Sn | Sr | Ta | Th | U | V | W | Zr | Y | La | Ce | Pr | Nd | Sm | Eu | Gd | Tb |
| | Unit | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| | MDL | 0.1 | 0.1 | 0.1 | 1 | 0.5 | 0.1 | 0.2 | 0.1 | 8 | 0.5 | 0.1 | 0.1 | 0.1 | 0.1 | 0.02 | 0.3 | 0.05 | 0.02 | 0.05 | 0.01 |
| 141920 | Rock | <0.1 | 0.5 | 0.8 | 228 | 27.1 | <0.1 | <0.2 | 5.2 | <8 | 115.8 | 3.4 | 1.4 | 0.8 | 1.1 | 0.20 | 0.8 | 0.19 | 0.05 | 0.24 | 0.03 |
| 141921 | Rock | 0.6 | 1.6 | >1000 | >10000 | 19.9 | <0.1 | 0.9 | 7.7 | 58 | 61.8 | 21.8 | 16.9 | 6.7 | 11.6 | 1.60 | 7.2 | 1.54 | 0.43 | 1.69 | 0.25 |

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.

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PHONE (604) 253-3158

**Client:** **Breakaway Expl. Mgmt. Inc.**
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# CERTIFICATE OF ANALYSIS WHI18000594.4

| | Method | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Dy | Ho | Er | Tm | Yb | Lu | Al | As | Ca | Cr | Co | Cu | Fe | K | Li | Mg | Mn | Ni | Pb | S |
| | Unit | ppm | ppm | ppm | ppm | ppm | ppm | % | % | % | % | % | % | % | % | % | % | % | % | % | % |
| | MDL | 0.05 | 0.02 | 0.03 | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | 0.05 | 0.01 | 0.002 | 0.005 | 0.05 | 0.01 | 0.001 | 0.01 | 0.01 | 0.005 | 0.003 | 0.01 |
| 141920 | Rock | 0.20 | 0.04 | 0.12 | 0.02 | 0.18 | 0.03 | | | | | | | | | | | | | | |
| 141921 | Rock | 1.69 | 0.38 | 1.21 | 0.16 | 1.06 | 0.15 | 3.86 | <0.01 | 10.23 | 0.02 | <0.002 | 0.294 | 23.99 | 2.79 | 0.013 | 1.44 | 0.13 | 0.005 | <0.003 | 0.75 |

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.

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Project: None Given
Report Date: October 20, 2018



# CERTIFICATE OF ANALYSIS WHI18000594.4

| | Method | PF370 | PF370 | PF370 |
|---|---|---|---|---|
| | Analyte | Sn | Ti | Zn |
| | Unit | % | % | % |
| | MDL | 0.005 | 0.01 | 0.01 |
| 141920 | Rock | | | |
| 141921 | Rock | 1.129 | 0.13 | 0.04 |

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Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | Method | WGHT | FA430 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Wgt | Au | Mo | Cu | Pb | Zn | Ag | Ni | Co | Mn | Fe | As | U | Au | Th | Sr | Cd | Sb | Bi | V |
| | Unit | kg | ppm | ppm | ppm | ppm | ppm | ppb | ppm | ppm | ppm | % | ppm | ppm | ppb | ppm | ppm | ppm | ppm | ppm | ppm |
| | MDL | 0.01 | 0.005 | 0.01 | 0.01 | 0.01 | 0.1 | 2 | 0.1 | 0.1 | 1 | 0.01 | 0.1 | 0.1 | 0.2 | 0.1 | 0.5 | 0.01 | 0.02 | 0.02 | 1 |
| Pulp Duplicates | | | | | | | | | | | | | | | | | | | | | |
| 141920 | Rock | 2.70 | 0.096 | 0.12 | 3266.55 | 3.96 | 293.9 | 9868 | 128.1 | 39.8 | 3973 | 4.67 | 205.8 | 4.3 | 96.8 | 0.1 | 13.9 | 2.40 | 6.53 | >2000 | 4 |
| REP 141920 | QC | | | 0.10 | 3281.74 | 3.95 | 300.9 | 10017 | 129.3 | 39.7 | 4003 | 4.78 | 208.3 | 4.3 | 95.5 | 0.1 | 14.1 | 2.37 | 6.42 | >2000 | 4 |
| 141921 | Rock | 2.59 | 0.005 | 0.12 | 3062.83 | 3.83 | 393.4 | 7259 | 5.7 | 2.2 | 1427 | 24.18 | 62.9 | 7.4 | 2.0 | 1.1 | 19.8 | 1.07 | 15.44 | 124.22 | 65 |
| REP 141921 | QC | | | | | | | | | | | | | | | | | | | | |
| Reference Materials | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | | | 14.42 | 157.08 | 141.81 | 346.9 | 1693 | 83.2 | 14.3 | 1034 | 3.19 | 43.6 | 2.7 | 65.8 | 8.0 | 67.9 | 2.38 | 8.36 | 11.98 | 50 |
| STD DS11 | Standard | | | 13.95 | 153.76 | 143.45 | 355.2 | 1770 | 79.9 | 13.9 | 1059 | 3.15 | 44.6 | 2.7 | 74.9 | 8.1 | 67.9 | 2.61 | 9.31 | 12.98 | 50 |
| STD LI-1 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 | Standard | | | 1.34 | 27.91 | 6.08 | 41.8 | 17 | 80.3 | 20.6 | 419 | 3.08 | 0.5 | 0.7 | 184.7 | 1.8 | 185.7 | 0.02 | 0.04 | <0.02 | 52 |
| STD OXC129 | Standard | | | 1.33 | 27.12 | 6.48 | 41.1 | 10 | 77.7 | 19.9 | 413 | 3.05 | 0.5 | 0.7 | 202.3 | 2.0 | 180.9 | <0.01 | 0.05 | <0.02 | 54 |
| STD OXC145 | Standard | | 0.207 | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | 0.209 | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | 0.210 | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | 0.211 | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | 1.319 | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | 1.285 | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | 1.326 | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | 1.309 | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | 7.466 | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | 7.611 | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | 7.675 | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | 7.557 | | | | | | | | | | | | | | | | | | |
| STD RTS-2 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 Expected | | | | 1.3 | 28 | 6.2 | 42.9 | 13 | 79.5 | 20.3 | 421 | 3.065 | 0.6 | 0.69 | 195 | 1.9 | | 0.03 | 0.04 | | 51 |
| STD DS11 Expected | | | | 14.6 | 149 | 138 | 345 | 1710 | 77.7 | 14.2 | 1055 | 3.1 | 42.8 | 2.59 | 79 | 7.65 | 67.3 | 2.37 | 8.74 | 12.2 | 50 |
| STD OXN134 Expected | | | 7.667 | | | | | | | | | | | | | | | | | | |

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1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | Method | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Ca | P | La | Cr | Mg | Ba | Ti | B | Al | Na | K | W | Sc | Tl | S | Hg | Se | Te | Ga | Cs |
| | Unit | % | % | ppm | ppm | % | ppm | % | ppm | % | % | % | ppm | ppm | ppm | % | ppb | ppm | ppm | ppm | ppm |
| | MDL | 0.01 | 0.001 | 0.5 | 0.5 | 0.01 | 0.5 | 0.001 | 1 | 0.01 | 0.001 | 0.01 | 0.1 | 0.1 | 0.02 | 0.02 | 5 | 0.1 | 0.02 | 0.1 | 0.02 |
| Pulp Duplicates | | | | | | | | | | | | | | | | | | | | | |
| 141920 | Rock | 7.44 | 0.017 | 0.5 | 0.8 | 0.13 | 1.4 | 0.003 | <1 | 0.19 | 0.020 | 0.01 | >100 | 0.5 | <0.02 | 0.05 | <5 | 2.3 | 2.01 | 1.5 | 0.11 |
| REP 141920 | QC | 7.46 | 0.015 | 0.5 | 0.9 | 0.13 | 1.6 | 0.003 | <1 | 0.19 | 0.021 | 0.01 | >100 | 0.5 | <0.02 | 0.05 | <5 | 2.6 | 2.01 | 1.6 | 0.12 |
| 141921 | Rock | 9.44 | 0.037 | 6.6 | 7.8 | 1.33 | 14.5 | 0.127 | 37 | 3.81 | 0.127 | 2.87 | 56.4 | 8.2 | 13.35 | 0.70 | <5 | 1.8 | 0.03 | 44.3 | 322.15 |
| REP 141921 | QC | | | | | | | | | | | | | | | | | | | | |
| Reference Materials | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | 1.03 | 0.074 | 18.7 | 61.4 | 0.85 | 346.7 | 0.095 | 5 | 1.16 | 0.073 | 0.40 | 2.9 | 3.3 | 4.79 | 0.27 | 259 | 2.2 | 4.64 | 4.9 | 2.83 |
| STD DS11 | Standard | 1.04 | 0.073 | 18.9 | 61.1 | 0.85 | 341.7 | 0.094 | 8 | 1.14 | 0.074 | 0.40 | 3.3 | 3.0 | 5.04 | 0.28 | 256 | 2.0 | 4.87 | 4.9 | 2.93 |
| STD LI-1 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 | Standard | 0.66 | 0.099 | 12.4 | 53.2 | 1.53 | 50.1 | 0.406 | 3 | 1.55 | 0.583 | 0.37 | <0.1 | 0.8 | 0.04 | <0.02 | <5 | <0.1 | <0.02 | 5.4 | 0.17 |
| STD OXC129 | Standard | 0.65 | 0.104 | 13.3 | 51.5 | 1.51 | 49.1 | 0.398 | 2 | 1.63 | 0.606 | 0.41 | <0.1 | 1.0 | 0.03 | <0.02 | <5 | <0.1 | <0.02 | 5.4 | 0.17 |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 Expected | | 0.684 | 0.102 | 12.5 | 52 | 1.545 | 50 | 0.4 | 1 | 1.58 | 0.59 | 0.3655 | 0.08 | 1.1 | 0.03 | | | | | 5.5 | 0.16 |
| STD DS11 Expected | | 1.063 | 0.0701 | 18.6 | 61.5 | 0.85 | 385 | 0.0976 | | 1.1795 | 0.0762 | 0.4 | 2.9 | 3.4 | 4.9 | 0.2835 | 260 | 2.2 | 4.56 | 5.1 | 2.88 |
| STD OXN134 Expected | | | | | | | | | | | | | | | | | | | | | |

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**Client:** **Breakaway Expl. Mgmt. Inc.**
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | Method | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | LF100 | LF100 | LF100 | LF100 | LF100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Ge | Hf | Nb | Rb | Sn | Ta | Zr | Y | Ce | In | Re | Be | Li | Pd | Pt | Ba | Be | Co | Cs | Ga |
| | Unit | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppb | ppm | ppm | ppb | ppb | ppm | ppm | ppm | ppm | ppm |
| | MDL | 0.1 | 0.02 | 0.02 | 0.1 | 0.1 | 0.05 | 0.1 | 0.01 | 0.1 | 0.02 | 1 | 0.1 | 0.1 | 10 | 2 | 1 | 1 | 0.2 | 0.1 | 0.5 |
| Pulp Duplicates | | | | | | | | | | | | | | | | | | | | | |
| 141920 | Rock | 0.6 | <0.02 | 0.02 | 0.4 | 74.3 | <0.05 | 0.9 | 0.82 | 1.0 | 10.31 | 2 | 4.5 | 0.8 | <10 | <2 | 1 | 12 | 50.1 | 0.1 | 5.0 |
| REP 141920 | QC | 0.6 | 0.02 | <0.02 | 0.4 | 74.8 | <0.05 | 0.9 | 0.87 | 1.0 | 10.55 | 2 | 4.5 | 0.9 | <10 | <2 | 3 | 13 | 47.8 | 0.4 | 5.5 |
| 141921 | Rock | 9.2 | 0.48 | 1.54 | 1462.4 | >100 | <0.05 | 15.8 | 16.12 | 12.4 | 15.32 | <1 | 263.9 | 116.4 | <10 | <2 | 13 | 298 | 1.7 | 274.4 | 38.2 |
| REP 141921 | QC | | | | | | | | | | | | | | | | | | | | |
| Reference Materials | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | <0.1 | 0.07 | 1.59 | 33.5 | 1.9 | <0.05 | 3.1 | 7.87 | 36.5 | 0.23 | 47 | 0.5 | 23.0 | 96 | 173 | | | | | |
| STD DS11 | Standard | <0.1 | 0.07 | 1.67 | 34.3 | 1.9 | <0.05 | 2.8 | 7.85 | 37.1 | 0.28 | 49 | 0.5 | 24.9 | 94 | 191 | | | | | |
| STD LI-1 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 | Standard | 0.1 | 0.25 | 1.17 | 15.1 | 0.8 | <0.05 | 18.8 | 4.61 | 22.1 | 0.03 | <1 | 1.1 | 2.2 | <10 | <2 | | | | | |
| STD OXC129 | Standard | <0.1 | 0.26 | 1.85 | 16.6 | 0.8 | <0.05 | 22.0 | 4.58 | 23.2 | <0.02 | 2 | 0.9 | 2.4 | <10 | <2 | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 | Standard | | | | | | | | | | | | | | | | 472 | 13 | 25.0 | 4.4 | 17.9 |
| STD SO-19 | Standard | | | | | | | | | | | | | | | | 478 | 22 | 25.0 | 4.7 | 17.5 |
| STD OXC129 Expected | | | 0.24 | 1.4 | | 0.7 | | 21 | 4.7 | 23.7 | | | 0.8 | 2.22 | | | | | | | |
| STD DS11 Expected | | 0.08 | 0.06 | 1.53 | 33.6 | 1.8 | | 3.1 | 7.82 | 37 | 0.24 | 50 | 0.67 | 23.3 | 100 | 172 | | | | | |
| STD OXN134 Expected | | | | | | | | | | | | | | | | | | | | | |

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Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | Method | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Hf | Nb | Rb | Sn | Sr | Ta | Th | U | V | W | Zr | Y | La | Ce | Pr | Nd | Sm | Eu | Gd | Tb |
| | Unit | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm | ppm |
| | MDL | 0.1 | 0.1 | 0.1 | 1 | 0.5 | 0.1 | 0.2 | 0.1 | 8 | 0.5 | 0.1 | 0.1 | 0.1 | 0.1 | 0.02 | 0.3 | 0.05 | 0.02 | 0.05 | 0.01 |
| Pulp Duplicates | | | | | | | | | | | | | | | | | | | | | |
| 141920 | Rock | <0.1 | 0.5 | 0.8 | 228 | 27.1 | <0.1 | <0.2 | 5.2 | <8 | 115.8 | 3.4 | 1.4 | 0.8 | 1.1 | 0.20 | 0.8 | 0.19 | 0.05 | 0.24 | 0.03 |
| REP 141920 | QC | <0.1 | 0.5 | 1.2 | 225 | 27.8 | <0.1 | <0.2 | 4.7 | <8 | 123.7 | 2.9 | 1.8 | 0.7 | 1.2 | 0.20 | 0.9 | 0.17 | 0.05 | 0.21 | 0.03 |
| 141921 | Rock | 0.6 | 1.6 | >1000 | >10000 | 19.9 | <0.1 | 0.9 | 7.7 | 58 | 61.8 | 21.8 | 16.9 | 6.7 | 11.6 | 1.60 | 7.2 | 1.54 | 0.43 | 1.69 | 0.25 |
| REP 141921 | QC | | | | | | | | | | | | | | | | | | | | |
| Reference Materials | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD LI-1 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 | Standard | 3.0 | 68.9 | 19.4 | 20 | 318.8 | 4.5 | 13.2 | 19.3 | 161 | 9.8 | 111.7 | 35.7 | 73.2 | 161.2 | 19.24 | 75.8 | 12.91 | 3.64 | 10.18 | 1.34 |
| STD SO-19 | Standard | 2.9 | 68.7 | 19.6 | 19 | 317.2 | 4.8 | 13.5 | 19.5 | 168 | 9.4 | 110.2 | 34.5 | 72.9 | 159.4 | 19.04 | 76.8 | 13.27 | 3.60 | 9.75 | 1.37 |
| STD OXC129 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 Expected | | | | | | | | | | | | | | | | | | | | | |

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PHONE (604) 253-3158

**Client:** **Breakaway Expl. Mgmt. Inc.**
1740 Chemin Sullivan
Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | Method | LF100 | LF100 | LF100 | LF100 | LF100 | LF100 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 | PF370 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Analyte | Dy | Ho | Er | Tm | Yb | Lu | Al | As | Ca | Cr | Co | Cu | Fe | K | Li | Mg | Mn | Ni | Pb | S |
| | Unit | ppm | ppm | ppm | ppm | ppm | ppm | % | % | % | % | % | % | % | % | % | % | % | % | % | % |
| | MDL | 0.05 | 0.02 | 0.03 | 0.01 | 0.05 | 0.01 | 0.01 | 0.01 | 0.05 | 0.01 | 0.002 | 0.005 | 0.05 | 0.01 | 0.001 | 0.01 | 0.01 | 0.005 | 0.003 | 0.01 |
| Pulp Duplicates | | | | | | | | | | | | | | | | | | | | | |
| 141920 | Rock | 0.20 | 0.04 | 0.12 | 0.02 | 0.18 | 0.03 | | | | | | | | | | | | | | |
| REP 141920 | QC | 0.20 | 0.04 | 0.13 | 0.02 | 0.22 | 0.03 | | | | | | | | | | | | | | |
| 141921 | Rock | 1.69 | 0.38 | 1.21 | 0.16 | 1.06 | 0.15 | 3.86 | <0.01 | 10.23 | 0.02 | <0.002 | 0.294 | 23.99 | 2.79 | 0.013 | 1.44 | 0.13 | 0.005 | <0.003 | 0.75 |
| REP 141921 | QC | | | | | | | 3.78 | <0.01 | 10.12 | <0.01 | <0.002 | 0.297 | 23.77 | 2.86 | 0.013 | 1.40 | 0.13 | <0.005 | <0.003 | 0.75 |
| Reference Materials | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD DS11 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD LI-1 | Standard | | | | | | | 13.28 | <0.01 | 0.21 | 0.02 | <0.002 | <0.005 | 0.14 | 7.99 | 1.574 | <0.01 | 0.12 | 0.015 | <0.003 | 0.04 |
| STD OXC129 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC129 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXC145 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 | Standard | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 | Standard | | | | | | | 0.82 | <0.01 | 0.69 | 0.02 | 0.007 | 0.076 | 38.20 | 0.37 | 0.001 | 0.36 | 0.03 | 0.241 | <0.003 | 18.59 |
| STD SO-19 | Standard | 7.07 | 1.27 | 3.64 | 0.53 | 3.33 | 0.50 | | | | | | | | | | | | | | |
| STD SO-19 | Standard | 6.91 | 1.35 | 3.78 | 0.51 | 3.32 | 0.50 | | | | | | | | | | | | | | |
| STD OXC129 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD DS11 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD OXN134 Expected | | | | | | | | | | | | | | | | | | | | | |

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Suite 1100
Val d'Or Québec J9P 7H1 Canada

Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | Method | PF370 | PF370 | PF370 |
|---|---|---|---|---|
| | Analyte | Sn | Ti | Zn |
| | Unit | % | % | % |
| | MDL | 0.005 | 0.01 | 0.01 |
| Pulp Duplicates | | | | |
| 141920 | Rock | | | |
| REP 141920 | QC | | | |
| 141921 | Rock | 1.129 | 0.13 | 0.04 |
| REP 141921 | QC | 1.112 | 0.13 | 0.04 |
| Reference Materials | | | | |
| STD DS11 | Standard | | | |
| STD DS11 | Standard | | | |
| STD LI-1 | Standard | 0.022 | <0.01 | <0.01 |
| STD OXC129 | Standard | | | |
| STD OXC129 | Standard | | | |
| STD OXC145 | Standard | | | |
| STD OXC145 | Standard | | | |
| STD OXC145 | Standard | | | |
| STD OXC145 | Standard | | | |
| STD OXH139 | Standard | | | |
| STD OXH139 | Standard | | | |
| STD OXH139 | Standard | | | |
| STD OXH139 | Standard | | | |
| STD OXN134 | Standard | | | |
| STD OXN134 | Standard | | | |
| STD OXN134 | Standard | | | |
| STD OXN134 | Standard | | | |
| STD RTS-2 | Standard | <0.005 | 0.16 | 0.01 |
| STD SO-19 | Standard | | | |
| STD SO-19 | Standard | | | |
| STD OXC129 Expected | | | | |
| STD DS11 Expected | | | | |
| STD OXN134 Expected | | | | |

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# QUALITY CONTROL REPORT WHI18000594.4

| | | WGHT | FA430 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Wgt | Au | Mo | Cu | Pb | Zn | Ag | Ni | Co | Mn | Fe | As | U | Au | Th | Sr | Cd | Sb | Bi | V |
| | | kg | ppm | ppm | ppm | ppm | ppm | ppb | ppm | ppm | ppm | % | ppm | ppm | ppb | ppm | ppm | ppm | ppm | ppm | ppm |
| | | 0.01 | 0.005 | 0.01 | 0.01 | 0.01 | 0.1 | 2 | 0.1 | 0.1 | 1 | 0.01 | 0.1 | 0.1 | 0.2 | 0.1 | 0.5 | 0.01 | 0.02 | 0.02 | 1 |
| STD OXC145 Expected | | | 0.212 | | | | | | | | | | | | | | | | | | |
| STD OXH139 Expected | | | 1.312 | | | | | | | | | | | | | | | | | | |
| STD SO-19 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD LI-1 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 Expected | | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | 0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | <0.01 | <0.01 | <0.01 | <0.1 | <2 | <0.1 | <0.1 | <1 | <0.01 | <0.1 | <0.1 | <0.2 | <0.1 | <0.5 | <0.01 | <0.02 | <0.02 | <1 |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | <0.01 | 0.13 | 0.04 | <0.1 | 2 | <0.1 | <0.1 | <1 | <0.01 | <0.1 | <0.1 | <0.2 | <0.1 | <0.5 | <0.01 | <0.02 | <0.02 | <1 |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | <0.005 | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| Prep Wash | | | | | | | | | | | | | | | | | | | | | |
| ROCK-WHI | Prep Blank | | <0.005 | 1.42 | 5.61 | 2.13 | 59.6 | 17 | 1.2 | 4.3 | 623 | 1.92 | 2.0 | 0.5 | <0.2 | 2.3 | 48.2 | 0.14 | 0.08 | 0.19 | 24 |

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# QUALITY CONTROL REPORT WHI18000594.4

| | | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 | AQ252 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ca | P | La | Cr | Mg | Ba | Ti | B | Al | Na | K | W | Sc | Tl | S | Hg | Se | Te | Ga | Cs |
| | | % | % | ppm | ppm | % | ppm | % | ppm | % | % | % | ppm | ppm | ppm | % | ppb | ppm | ppm | ppm | ppm |
| | | 0.01 | 0.001 | 0.5 | 0.5 | 0.01 | 0.5 | 0.001 | 1 | 0.01 | 0.001 | 0.01 | 0.1 | 0.1 | 0.02 | 0.02 | 5 | 0.1 | 0.02 | 0.1 | 0.02 |
| STD OXC145 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD LI-1 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 Expected | | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | <0.01 | <0.001 | <0.5 | <0.5 | <0.01 | <0.5 | <0.001 | <1 | <0.01 | <0.001 | <0.01 | <0.1 | <0.1 | <0.02 | <0.02 | <5 | <0.1 | <0.02 | <0.1 | <0.02 |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | <0.01 | <0.001 | <0.5 | <0.5 | <0.01 | 0.9 | <0.001 | <1 | <0.01 | <0.001 | <0.01 | <0.1 | <0.1 | <0.02 | <0.02 | <5 | <0.1 | <0.02 | <0.1 | <0.02 |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| Prep Wash | | | | | | | | | | | | | | | | | | | | | |
| ROCK-WHI | Prep Blank | 1.15 | 0.042 | 6.6 | 3.2 | 0.54 | 77.6 | 0.090 | 3 | 1.42 | 0.070 | 0.10 | 0.1 | 3.4 | <0.02 | 0.10 | <5 | <0.1 | 0.03 | 4.8 | 0.29 |

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Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | | AQ252 Ge ppm 0.1 | AQ252 Hf ppm 0.02 | AQ252 Nb ppm 0.02 | AQ252 Rb ppm 0.1 | AQ252 Sn ppm 0.1 | AQ252 Ta ppm 0.05 | AQ252 Zr ppm 0.1 | AQ252 Y ppm 0.01 | AQ252 Ce ppm 0.1 | AQ252 In ppm 0.02 | AQ252 Re ppb 1 | AQ252 Be ppm 0.1 | AQ252 Li ppm 0.1 | AQ252 Pd ppb 10 | AQ252 Pt ppb 2 | LF100 Ba ppm 1 | LF100 Be ppm 1 | LF100 Co ppm 0.2 | LF100 Cs ppm 0.1 | LF100 Ga ppm 0.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STD OXC145 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 Expected | | | | | | | | | | | | | | | | | 486 | 20 | 24 | 4.5 | 17.5 |
| STD LI-1 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 Expected | | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | <0.1 | <0.02 | <0.02 | <0.1 | <0.1 | <0.05 | <0.1 | <0.01 | <0.1 | <0.02 | <1 | <0.1 | <0.1 | <10 | <2 | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | <0.1 | <0.02 | <0.02 | <0.1 | <0.1 | <0.05 | <0.1 | <0.01 | <0.1 | <0.02 | <1 | <0.1 | <0.1 | <10 | <2 | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | 1 | 1 | 0.2 | <0.1 | <0.5 |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| Prep Wash | | | | | | | | | | | | | | | | | | | | | |
| ROCK-WHI | Prep Blank | <0.1 | 0.10 | 0.22 | 2.7 | 0.4 | <0.05 | 3.4 | 9.66 | 12.9 | 0.03 | <1 | 0.2 | 2.1 | <10 | <2 | 800 | <1 | 4.7 | 0.5 | 15.3 |

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# QUALITY CONTROL REPORT WHI18000594.4

| | | LF100 Hf ppm 0.1 | LF100 Nb ppm 0.1 | LF100 Rb ppm 0.1 | LF100 Sn ppm 1 | LF100 Sr ppm 0.5 | LF100 Ta ppm 0.1 | LF100 Th ppm 0.2 | LF100 U ppm 0.1 | LF100 V ppm 8 | LF100 W ppm 0.5 | LF100 Zr ppm 0.1 | LF100 Y ppm 0.1 | LF100 La ppm 0.1 | LF100 Ce ppm 0.1 | LF100 Pr ppm 0.02 | LF100 Nd ppm 0.3 | LF100 Sm ppm 0.05 | LF100 Eu ppm 0.02 | LF100 Gd ppm 0.05 | LF100 Tb ppm 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STD OXC145 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 Expected | | 3.1 | 68.5 | 19.5 | 19 | 317.1 | 4.9 | 13 | 19.4 | 165 | 9.8 | 112 | 35.5 | 71.3 | 161 | 19.4 | 75.7 | 13.7 | 3.81 | 10.53 | 1.41 |
| STD LI-1 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD RTS-2 Expected | | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | <0.1 | 0.4 | <0.1 | <1 | <0.5 | <0.1 | <0.2 | 0.1 | <8 | <0.5 | 0.4 | <0.1 | 0.3 | 0.2 | <0.02 | <0.3 | <0.05 | <0.02 | <0.05 | <0.01 |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| Prep Wash | | | | | | | | | | | | | | | | | | | | | |
| ROCK-WHI | Prep Blank | 3.5 | 7.0 | 33.0 | <1 | 209.4 | 0.5 | 3.2 | 1.5 | 52 | 0.5 | 143.8 | 18.6 | 16.5 | 29.1 | 3.41 | 12.9 | 2.85 | 0.76 | 2.86 | 0.49 |

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# QUALITY CONTROL REPORT WHI18000594.4

| | | LF100 Dy ppm 0.05 | LF100 Ho ppm 0.02 | LF100 Er ppm 0.03 | LF100 Tm ppm 0.01 | LF100 Yb ppm 0.05 | LF100 Lu ppm 0.01 | PF370 Al % 0.01 | PF370 As % 0.01 | PF370 Ca % 0.05 | PF370 Cr % 0.01 | PF370 Co % 0.002 | PF370 Cu % 0.005 | PF370 Fe % 0.05 | PF370 K % 0.01 | PF370 Li % 0.001 | PF370 Mg % 0.01 | PF370 Mn % 0.01 | PF370 Ni % 0.005 | PF370 Pb % 0.003 | PF370 S % 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STD OXC145 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD OXH139 Expected | | | | | | | | | | | | | | | | | | | | | |
| STD SO-19 Expected | | 7.5 | 1.39 | 3.78 | 0.55 | 3.55 | 0.53 | | | | | | | | | | | | | | |
| STD LI-1 Expected | | | | | | | | | | | | | | | | 1.53 | | | | | |
| STD RTS-2 Expected | | | | | | | | | | 2.67 | | | | 37.4 | | | | | 0.243 | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
| BLK | Blank | | | | | | | | | | | | | | | | | | | | |
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| Prep Wash | | | | | | | | | | | | | | | | | | | | | |
| ROCK-WHI | Prep Blank | 2.93 | 0.68 | 2.15 | 0.33 | 2.34 | 0.38 | | | | | | | | | | | | | | |

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.

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Project: None Given
Report Date: October 20, 2018



# QUALITY CONTROL REPORT WHI18000594.4

| | | PF370 Sn % 0.005 | PF370 Ti % 0.01 | PF370 Zn % 0.01 |
|---|---|---|---|---|
| STD OXC145 Expected | | | | |
| STD OXH139 Expected | | | | |
| STD SO-19 Expected | | | | |
| STD LI-1 Expected | | | | |
| STD RTS-2 Expected | | | 1.6E-05 | |
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| Prep Wash | | | | |
| ROCK-WHI | Prep Blank | | | |

This report supersedes all previous preliminary and final reports with this file number dated prior to the date on this certificate. Signature indicates final approval; preliminary reports are unsigned and should be used for reference only.

# Appendix C - Precision GeoSurveys Airborne Geophysical Survey Report

Precision GeoSurveys

# AIRBORNE GEOPHYSICAL SURVEY REPORT

## Jaycee Tin Survey Block

Teslin, Yukon

## Jaycee Prospecting Syndicate


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August 2018
Job#18110

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# 1.0 Introduction

This report outlines the geophysical survey operations and data processing procedures taken during the high resolution helicopter-borne aeromagnetic and radiometric survey flown over Jaycee Tin survey block located east of Teslin, Yukon (Figure 1) for Jaycee Prospecting Syndicate. The geophysical survey was started on July 7, 2018 and completed on July 9, 2018.

**Figure 1**: Jaycee Tin survey area location map.

## 1.1 Survey Area

The Jaycee Tin survey block is centered approximately 55 km east of Teslin, Yukon (Figure 2).

**Figure 2:** Jaycee Tin survey block 55 km east of Teslin, Yukon.

A total of 475 line km of magnetic and radiometric data was collected over a total area of 42.5 $km^2$ (Figures 3 and 4). The survey was flown at 100 meter line spacing at a heading of 030°/210°; tie lines were flown at 1000 meter spacing at a heading of 120°/300°.

**Figure 3:** Plan View – Jaycee Tin survey block with actual flight lines displayed in yellow and boundary in red.

**Figure 4:** Terrain View – Jaycee Tin survey block with actual flight lines displayed in yellow.

### 1.2 Survey Specifications

The geodetic system used for the geophysical survey was WGS 84 in UTM Zone 9N. A total of 475 line km was flown over 42.5 km$^2$ (Table 1). Polygon coordinates for the survey block are specified in Table 2.

| Survey Block | Area (km$^2$) | Line Type | No. of Lines Planned | No. of Lines Completed | Line Spacing (m) | Line Orientation (UTM grid) | Actual Survey Height (m) | Total Planned Line km | Total Actual km Flown |
|---|---|---|---|---|---|---|---|---|---|
| Jaycee Tin | 42.5 | Survey | 70 | 70 | 100 | 030°/210° | 43.8 | 426 | 426 |
| | | Tie | 7 | 7 | 1000 | 120°/300° | 43.4 | 49 | 49 |
| | | **Total** | **77** | **77** | | | | **475** | **475** |

**Table 1:** Survey flight line specifications.

| Longitude (deg) | Latitude (deg) | Easting (m) | Northing (m) | N/S | E/W |
|---|---|---|---|---|---|
| 131.74072584 | 60.24202808 | 348276 | 6681517 | N | W |
| 131.62932453 | 60.21276789 | 354311 | 6678009 | N | W |
| 131.68036356 | 60.16455300 | 351266 | 6672756 | N | W |
| 131.79193463 | 60.19357657 | 345214 | 6676243 | N | W |

**Table 2:** Jaycee Tin survey block polygon coordinates using WGS 84 in UTM Zone 9N.

## 2.0 Geophysical Data

Geophysical data are collected in a variety of ways and are used to aid in determination of geology, mineral deposits, oil and gas deposits, geotechnical investigations, contaminated land sites, and UXO (unexploded ordnance) detection.

For the purposes of this survey, airborne magnetic and radiometric data were collected to serve in geological mapping and exploration for mineral deposits.

### 2.1 Magnetic Data

Magnetic surveying is the most common airborne geophysical technology used for both mineral and hydrocarbon exploration. Aeromagnetic surveys measure and record the total intensity of the magnetic field at the magnetometer sensor, which is a combination of the desired magnetic field generated in the Earth as well as small variations due to the temporal effects of the constantly varying solar wind and the magnetic field of the survey aircraft. By subtracting the temporal, regional, and aircraft effects, the resulting aeromagnetic map shows the spatial distribution and relative abundance of magnetic minerals - most commonly the iron oxide mineral magnetite - in the upper levels of Earth's crust, which in turn are related to lithology, structure, and alteration of bedrock. Survey specifications, instrumentation, and

interpretation procedures depend on the objectives of the survey. Magnetic surveys are typically performed for:

- Geological Mapping - to aid in mapping lithology, structure, and alteration.
- Depth to Basement Mapping - for exploration in sedimentary basins or mineralization associated with the basement surface.

## 2.2 Radiometric Data

Radiometric surveys are used to determine either the absolute or relative amounts of uranium (U), thorium (Th), and potassium (K) in surface rocks and soils using natural radioactive emanations. Gamma radiation is utilized due to its greater penetration depth compared with alpha and beta radiation. Radiometric data are useful for mapping lithology, alteration, and structure as well as providing insights into weathering. For example, the natural radioactivity of igneous rocks generally increases with $SiO_2$ content and clay minerals tend to fix the natural radioelements.

Gamma rays are electromagnetic waves with frequencies between $10^{19}$ and $10^{21}$ Hz emitted spontaneously from an atomic nucleus during radioactive decay, in packets referred to as photons. The energy E transported by a photon is related to the wavelength $\lambda$ or frequency $\nu$ by the formula:

$$E = h\nu = hc/\lambda$$

where: $c$ is the velocity of light
$h$ is Planck's constant ($6.626 \times 10^{-34}$ joule).

All detectable gamma radiation from Earth materials comes from the natural decay products of three primary radioelements: U, Th, and K. Each individual nuclear species (isotope) emits gamma rays at one or more specific energies, as shown in Figure 5. Of the three main natural radioactive elements, only potassium ($^{40}K$) emits gamma energy directly, at 1.46 MeV. Uranium ($^{238}U$) and thorium ($^{232}Th$) emit gamma rays through their respective decay series; $^{214}Bi$ at 1.76 MeV for uranium and $^{208}Tl$ at 2.61 MeV for thorium. Accordingly, the $^{214}Bi$ and $^{208}Tl$ measurements are considered equivalents for uranium (eU) and thorium (eTh), as the daughter products will be in equilibrium under most natural conditions.

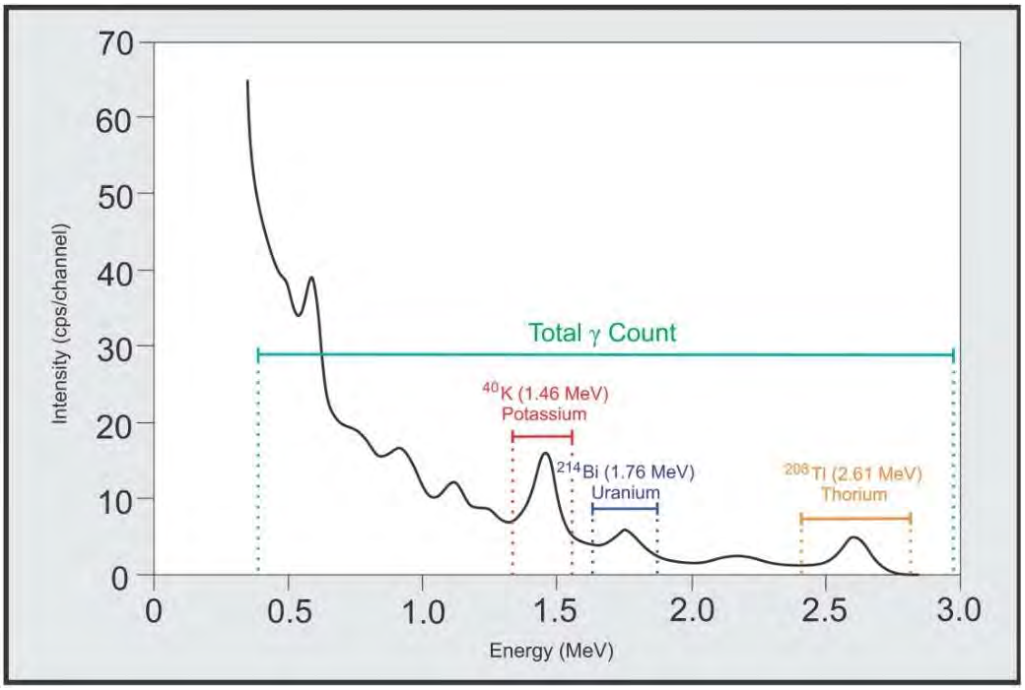



**Figure 5:** Typical natural gamma spectrum showing the three spectral windows ($^{40}$K 1.37-1.57 MeV, $^{214}$Bi 1.66-1.86 MeV, $^{208}$Tl 2.41-2.81 MeV) and total count (0.40-2.81 MeV) window.

Surficial debris, vegetation, standing water (lakes, marshes, swamps), and snow can effectively attenuate gamma rays originating from underlying rocks. Therefore, variations in isotope counts must be evaluated with respect to surficial conditions before they are attributed to changes in underlying geology. An increase in soil moisture can also significantly affect gamma radiation concentrations. For example, a 10% increase in soil moisture can decrease the measured gamma radiation by about the same amount. Radon isotopes are long-lived members of both the U and Th decay series and Ra mobility can influence radiometric surveys. In addition to being directly radioactive, $^{226}$Ra and $^{222}$Rn can attach to dust particles in the atmosphere. Radioactive precipitation of these dust particles by rain can lead to apparent increases of more than 2000% in uranium ground concentration (IAEA, 2003). Therefore, gamma ray surveying should not be carried out during a rainfall, or shortly after a rainfall.

## 3.0 Survey Operations

Survey operations began on July 7, 2018 and completed on July 9, 2018, in cloudy and windy conditions. The survey encountered minor delays due to poor weather: strong winds, rain showers, and low ceilings. The experience of the pilot ensured 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 geophysical surveying. Field processing and quality control checks were performed daily.

## 3.1 Operations Base and Crew

The base of operations was at Teslin airport (YZW), Yukon (Figure 6) west of Jaycee Tin survey block.

**Figure 6:** Map showing base of operations at Teslin airport (YZW), Yukon west of Jaycee Tin survey block.

The Precision geophysical crew consisted of four members (Table 3):

| Crew Member | Position |
|---|---|
| Harmen Keyser, P.Geo. | Helicopter survey pilot |
| Bruce Larsen | Geophysical operator |
| Jenny Poon, B.Sc., P.Geo. | Geophysicist and data processor (off-site) |
| Shawn Walker, M.Sc., P.Geo. | Geophysicist and data processor (off-site) |

**Table 3:** List of survey crew members.

## 3.2 Magnetic Base Station Specifications

Temporal magnetic field variations, such as diurnal variations, magnetic pulsations, and geomagnetic storms, were measured and recorded by two GEM GSM-19T proton precession magnetometers. The magnetic base stations were installed in an area (Table 4; Figures 7 and 8) of low magnetic noise away from metallic items such as ferromagnetic objects, vehicles, or power lines that could affect the base stations and ultimately the survey data.

| Station name | Easting/Northing | Longitude/Latitude | Datum/ Projection |
|---|---|---|---|
| GEM 1<br>S/N 8052735 | 0625897E,6672775N | 132° 43' 50.74" W<br>60° 10' 20.64" N | WGS 84,<br>Zone 8N |
| GEM 2<br>S/N 2065369 | 0625906E,6672772N | 132° 43' 50.16" W<br>60° 10' 20.53" N | WGS 84,<br>Zone 8N |

**Table 4:** Magnetic base station locations.

Magnetic readings were reviewed at regular intervals to ensure that no airborne data were collected during periods of high magnetic activity (greater than 10 nT change per minute).

**Figure 7:** GEM 1 and GEM 2 magnetic base stations located at Teslin airport, Yukon.

**Figure 8:** GEM 1 (left) and GEM 2 (right) magnetic base stations located in the bushes at Teslin airport, Yukon.

## 3.3 Field Processing and Quality Control

On a flight-by-flight basis, survey data were transferred from the aircraft's data acquisition system onto a USB memory stick and copied onto a field data processing laptop. The raw data files in PEI binary data format were converted into Geosoft GDB database format. Using Geosoft Oasis Montaj 9.3.3, the data were inspected to ensure compliance with contract specifications (Table 5; Figures 9 to 11). A radiometric test line was flown every survey day. The test line was used to monitor the effects of moisture on radiometric data and to monitor the behaviour of the gamma-ray spectrometer in the air over time.

| Parameter | Specification | Tolerance |
|---|---|---|
| Position | Line Spacing | Flight line deviation within 10 m L/R from ideal flight path. No exceedance for more than 1 km. |
| | Height | Nominal flight height of 35 m AGL with tolerance of +/- 10 m. No exceedance for more than 1 km, provided deviation is not due to tall trees, topography, mitigation of wildlife/livestock harassment, cultural features, or other obstacles beyond the pilot's control. |
| | GPS | GPS signals from four or more satellites must be received at all times, except where signal loss is due to topography. No exceedance for more than 1 km. |
| Magnetics | Temporal/Diurnal Variations | Non-linear magnetic temporal variations within 10 nT of a linear chord of length 1 minute. |
| | Normalized 4$^{th}$ Difference | Magnetic data within 0.20 nT peak to peak. No exceedance for distances greater than 1 km or more, provided noise is not due to geological or cultural features. |
| Radiometrics | Test Line Data | Gamma signal from each of the four spectrometer windows (K, Th, U, TC) over the test line must be within 12%. |

**Table 5:** Contract survey specifications.

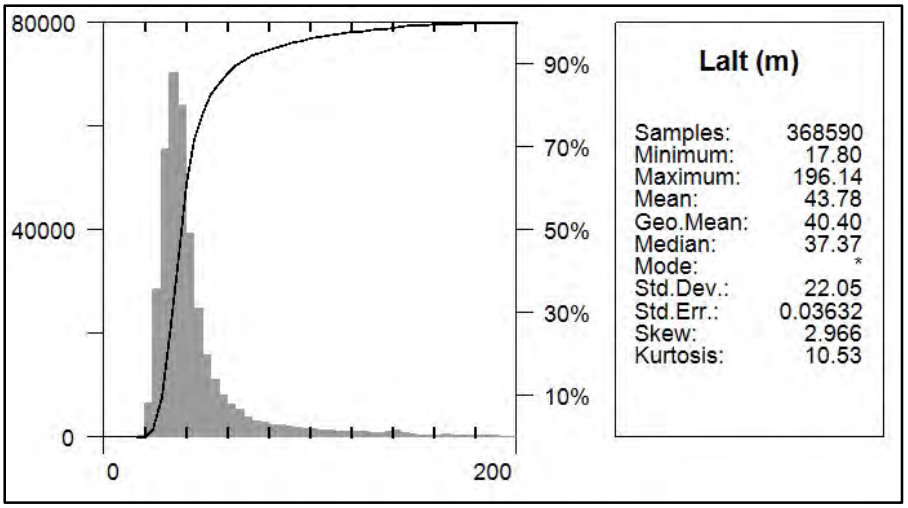



**Figure 9:** Histogram showing survey elevation vertically above ground.

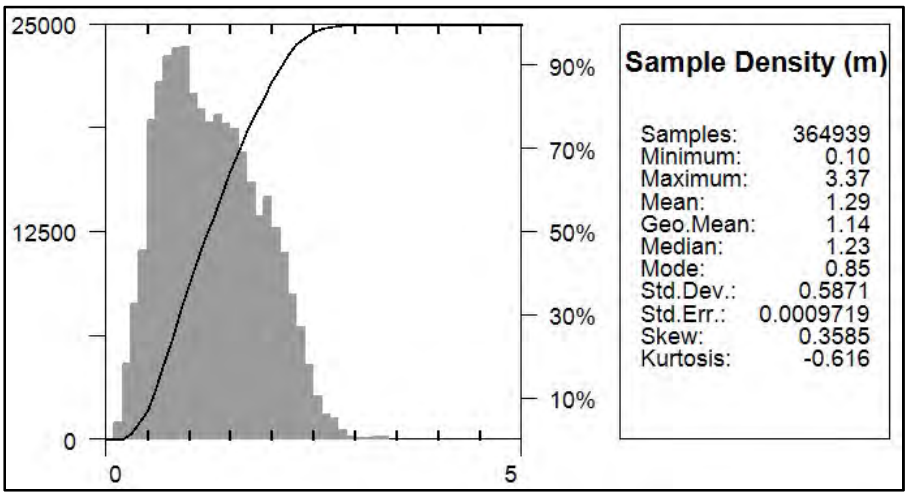



**Figure 10:** Histogram showing magnetic sample density. Linear distance in meters between adjacent measurement locations; magnetic sample frequency 20 Hz.

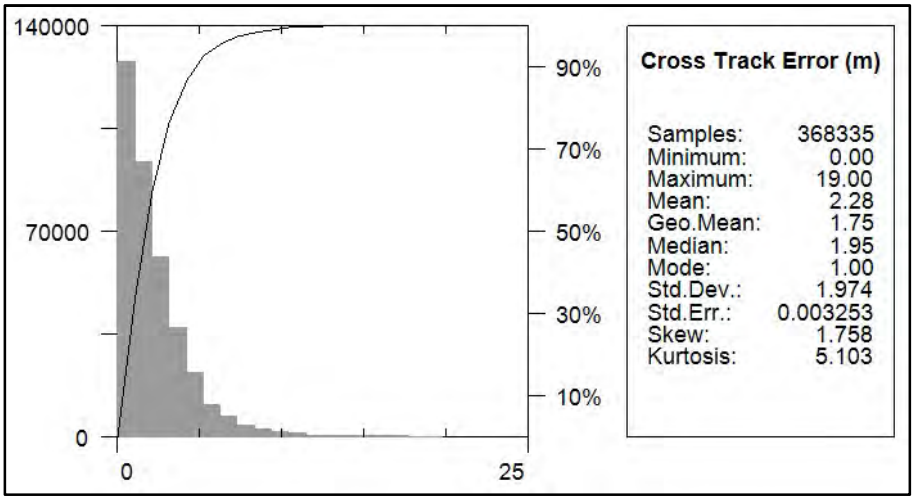



**Figure 11:** Histogram showing cross track error.

# 4.0 Aircraft and Equipment

All geophysical and subsidiary equipment were carefully installed on a Precision GeoSurveys aircraft to collect integrated magnetic and radiometric data.

## 4.1 Aircraft

Precision GeoSurveys flew the survey using an Airbus AS350 helicopter, registration C-GSVY, at a nominal height of 35 m AGL.

## 4.2 Geophysical Equipment

The survey aircraft (Figure 12) was equipped with a magnetometer, spectrometer, data acquisition system, laser altimeter, magnetic compensation system, barometer, temperature/humidity probe, pilot guidance unit (PGU), and GPS navigation system. In addition, two magnetic base stations were used to record temporal magnetic variations.

**Figure 12:** Survey helicopter equipped with geophysical equipment.

### 4.2.1 AGIS

The Airborne Geophysical Information System (AGIS), manufactured by Pico Envirotec, is the main computer used in integrated data recording, data synchronizing, displaying real-time quality control data for the geophysical operator (Figure 13) and the generation of navigation information for the pilot and operator display systems. Information such as magnetic field components, aircraft position, survey altitude, and survey speed are recorded to solid-state memory and can all be monitored on the on-board AGIS display for immediate quality control.

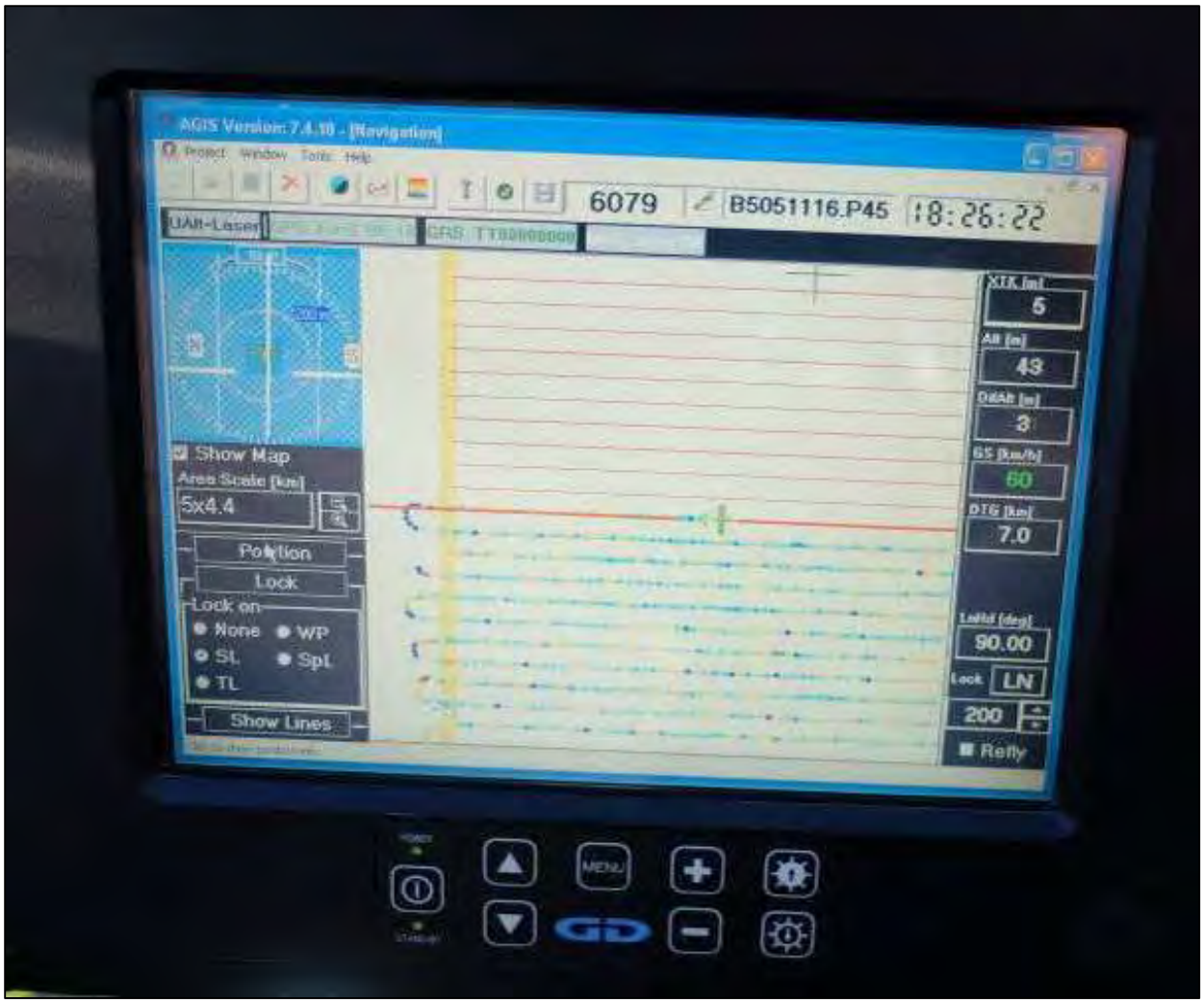



**Figure 13:** AGIS operator display installed in Airbus AS350 survey helicopter, with screen displaying real time flight line recording and navigation parameters. Additional windows display real time geophysical data to operator.

### 4.2.2 Magnetometer

A Scintrex CS-3 cesium vapor magnetometer (S/N 0706248) was used for this airborne survey. 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 +/- 0.01 nT. Magnetic data were recorded at 20 Hz. A separate fluxgate magnetometer determined the aircraft's attitude (pitches, rolls, and yaws) relative to the inclination and declination of the Earth's magnetic field, which was necessary to remove magnetic noise created by movement of the aircraft through a compensation process. The magnetic sensors were mounted on the front of the helicopter in an approved non-magnetic and non-conductive "stinger" configuration (Figures 14 and 15) to reduce influence from the aircraft's magnetic field.

**Figure 14:** View of magnetic "stinger" installation on survey helicopter.

**Figure 15:** View of cesium vapor magnetometer. Sensor oriented 45° from vertical to couple with local magnetic field at the Jaycee Tin survey block.

### 4.2.3 Spectrometer

The GRS-10 radiometric data acquisition system is a fully integrated gamma radiation detection system (Figure 16) containing a total of 21 litres of NaI(Tl) synthetic crystals; 16.8 litres downward-looking and 4.2 litres of upward-looking, 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 cosmic and solar gamma radiation originating from above the survey aircraft and is shielded from terrestrial radiation by the downward-looking crystals. All crystals are installed in the rear cabin of the helicopter away from variable fuel cell gamma attenuation.

**Figure 16:** GRS-10 thallium-activated sodium iodide gamma spectrometer crystal packs. The open unit on the right shows two individual 4.2 litre gamma detectors.

### 4.2.4 Magnetic Base Station

To monitor and record the Earth's temporal magnetic field variations, particularly diurnal, Precision GeoSurveys operated two GEM GSM-19T base station magnetometers at all times while airborne data were being collected. The base stations were located in an area with low magnetic gradient, away from electric power transmission lines and moving ferrous objects, such as motor vehicles, that could affect the survey data integrity.

The GEM GSM-19T magnetometer (Figure 17) with integrated GPS time synchronization uses proton precession technology with a 1 Hz sampling rate. The GSM-19T has an absolute accuracy of +/- 0.2 nT and sensitivity of 0.15 nT at 1 Hz. Base station magnetic data were recorded on internal solid-state memory and downloaded onto a field laptop computer using a serial cable and GEMLink 5.4 software. Profile plots of the base station readings were generated, updated, and reviewed at the end of each survey day.

**Figure 17:** GEM GSM-19T proton precession magnetometer.

### 4.2.5 Laser Altimeter

Terrain clearance is measured by an Opti-Logic RS800 Rangefinder laser altimeter (Figure 18) attached to the aft end of the magnetometer boom. The RS800 laser 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 natural surfaces with an accuracy of +/- 1 meter on 1 x 1 m 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, ground clearance data are transmitted to an RS-232 compatible port and recorded and displayed by the AGIS and PGU at 10 Hz in meters.

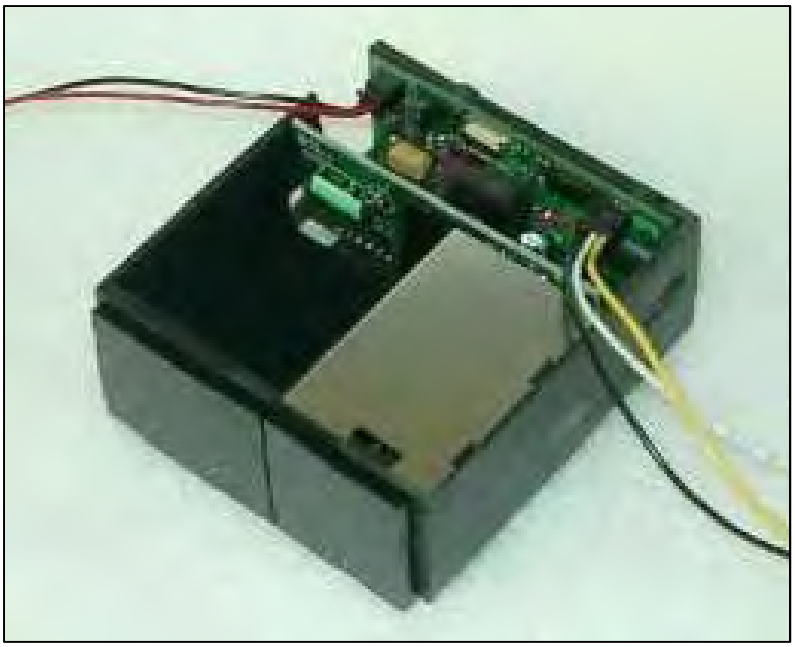


**Figure 18:** Opti-Logic RS800 Rangefinder laser altimeter.

### 4.2.6 Pilot Guidance Unit

Steering and elevation (ground clearance) information is continuously provided to the pilot by the Pilot Guidance Unit (PGU). The graphical display is mounted on top of the aircraft's instrument panel, remotely from the data acquisition system. The PGU is the primary navigation aid (Figure 19) to assist the pilot in keeping the aircraft on the planned flight path, heading, speed, and at the desired ground clearance.

**Figure 19:** PGU screen displaying navigation information.

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

### 4.2.7 GPS Navigation System

A Hemisphere R120 GPS receiver (Figure 20) navigation system integrated with the pilot display (PGU) and AGIS provided navigational information and control. The R120 GPS receiver supports fast updates and outputs messages at a rate of up to 20 Hz (20 times per second); delivering sub-meter positioning accuracy in three dimensions. It employs COAST technology

that allows continuous operation for at least 40 minutes during temporary differential signal outages.

The receiver supports GPS, SBAS (Satellite-Based Augmentation System), and L-Band (OmniSTAR HP and XP) differential corrections to provide accurate positioning.

**Figure 20:** Hemisphere R120 GPS receiver.

# 5.0 Data Acquisition Equipment Checks and Calibration

Airborne equipment tests and calibrations were conducted for the laser altimeter, magnetometer, and spectrometer. A lag test was performed for all three sensors. There were two tests conducted for the airborne magnetometer: compensation flight and heading error test. There were three tests conducted for the gamma spectrometer: calibration pad test, cosmic flight test, and altitude correction and sensitivity test.

## 5.1 Lag Test

A lag test was performed to determine the relationship between the time the digital reading was recorded for the magnetometer, gamma spectrometer, and laser altimeter with the position fix time that the fiducial of the reading was obtained by the GPS system resulting from a combination of system lag and different locations of the sensors and the GPS antenna. The test was flown in the four orthogonal survey headings over an identifiable magnetic anomaly at

survey speed and height. A lag of 2 fiducials (0.1 seconds) was determined for the magnetic sensor, 10 fiducials (0.5 seconds) was determined for the spectrometer, and 6 fiducials (0.3 seconds) was determined for the laser altimeter.

## 5.2 Magnetometer Tests

The magnetometer was tested and calibrated with a series of dedicated flights specifically for removing undesired effects of aircraft movement, speed, and heading direction.

### 5.2.1 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 aircraft's magnetic field. Movement of the aircraft (roll, pitch, and yaw) combined with the permanent magnetization of certain aircraft parts (in particular the engine and other ferrous magnetic objects) contribute to this noise. The aircraft was degaussed using proprietary technology prior to starting the survey and the remaining magnetic noise was removed by a process called magnetic compensation.

A magnetic compensation flight was completed (Table 6). The process consists of a series of prescribed maneuvers where the aircraft flies in the four orthogonal headings required for the survey (030°/120°/210°/300° in the case of this survey) at a sufficient altitude (typically > 2,500 m AGL) in an area of low magnetic gradient where the Earth's magnetic field becomes nearly uniform at the scale of the compensation flight. In each heading direction, three specified roll, pitch, and yaw maneuvers (total 36) are performed by the pilot at constant elevation so that any magnetic variation recorded by the airborne magnetometer can be attributed to aircraft movement. These maneuvers are recorded by the airborne fluxgate magnetometer and provide the data that are required to calculate the necessary parameters for compensating the magnetic data to remove aircraft noise from survey data.

| Pre-Compensation | | | | | Post-Compensation | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Heading** | **Roll** | **Pitch** | **Yaw** | **Total** | **Heading** | **Roll** | **Pitch** | **Yaw** | **Total** |
| 030° | 3.3631 | 1.4039 | 1.2360 | 6.0030 | 030° | 0.2117 | 0.2282 | 0.2179 | 0.6578 |
| 120° | 3.2375 | 1.9732 | 0.7200 | 5.9307 | 120° | 0.2231 | 0.2309 | 0.2919 | 0.7459 |
| 210° | 2.8217 | 1.9758 | 1.0202 | 5.8177 | 210° | 0.2239 | 0.2277 | 0.2712 | 0.7228 |
| 300° | 2.5146 | 0.9512 | 0.4816 | 3.9474 | 300° | 0.2057 | 0.1493 | 0.1711 | 0.5261 |
| **Total** | 11.9369 | 6.3041 | 3.4578 | | **Total** | 0.8644 | 0.8361 | 0.9521 | |
| **FOM (nT) = 21.6988** | | | | | **FOM (nT) = 2.6526** | | | | |

**Table 6:** Figure of Merit maneuver test results for 030°/120°/210°/300° compensation flight.

### 5.2.2 Heading Error Test

To determine the magnetic heading effect a cloverleaf pattern flight test was conducted. The cloverleaf test was flown in the same orthogonal headings (Table 7) as the survey and tie lines (030°/120°/210°/300°) at >1000 m AGL in an area with low magnetic gradient. For the cloverleaf test, the survey aircraft must pass over the same mid-point all four times at the same elevation so that any change in measured magnetic intensity can be attributed to heading.

| Heading | Fiducial | Mag (nT) | Correction (nT) |
|---|---|---|---|
| 030° | 768.95 | 54812.79 | 2.91 |
| 120° | 856.20 | 54823.85 | -8.15 |
| 210° | 663.15 | 54815.74 | -0.04 |
| 300° | 953.80 | 54810.42 | 5.28 |
| | **Average** | 54815.70 | |
| | **Total** | | 0.00 |

**Table 7:** Heading error test data format.

## 5.3 Gamma-ray Spectrometer Tests and Calibrations

Calibration and testing of the GRS-10 airborne gamma-ray spectrometry system was 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 altitude correction and sensitivity test. 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 Specifications for Airborne Gamma-Ray Surveys*.

### 5.3.1 Calibration Pad Test

The calibration pad test was conducted by Pico Envirotec using GSC (Geological Survey of Canada) portable calibration pads. The pads are slabs of concrete containing known concentrations of the radioelements (K, Th, and U) and are used to simulate ideal geological sources of radiation. The measurements collected from the calibration pad test were used to determine the Compton scattering and Grasty backscatter (spectral overlap between element windows) coefficients.

### 5.3.2 Cosmic Flight Test

While the background source of gamma radiation from the aircraft itself is essentially constant, the amount of signal detected from ground sources varies with ground clearance. As the height of the aircraft increases, the distance between the ground and the spectrometer crystals increases, and the proportion of cosmic radiation in each spectral window increases exponentially due to radiation of cosmic origin. 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 at the following elevations in meters above ground; 900, 1500, 2100, 2400, and 2700, for approximately 2 minutes each to collect gamma data used to determine the amount of non-terrestrial gamma signal.

### 5.3.3 Altitude Correction and Sensitivity Test

The altitude and sensitivity test is 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, 60, 90, 120, 150, 210, 270, and 360, for 2 minutes each. As the distance of the aircraft increases above the radioactive ground 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 data were collected, several procedures were undertaken to ensure that the data met a high standard of quality. All magnetic and radiometric data recorded by the AGIS are converted into Geosoft or ASCII file formats by using Pico Envirotec software. Further processing (Figure 21) was carried out using Geosoft Oasis Montaj 9.3.3 geophysical processing software along with proprietary processing algorithms.

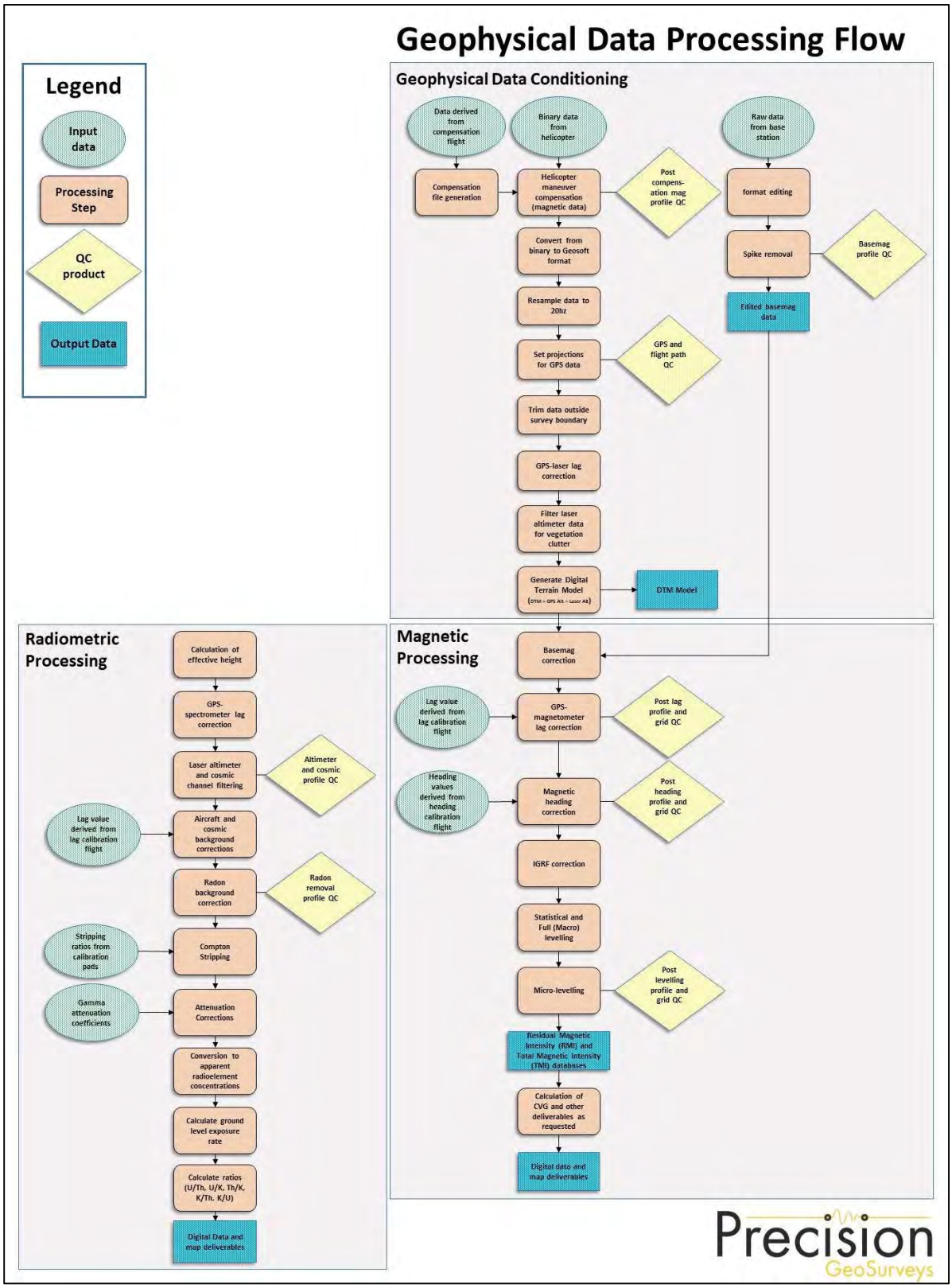



**Figure 21:** Magnetic and radiometric data processing flow.

## 6.1 Flight Height and Digital Terrain Model

A lag correction of 0.3 seconds was applied to the raw laser data to compensate for the combination of lag in the recording system and the difference in position of the laser altimeter and the GPS antenna.

Laser altimeters cannot provide valid data over glassy water, fog, or dense vegetation. Over areas with dense vegetation a certain proportion of the laser signal does not penetrate through the trees to record actual ground clearance and high frequency variations are recorded. A Rolling Statistics filter was applied to the laser data to remove vegetation clutter followed by a Low Pass filter which was used to smooth out the laser altimeter profile to eliminate isolated high frequency noise and generate a surface closely corresponding to the actual ground profile.

A Digital Terrain Model (DTM) channel was calculated by subtracting the processed laser altimeter data from the filtered GPS altimeter data defined by the WGS 84 ellipsoidal height. DTM accuracy is affected by the geometric relationship between the GPS antenna and the laser altimeter as well as flight attitude of the aircraft, slope of the ground, and sample density.

## 6.2 Magnetic Processing

Raw magnetic data, as collected by the airborne instruments, were corrected for flight maneuvers, temporal variations, lag, and heading. The data were examined for magnetic noise and spikes, which were removed as required. Survey and tie line data of the resulting total magnetic field were leveled and the background magnetic field, International Geomagnetic Reference Field of the Earth, removed.

### 6.2.1 Flight Compensation

Data obtained from the compensation flight test were applied to the raw magnetic data as the first step of data processing. A 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 data from each survey flight.

### 6.2.2 Base Station Correction

The next step in processing the compensated magnetic data was to correct for temporal variation of the Earth's magnetic field. Magnetic data from base station GEM 1 were used for correcting the airborne magnetic survey data, and GEM 2 data were retained for backup. The data were edited, plotted, and merged into a Geosoft database (.GDB) on a daily basis.

The base station measurements were averaged to establish a magnetic base reference datum at 56600.0 nT, and this value was used to calculate the observed magnetic base station deviations resulting from variations of the Earth's magnetic field over time with reference to the datum. The airborne magnetic data were then corrected for temporal variations by subtracting the base station deviations from the data collected on the aircraft, which effectively removed the effects of diurnal and other temporal variations.

### 6.2.3 Lag Correction

Following the base station correction, a lag correction of 0.1 seconds was applied to each total magnetic field data point to compensate for the combination of lag in the recording system and the magnetometer sensor flying 14.7 m ahead of the GPS antenna.

### 6.2.4 Heading Correction

For each survey heading, changes in instrument magnetic fields along a survey flight line are detected and these systematic shifts are recorded. These values are used to construct a heading .TBL table file. An intersection table was created, containing all magnetic field values where tie lines intersected the survey lines and the overall average magnetic field value was calculated. For each of the four headings, the averages were calculated and then compared to the overall average to determine four values to be used for heading error correction.

### 6.2.5 IGRF Removal

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 satellite data and from magnetic 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). Accordingly, the 12th generation IGRF (IGRF-12), an IGRF model for epoch 2015.0 was used with the actual survey date obtained from the "Date" channel.

Residual Magnetic Intensity (RMI) was calculated by taking the difference between IGRF and the non-leveled Total Magnetic Intensity (TMI). This created a more valid model of individual near-surface anomalies so that the data were not referenced to a specific time. This will allow for other magnetic data (historic or future) to be more easily incorporated into each survey database.

### 6.2.6 Leveling and Micro-leveling

Residual Magnetic Intensity (RMI) data from survey and tie lines were used to level the entire survey dataset. Two types of leveling were applied to the corrected data: conventional leveling

and micro-leveling. There were two components to conventional leveling; statistical leveling to level tie lines and full leveling to level survey lines. The statistical leveling method corrected the SL/TL intersection errors that follow a specific pattern or trend. Through the error channel, an algorithm calculated a least-squares trend line and derived a trend error curve, which was then added to the channel to be leveled. The second component was full leveling. This adjusted the magnetic value of the survey lines so that all lines matched the trended tie lines at each intersection point.

Following statistical leveling, micro-leveling was applied to the corrected conventional leveled data. This iterative grid-based process removed low amplitude components of flight line noise that still remained in the data after tie line and survey line leveling and resulted in fully leveled RMI data. The IGRF was then added back onto the RMI to allow for the production of a leveled TMI grid and map.

### 6.2.7 Reduced to Magnetic Pole

Reduced to Magnetic Pole (RTP) data were computed from the leveled Residual Magnetic Intensity (RMI) data. The RTP filter was applied in the Fourier domain and it migrates the observed magnetic inclination and declination field to what the field would look like at the north magnetic pole.

### 6.2.8 Calculation of First Vertical Derivative

The first vertical derivative was computed from the leveled Residual Magnetic Intensity (RMI) data. The first vertical derivative calculates the vertical rate of change in the magnetic field. It is used to enhance shorter wavelength signals; therefore, edges of magnetic anomalies are highlighted, and deep geologic sources in the data are suppressed.

The first vertical derivative calculated from the RMI was designated as Calculated Vertical Derivative of RMI, or CVG.

Vertical derivative to the $n^{th}$ derivative is:

$$L(r) = r^n$$

### 6.2.9 Calculation of Horizontal Gradient

The Calculated Horizontal Gradient (CHG) is the magnitude of the total horizontal gradient. It is used to estimate contact locations of magnetic bodies at shallow depths, reveal anomaly texture, and highlight anomaly-pattern discontinuities.

If $M$ is the magnetic field, then the CHG is calculated as:

$$\mathrm{CHG}(x,y) = \sqrt{\left(\frac{\partial M}{\partial x}\right)^2 + \left(\frac{\partial M}{\partial y}\right)^2}$$

## 6.3 Radiometric Processing

Radiometric surveys map gamma rays from the concentration of radioelements at or near Earth's surface; typically, up to 1.5 meters below surface. Before any processing of the airborne radiometric data, the spectrometer system is calibrated with the calibration pad test, cosmic flight test, and altitude correction and sensitivity test. Once calibration of the system was complete, the radiometric data were processed by windowing the full spectrum to create individual channels for U, Th, K, and total count.

Steps taken to process acquired radiometric data are summarized below:

- Calculation of effective height
- Lag Correction
- Aircraft and Cosmic background corrections
- Radon background correction
- Stripping ratios
- Attenuation corrections
- Conversion to apparent radioelement concentrations

### 6.3.1 Calculation of Effective Height

Laser/Radar altimeter data were converted to effective height ($h_{ef}$) in meters using the acquired laser/radar altimeter, temperature and pressure data, according to the formula below:

$$h_{ef} = h * \frac{273.15}{T + 273.15} * \frac{P}{1013.25}$$

where: $h$ is observed laser/radar altitude in meters
$T$ is measured air temperature in degrees Celsius
$P$ is barometric pressure in millibars

### 6.3.2 Lag Correction

Following the calculation of effective height, a lag correction of 0.5 seconds was applied to each radiometric channel to compensate for the combination of lag in the recording system and the difference in position of the spectrometer and the GPS antenna.

### 6.3.3 Aircraft and Cosmic Background Corrections

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

$$C_{ac} = \mathrm{a}_c + b_c * Cos_f$$

where: $C_{ac}$ is the background and cosmic corrected channel
$\mathrm{a}_c$ is the aircraft background for this channel
$b_c$ is the cosmic stripping coefficient for this channel
$Cos_f$ is the filtered cosmic channel

### 6.3.4 Radon Background Correction

To strip the effects of atmospheric radon from the downward-looking detectors, there are multiple methods available for radon background estimation. The method selected was the background table method. Procedures to the background table method and how to determine the radiometric values filled within the table in detail are outlined in the IAEA 1363 report, *Guidelines for Radioelement Mapping using Gamma Ray Spectrometry Data*.

### 6.3.5 Compton Stripping

Spectral overlap corrections are applied to potassium, uranium, and thorium as part of the Compton stripping process. This is 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.

Stripping ratios α, β, and γ are first modified according to altitude. Then an adjustment factor (derived from the cosmic flight test), the reversed stripping ratio, uranium into thorium, is calculated.

$$\alpha_h = \alpha + h_{ef} * 0.00049$$

$$\beta_h = \beta + h_{ef} * 0.00065$$

$$\gamma_h = \gamma + h_{ef} * 0.00069$$

where: $\alpha, \beta. \gamma$ are the Compton stripping coefficients
$\alpha_h, \beta_h. \gamma_h$ are the height corrected Compton stripping coefficients
$h_{ef}$ is the effective height above ground in metres at STP

The stripping corrections are then carried out using the following formulas:

$$Th_c = Th_{bc}(1 - g\beta_h) + U_{bc}(b\gamma_h - a) + K_{bc}(ag - b)/A$$

$$U_c = Th_{bc}(g\beta_h - \alpha_h) + U_{bc}(1 - b\beta_h) + K_{bc}(b\alpha_h - g)/A$$

$$K_c = [Th_{bc}(\alpha_h\gamma_h - \beta_h) + U_{bc}(a\beta_h - \gamma_h) + K_{bc}(1 - a\alpha_h)]/A$$

where: $U_c$, $Th_c$, and $K_c$ are stripping corrected uranium, thorium and potassium
$\alpha_h$, $\beta_h$. $\gamma_h$ are height corrected Compton stripping coefficients
$U_{bc}$, $Th_{bc}$, and $K_{bc}$ are background corrected uranium, thorium and potassium
$a$ is the spectral ratio Th/U
$b$ is the spectral ratio Th/K
$g$ is the spectral ratio U/K
$A = 1 - g\gamma_h - (\alpha_h - g\,\beta_h) - b(\beta_h - \alpha_h\,\gamma_h)$ is the backscatter correction

### 6.3.6 Attenuation Corrections

The total count, potassium, uranium, and thorium data are then corrected to a nominal survey altitude (corrected to remove vegetation clutter from radar/laser altimeter data), in this case the survey height was 35 meters. This is done according to the equation:

$$C_a = C * e^{\mu(h_{ef} - h_0)}$$

where: $C_a$ is the output altitude corrected channel
$C$ is the input channel
$\mu$ is the attenuation correction for that channel
$h_{ef}$ is the effective altitude, usually in m
$h_0$ is the nominal survey altitude used as datum

### 6.3.7 Conversion to Apparent Radioelement Concentrations

With all corrections applied to the radiometric data, the final step is to convert the corrected potassium ($^{40}$K), uranium (from $^{214}$Bi), and thorium (from $^{212}$Tl) 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 by using the following formula:

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

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)

### 6.3.8 Radiometric Ratios

To calculate some of the common radiometric ratios (U/Th, Th/K, and U/K and their inverses) the guidelines of the IAEA are followed. Due to statistical uncertainties in the individual radioelement measurements, care is taken during ratio calculation in order to obtain statistically significant values. Following IAEA guidelines, the method of determining ratios of the eU/eTh, eU/K and eTh/K is as follows:

1. Any data points where the potassium concentration is less than 0.25% are neglected.
2. The element with the lowest corrected count rate is determined.
3. The element concentrations of adjacent points on either side of each data point are summed until they exceed a pre-determined threshold value. This threshold is 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 are established to ensure meaningful ratios.
4. The ratios are calculated using the accumulated sums.

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

# 7.0 Deliverables

Survey data are presented as digital databases, maps, and a logistics report.

## 7.1 Digital Data

The digital files have been provided in two formats, the first is a .GDB file for use in Geosoft Oasis Montaj and the second format is a .XYZ (text) file. Full descriptions of the digital data and contents are included in the report (Appendix B).

The digital data were represented as grids, as 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 RMI
- Reduced to Magnetic Pole (RTP) – reduced to magnetic pole of RMI
- Calculated Horizontal Gradient (CHG) – total horizontal gradient of RMI
- Potassium – Percentage (%K)
- Thorium – Equivalent Concentration (eTh)
- Uranium – Equivalent Concentration (eU)
- Total Count – Equivalent Dose Rate (TCcor)
- Total Count – Exposure Rate (TCexp)
- Potassium over Thorium Ratio (%K/eTh)
- Potassium over Uranium Ratio (%K/eU)
- Uranium over Thorium Ratio (eU/eTh)
- Uranium over Potassium Ratio (eU/%K)
- Thorium over Potassium Ratio (eTh/%K)
- Thorium over Uranium Ratio (eTh/eU)
- Ternary Map (TM)

### 7.1.1 Grids

Digital data were gridded and displayed using the following Geosoft parameters:

- Grid cell size: 25 m
- Low-pass desampling factor: 2
- Tolerance: 0.001
- % pass tolerance: 99.99
- Maximum iterations: 100

All grids were drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

## 7.2 KMZ

The digital data represented as 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 Maps

Digital maps were created for Jaycee Tin survey block. The following map products were prepared:

Overview Maps (colour images with elevation contour lines):

- Actual flight lines, with property boundaries
- DTM

Magnetic Maps (colour images with elevation contour lines):

- TMI with actual flight lines
- TMI
- RMI
- CVG of RMI
- RTP of RMI
- CHG of RMI

Radiometric Maps (colour images with elevation contour lines):

- %K – Percentage
- eTh – Equivalent Concentration
- eU – Equivalent Concentration
- TCcor – Equivalent Dose Rate
- TCexp – Exposure Rate
- %K/eTh Ratio
- %K/eU Ratio
- eU/eTh Ratio
- eU/%K Ratio
- eTh/%K Ratio
- eTh/eU Ratio
- Ternary Map

All survey maps were prepared in WGS 84 and UTM Zone 9N.

## 7.4 Report

A pdf copy of the logistics report is included along with the digital data and maps. The report provides information on the data acquisition procedures, magnetic and radiometric processing, and presentation of the Jaycee Tin survey block data.

# 8.0 Conclusions and Recommendations

The Jaycee Tin survey was flown in windy conditions over steep terrain which included glacial cirques. Magnetic and radiometric signals have been locally compromised where the helicopter was unable to maintain constant ground clearance for safety reasons.

While the objective of geophysical data processing is to accurately represent the Earth's geophysical features, continual processing, such as the calculation of derivatives, can generate false features as the signal-to-noise ratio decreases. In addition, false features can appear near the edges of a survey block where gridding algorithms are unable to properly calculate grids, such as in "edge effects." Therefore, subtle geophysical features in derivative-enhanced map products or near the survey margins must be used with discretion.

The airborne geophysical data were acquired to map the geophysical characteristics of the survey area, which are in turn related to the distribution and concentration of magnetic minerals and radioactive elements in the Earth. Geophysical data are not a direct indication of mineral deposits and therefore interpretation and careful integration with existing and new geological, geochemical, and other geophysical data are recommended to maximize value from the survey investment.

# Appendix A

Equipment Specifications

- GEM GSM-19T Proton Precession Magnetometer (Magnetic Base Station)
- Hemisphere R120 GPS Receiver
- Opti-Logic RS800 Rangefinder Laser Altimeter
- Setra Model 276 Barometric Pressure
- Scintrex CS-3 Survey Magnetometer
- Billingsley TFM100G2 Ultra Miniature Triaxial Fluxgate Magnetometer
- Pico Envirotec GRS-10 Gamma Spectrometer
- Pico Envirotec AGIS data recorder system (for navigation and geophysical data acquisition)

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

| | |
|---|---|
| **Sensitivity** | 0.15 nT @ 1 Hz |
| **Resolution** | 0.01 nT (gamma), magnetic field and gradient |
| **Absolute accuracy** | ± 0.2 nT @ 1 Hz |
| **Operating Range** | 20,000 to 120,000 nT |
| **Gradient Tolerance** | Over 7,000 nT/m |
| **Operating Ranges** | Temperature: -40°C to +50°C<br>Battery Voltage: 10.0 V minimum to 15 V maximum<br>Humidity: up to 90% relative, non-condensing |
| **Storage Temperature** | -50°C to +50°C |
| **Dimensions** | Console: 223 x 69 x 40 mm<br>Sensor Staff: 4 x 450 mm sections<br>Sensor: 170 x 71 mm dia.<br>Weight: console 2.1 kg, sensor and staff assembly 2.2 kg |
| **Integrated GPS** | Yes |

## Hemisphere R120 GPS Receiver

| | | |
|---|---|---|
| **GPS Sensor** | Receiver Type | L1, C/A code, with carrier phase smoothing (Patented COAST technology during differential signal outage |
| | Channels | 12-channel, parallel tracking (10-channel when tracking SBAS) |
| | Update Rate | Up to 20 Hz position |
| | Cold Start Time | <60 s |
| | SBAS Tracking | 2-channel, parallel tracking |
| | Horizontal Accuracy | <0.02 m 95% confidence (RTK 1, 2) <0.28 m 95% confidence (L-Dif 1, 2) <0.6 m 95% confidence (DGPS 1,3) <2.5 m 95% confidence (autonomous, no SA1) |
| | Differential Options | SBAS, Autonomous, External RTCM, RTK, OmniSTAR (HP/XP) |
| **Beacon Sensor Specifications** | Channels | 2-channel, parallel tracking |
| | Frequency Range | 283.5 to 325 kHz |
| | MSK Bit Rates | 50, 100, and 200 bps |
| **L-Band Sensor** | Channels | Single channel |
| | Frequency Range | 1530 MHz to 1560 MHz |
| | Satellite Selection | Manual or Automatic (based on location) |
| | Startup and Satellite Reacquisition Time | 15 seconds typical |
| **Communications** | Serial Ports | 2 full duplex RS232C |
| | Baud Rates | 4800 – 115200 |
| | USB Ports | 1 Communications |
| | Correction I/O Protocol | RTCM SC-104 |
| | Data I/O Protocol | NMEA 0183 |
| | Timing Output | 1 PPS (HCMOS, active high, rising edge sync, 10 kΩ, 10 pF load) |
| | Raw Data | Proprietary binary (RINEX utility available) |
| **Environmental** | Operating Temperature | -30°C to +70°C |
| | Storage Temperature | -40°C to +85°C |
| | Humidity | 95% non-condensing |
| **Power** | Input Voltage Range | 8 to 36 VDC |
| | Power Consumption | 3 Watts |
| | Current Consumption | < 250 mA @ 12 VDC |
| | Antenna Voltage Output | 5.0 VDC |

[1] Depends on multipath environment, number of satellites in view, satellite geometry and ionospheric activity.
[2] Up to 5 km baseline length.
[3] Depends also on baseline length.

## Opti-Logic RS800 Rangefinder Laser Altimeter

| | |
|---|---|
| **Accuracy** | +/- 1 m on 1x1 $m^2$ diffuse target with 50% reflectivity, up to 700 m |
| **Resolution** | 0.2 m |
| **Communication Protocol** | RS232-8,N,1 |
| **Baud Rate** | 19200 |
| **Data Raw Counts** | ~200 Hz |
| **Data Calibrated Range** | ~10 Hz |
| **Calibrated Range Units** | Feet, Meters, Yards |
| **Laser** | Class I (eye-safe) 905 nm +/- 10 nm |
| **Power** | 7-9 VDC conditioned required, current draw at full power (~ 1.8 W) |
| **Laser Wavelength** | RS100 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 35 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) |
| **Weight** | < 227 g (8 oz) |
| **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. |

## Setra Model 276 Barometric Pressure

| | |
|---|---|
| **Pressure Ranges** | 600 to 1100 hPa/mb<br>800 to 1100 hPa/mb<br>0 to 20 psia |
| **Accuracy** | ±0.25% FS |
| **Output** | 0.1 to 5.1 VDC<br>0.5 to 4.5 VDC |
| **Excitation** | 12 VDC (9.0 to 14.5)<br>24 VDC (21.6 to 26.0)<br>5 VDC (4.9 to 7.1) |
| **Size** | 2” dia. x 1” (5 cm x 2.5 cm) |

## Scintrex CS-3 Magnetometer

| | |
|---|---|
| **Operating Principal** | Self-oscillating split-beam Cesium Vapor (non-radioactive $^{133}Cs$) |
| **Operating Range** | 15,000 to 105,000 nT |
| **Gradient Tolerance** | 40,000 nT/meter |
| **Operating Zones** | 10° to 85° and 95° to 170° |
| **Hemisphere Switching** | a) Automatic<br>b) Electronic control actuated by the control voltage levels (TTL/CMOS)<br>c) Manual |
| **Sensitivity** | 0.0006 nT √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<br>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”)<br>Length: 160 mm (6.3”)<br>Weight: 1.15 kg (2.6 lb) |
| **Sensor Electronics** | Diameter: 63 mm (2.5”)<br>Length: 350 mm (13.8”)<br>Weight: 1.5 kg (3.3 lb) |
| **Cable, Sensor to Sensor Electronics** | 3 m (9’ 8”), lengths up to 5 m (16’ 4”) available |
| **Operating Temperature** | -40°C to +50°C |
| **Humidity** | Up to 100%, splash proof |
| **Supply Power** | 24 to 35 Volts DC |
| **Supply Current** | Approx. 1.5 A at start up, decreasing to 0.5 A at 20°C |
| **Power Up Time** | Less than 15 minutes at -30°C |

## Billingsley TFM100G2 Ultra Miniature Triaxial Fluxgate Magnetometer

| | |
|---|---|
| **Axial Alignment** | Orthogonality better than ± 1° |
| **Input Voltage Options** | 15 to 34 VDC @ 30 mA |
| **Field Measurement Range Options** | ± 100 µT = ± 10V |
| **Accuracy** | ± 0.75% of full scale (0.5% typical) |
| **Linearity** | ± 0.015% of full scale |
| **Sensitivity** | 100 µV/nT |
| **Scale Factor Temperature Shift** | 0.007% full scale/°C |
| **Noise** | ≤12 pT rms/√Hz @ 1 Hz |
| **Output Ripple** | 3 mV peak to peak @ 2nd harmonic |
| **Analog Output at Zero Field** | ± 0.025 V |
| **Zero Shift with Temperature** | ± 0.6 nT/°C |
| **Susceptibility to Perming** | ± 8 nT shift with ± 5 Gauss applied |
| **Output Impedance** | 332 Ω ± 5% |
| **Frequency Response** | 3 dB @ > 500 Hz (to > 4 KHz wide band) |
| **Over Load Recovery** | ± 5 Gauss slew < 2 milliseconds |
| **Random Vibration** | > 20G rms 20 Hz to 2 KHz |
| **Temperature Range** | - 55°C to + 85°C |
| **Acceleration** | > 60G |
| **Weight** | 100 g |
| **Size** | 3.51 cm x 3.23 cm x 8.26 cm |
| **Connector** | Chassis mounted 9 pin male "D" type |

## Pico Envirotec GRS-10 Gamma Spectrometer

| | |
|---|---|
| **Crystal volume** | 16.8 litres of NaI(Tl) synthetic downward-looking crystals and 4.2 litre NaI(Tl) synthetic upward-looking crystal |
| **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® 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<br>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 litres. (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, U, K. No implanted sources |

# Pico Envirotec AGIS data recorder system

(for navigation and geophysical 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/AGRS, MMS4 Magnetometer, Totem 2A EM, A/D converter, temperature probe, humidity probe, barometric pressure probe, and laser altimeter. Output for the multi-parameter PGU (Pilot Guidance Unit) |
| **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** | 12 channel, WAAS/SBAS-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)<br>Data Format: Geosoft GBN and ASCII output<br>PEIConv: For survey preparation and survey plot after data acquisition |
| **Software** | Calibration: High voltage adjustment, linearity correction coefficients calculation, and communication test support<br>Real Time Data Collection: Automatic Gain real time control on natural isotopes and PC based test and calibration software suite |
| **Power Requirements** | 24 to 32 VDC |
| **Temperature** | Operating: -10°C to +55°C; storage: -20°C to +70°C |

# Appendix B

Digital File Descriptions

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

## Magnetic Database:

Abbreviations used in the GDB/XYZ files listed below:

| CHANNEL | UNITS | DESCRIPTION |
|---|---|---|
| **X_WGS84** | m | UTM Easting – WGS 84 Zone 9N |
| **Y_WGS84** | m | UTM Northing – WGS 84 Zone 9N |
| **Lon_deg** | Decimal degree | Longitude |
| **Lat_deg** | Decimal degree | Latitude |
| **Date** | yyyy/mm/dd | Dates of the survey flight(s) – Local |
| **FLT** | | Flight Line numbers |
| **LineNo** | | Line numbers |
| **STL** | | Number of satellite(s) |
| **GPSfix** | | 1 = non-differential<br>2 = WAAS/SBAS differential |
| **GPStime** | Hours:min:secs | GPS time (UTC) |
| **Geos_m** | m | Geoidal separation |
| **GHead_deg** | Decimal degree | Heading of the aircraft |
| **XTE_m** | m | Cross track error |
| **Galt** | m | GPS height – WGS 84 Zone 9N (ASL) |
| **Lalt** | m | Laser Altimeter readings (AGL) |
| **DTM** | m | Digital Terrain Model |
| **Sample_Density** | m | Linear distance in meters between adjacent measurement locations; sample frequency is 20 Hz |
| **Speed_km_hr** | km/hr | Ground speed of aircraft in km/hr |
| **basemag** | nT | Base station temporal data |
| **IGRF** | | International Geomagnetic Reference Field 2015; 12th generation |
| **Declin** | Decimal degree | Calculated declination of magnetic field |
| **Inclin** | Decimal degree | Calculated inclination of magnetic field |
| **TMI** | nT | Total Magnetic Intensity (levelled) |
| **RMI** | nT | Residual Magnetic Intensity (levelled) |

## Radiometric Database:

Abbreviations used in the GDB/XYZ files:

| CHANNEL | UNITS | DESCRIPTION |
|---|---|---|
| **X_WGS84** | m | UTM Easting – WGS 84 Zone 9N |
| **Y_WGS84** | m | UTM Northing – WGS 84 Zone 9N |
| **Lon_deg** | degree | Longitude |
| **Lat_deg** | degree | Latitude |
| **Date** | yyyy/mm/dd | Dates of the survey flight(s) – Local |
| **FLT** | | Flight numbers |
| **LineNo** | | Line numbers |
| **STL** | | Number of satellite(s) |
| **GPStime** | Hours:min:secs | GPS time (UTC) |
| **Geos_m** | m | Geoidal separation |
| **GPSFix** | | 1 = non-differential<br>2 = WAAS/SBAS differential |
| **GHead_deg** | degree | Heading of the aircraft |
| **XTE_m** | m | Flight line cross distance |
| **Galt** | m | GPS height – WGS 84 Zone 9N (ASL) |
| **Lalt** | m | Laser Altimeter readings (AGL) |
| **DTM** | m | Digital Terrain Model |
| **Sample_Density** | m | Linear distance in metres between adjacent measurement locations; sample frequency is 20 measurements per second |
| **Speed_km_hr** | km/hr | Ground speed of aircraft in km/hr |
| **BaroSTP_kPa** | KiloPascal | Barometric Altitude (Press and Temp Corrected) |
| **Temp_degC** | Degrees C | Air Temperature |
| **Press_kPa** | KiloPascal | Atmospheric Pressure |
| **COSFILT** | counts/sec | Spectrometer - Filtered Cosmic |
| **UPUFILT** | counts/sec | Spectrometer – Filtered Upward Uranium |
| **Kcor** | % | Concentration - Potassium |
| **Thcor** | ppm | Equivalent Concentration - Thorium |
| **Ucor** | ppm | Equivalent Concentration - Uranium |
| **TCcor** | µR | Equivalent Dose Rate |
| **TCexp** | µR/hour | Exposure Rate - SUM(%k, eU, eTh) * determined factors |
| **KThratio** | | Spectrometer –%K/eTh ratio |
| **KUratio** | | Spectrometer –%K/eU ratio |
| **ThKratio** | | Spectrometer – eTh/%K ratio |
| **ThUratio** | | Spectrometer – eTh/eU ratio |
| **UKratio** | | Spectrometer – eU/%K ratio |
| **UThratio** | | Spectrometer – eU/eTh ratio |

Grids: Jaycee Tin Survey Block, WGS 84 Datum, Zone 9N, cell size at 25 m

| FILE NAME | DESCRIPTION |
|---|---|
| 18110_JayceeTinBlock_DTM_25m.grd | Digital Terrain Model gridded at 25 m cell size |
| 18110_JayceeTinBlock_TMI_25m.grd | Total Magnetic Intensity gridded at 25 m cell size |
| 18110_JayceeTinBlock_RMI_25m.grd | Residual Magnetic Intensity gridded at 25 m cell size |
| 18110_JayceeTinBlock_CVG_25m.grd | Calculated Vertical Gradient of RMI gridded at 25 m cell size |
| 18110_JayceeTinBlock_RTP_25m.grd | Reduced to Magnetic Pole of RMI gridded at 25 m cell size |
| 18110_JayceeTinBlock_CHG_25m.grd | Calculated Horizontal Gradient of RMI gridded at 25 m cell size |
| 18110_JayceeTinBlock_Kcor_25m.grd | Potassium (%K) - concentration in percentage gridded at 25 m cell size |
| 18110_JayceeTinBlock_Thcor_25m.grd | Thorium (eTh) – equivalent concentration gridded at 25 m cell size |
| 18110_JayceeTinBlock_Ucor_25m.grd | Uranium (eU) – equivalent concentration gridded at 25 m cell size |
| 18110_JayceeTinBlock_TCcor_25m.grd | Total Count (TCcor) – equivalent dose rate gridded at 25 m cell size |
| 18110_JayceeTinBlock_TCexp_25m.grd | Total Count (TCexp) – exposure rate gridded at 25 m cell size |
| 18110_JayceeTinBlock_KThratio_25m.grd | Potassium over Thorium ratio (%K/eTh) gridded at 25 m cell size |
| 18110_JayceeTinBlock_KUratio_25m.grd | Potassium over Uranium ratio (%K/eU) gridded at 25 m cell size |
| 18110_JayceeTinBlock_UThratio_25m.grd | Uranium over Thorium ratio (eU/eTh) gridded at 25 m cell size |
| 18110_JayceeTinBlock_UKratio_25m.grd | Uranium over Potassium ratio (eU/%K) gridded at 25 m cell size |
| 18110_JayceeTinBlock_ThKratio_25m.grd | Thorium over Potassium ratio (eTh/%K) gridded at 25 m cell size |
| 18110_JayceeTinBlock_ThUratio_25m.grd | Thorium over Uranium ratio (eTh/eU) gridded at 25 m cell size |

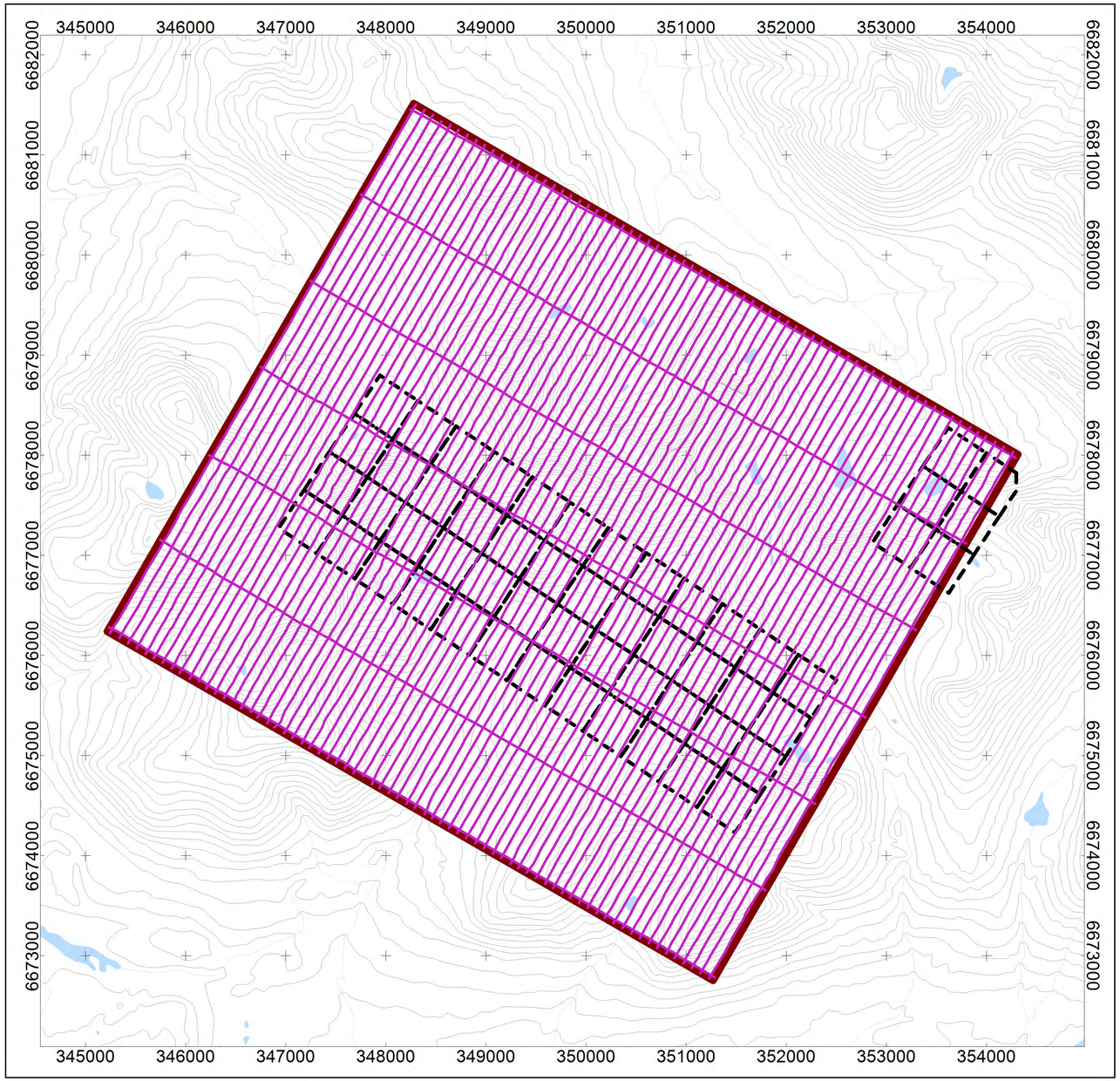
Maps: Jaycee Tin Survey Block, WGS 84 Datum, Zone 9N (jpegs and pdfs)

| FILE NAME | DESCRIPTION |
|---|---|
| 18110_JayceeTinBlock_ActualFlightLines | Plotted actual flown flight lines |
| 18110_JayceeTinBlock_DTM_25m | Digital Terrain Model gridded at 25 m cell size |
| 18110_JayceeTinBlock_TMI_wFL_25m | Total Magnetic Intensity gridded at 25 m cell size with plotted actual flown flight lines |
| 18110_JayceeTinBlock_TMI_25m | Total Magnetic Intensity gridded at 25 m cell size |
| 18110_JayceeTinBlock_RMI_25m | Residual Magnetic Intensity gridded at 25 m cell size |
| 18110_JayceeTinBlock_CVG_25m | Calculated Vertical Gradient of RMI gridded at 25 m cell size |
| 18110_JayceeTinBlock_RTP_25m | Reduced to Magnetic Pole of RMI gridded at 25 m cell size |
| 18110_JayceeTinBlock_CHG_25m | Calculated Horizontal Gradient of RMI gridded at 25 m cell size |
| 18110_JayceeTinBlock_Kcor_25m | Potassium (%K) - concentration in percentage gridded at 25 m cell size |
| 18110_JayceeTinBlock_Thcor_25m | Thorium (eTh) – equivalent concentration gridded at 25 m cell size |
| 18110_JayceeTinBlock_Ucor_25m | Uranium (eU) – equivalent concentration gridded at 25 m cell size |
| 18110_JayceeTinBlock_TCcor_25m | Total Count (TCcor) – equivalent dose rate gridded at 25 m cell size |
| 18110_JayceeTinBlock_TCexp_25m | Total Count (TCexp) – exposure rate gridded at 25 m cell size |
| 18110_JayceeTinBlock_KThratio_25m | Potassium over Thorium ratio (%K/eTh) gridded at 25 m cell size |
| 18110_JayceeTinBlock_KUratio_25m | Potassium over Uranium ratio (%K/eU) gridded at 25 m cell size |
| 18110_JayceeTinBlock_UThratio_25m | Uranium over Thorium ratio (eU/eTh) gridded at 25 m cell size |
| 18110_JayceeTinBlock_UKratio_25m | Uranium over Potassium ratio (eU/%K) gridded at 25 m cell size |
| 18110_JayceeTinBlock_ThKratio_25m | Thorium over Potassium ratio (eTh/%K) gridded at 25 m cell size |
| 18110_JayceeTinBlock_ThUratio_25m | Thorium over Uranium ratio (eTh/eU) gridded at 25 m cell size |
| 18110_JayceeTinBlock_TernaryMap_25m | Displaying ratios of all three elements (%K, eTh, eU) |

# Plates

Jaycee Tin Survey Block
Scale 1:25,000

- Plate 1: Jaycee Tin Block - Actual Flight Lines (FL)
- Plate 2: Jaycee Tin Block - Digital Terrain Model (DTM)
- Plate 3: Jaycee Tin Block - Total Magnetic Intensity with Actual Flight Lines (TMI_wFL)
- Plate 4: Jaycee Tin Block - Total Magnetic Intensity (TMI)
- Plate 5: Jaycee Tin Block - Residual Magnetic Intensity (RMI)
- Plate 6: Jaycee Tin Block - Calculated Vertical Gradient (CVG) of RMI
- Plate 7: Jaycee Tin Block - Reduced to Magnetic Pole (RTP) of RMI
- Plate 8: Jaycee Tin Block - Calculated Horizontal Gradient (CHG) of RMI
- Plate 9: Jaycee Tin Block - Potassium – Percentage (%K)
- Plate 10: Jaycee Tin Block - Thorium – Equivalent Concentration (eTh)
- Plate 11: Jaycee Tin Block - Uranium – Equivalent Concentration (eU)
- Plate 12: Jaycee Tin Block - Total Count – Equivalent Dose Rate (TCcor)
- Plate 13: Jaycee Tin Block - Total Count – Exposure Rate (TCexp)
- Plate 14: Jaycee Tin Block - Potassium over Thorium Ratio (%K/eTh)
- Plate 15: Jaycee Tin Block - Potassium over Uranium Ratio (%K/eU)
- Plate 16: Jaycee Tin Block - Uranium over Thorium Ratio (eU/eTh)
- Plate 17: Jaycee Tin Block - Uranium over Potassium Ratio (eU/%K)
- Plate 18: Jaycee Tin Block - Thorium over Potassium Ratio (eTh/%K)
- Plate 19: Jaycee Tin Block - Thorium over Uranium Ratio (eTh/eU)
- Plate 20: Jaycee Tin Block - Ternary Map (TM)

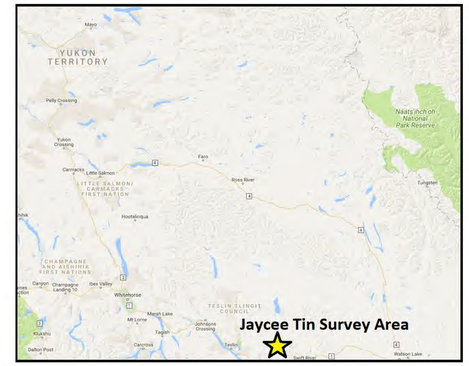



Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

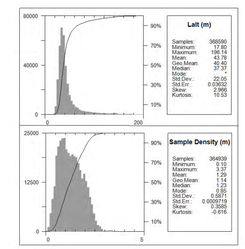
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 7, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

- Water Bodies
- Jaycee Tin Survey Block Boundary
- Claim Outlines
- Actual Flight Lines

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

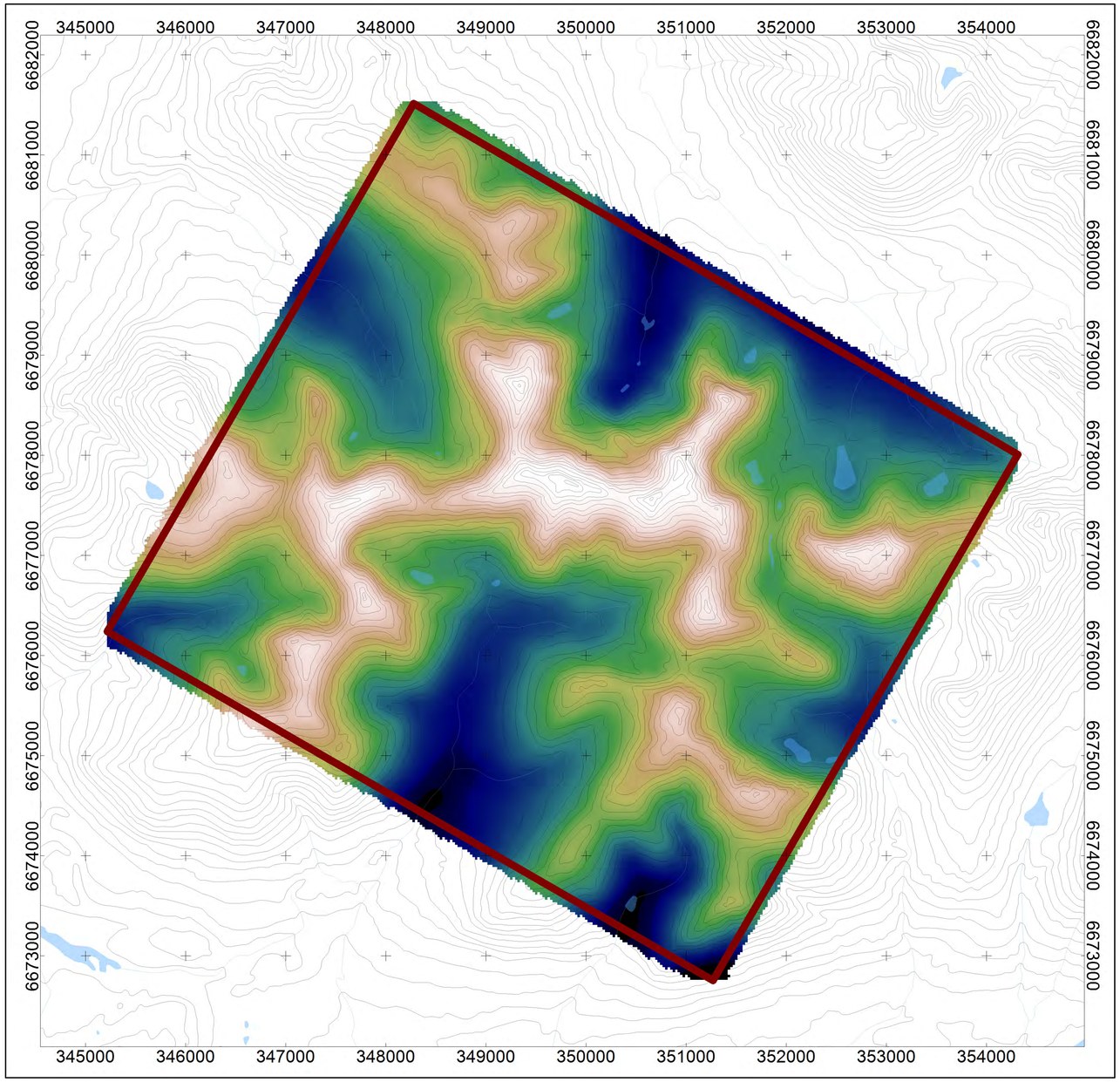
## Overview Map

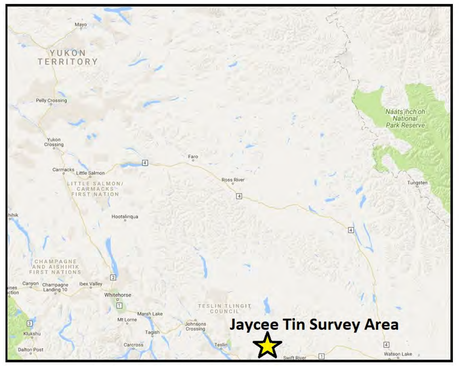
Jaycee Tin Survey Block
Actual Flight Lines

Precision GeoSurveys

Job#18110
Aug 1, 2018

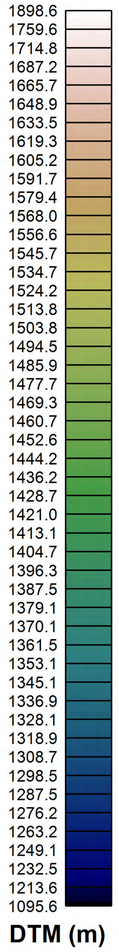
Plate1
FL




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |




**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

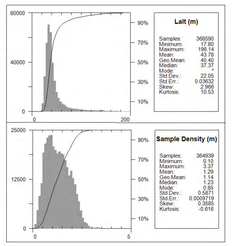
**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |

| | |
|---|---|
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....
Jaycee Tin Survey Block Boundary.....

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

Scale 1:25000

500 0 500 1000 1500
(meters)
*WGS 84 / UTM zone 9N*

# Jaycee Prospecting Syndicate

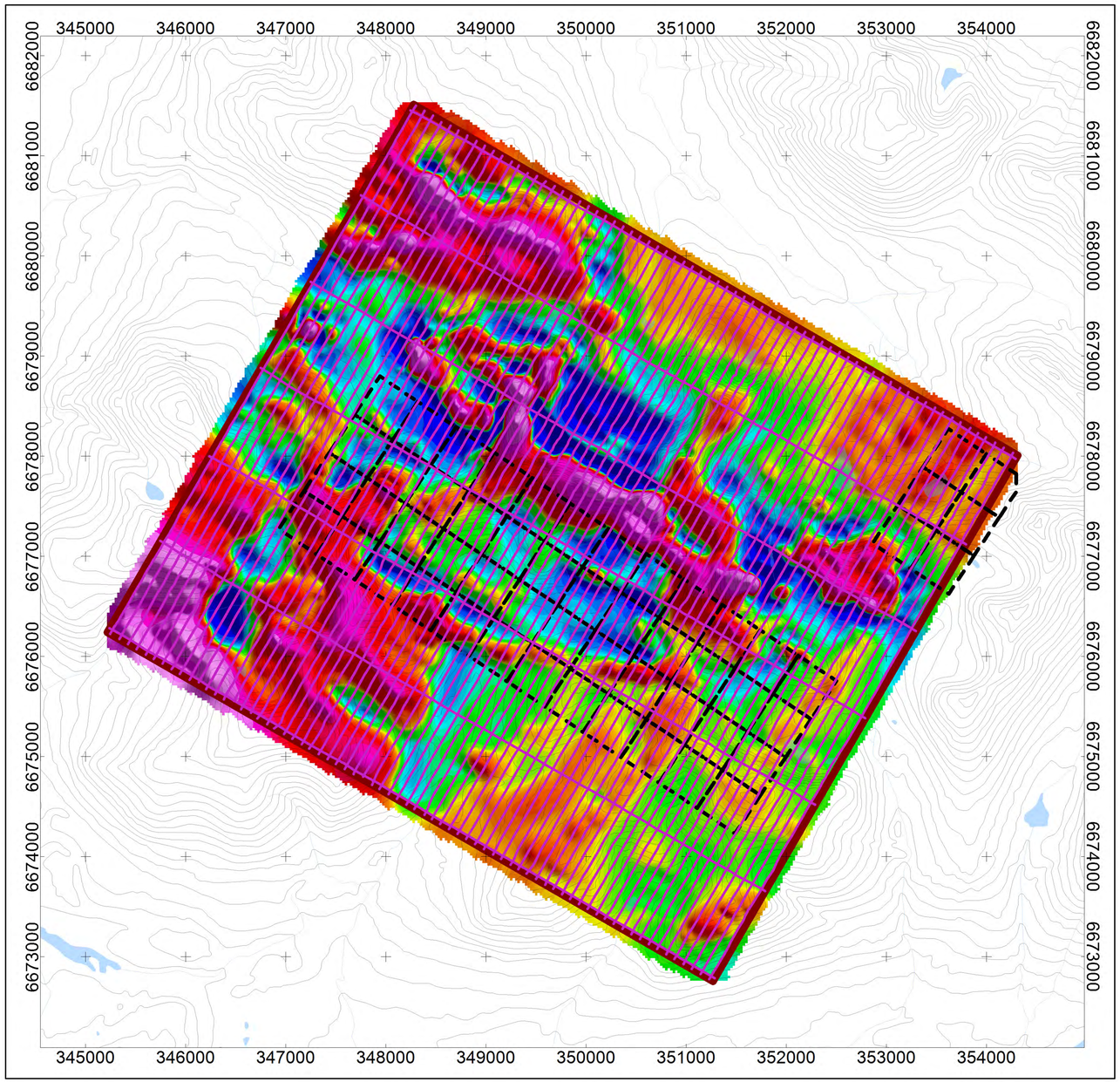
## Overview Map

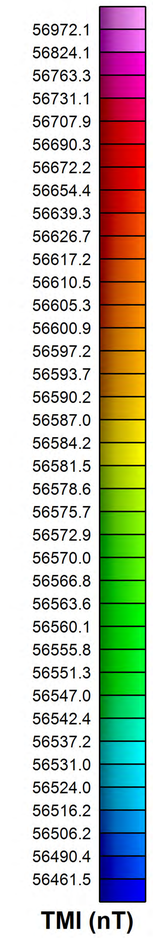
Jaycee Tin Survey Block
Digital Terrain Model

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate2
DTM



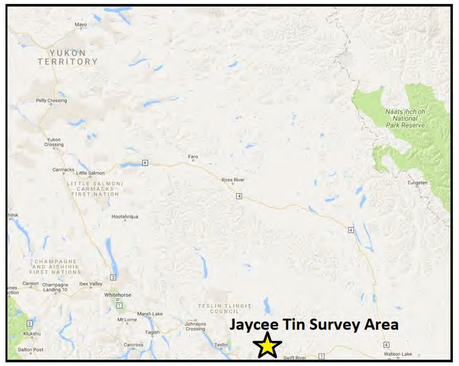




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

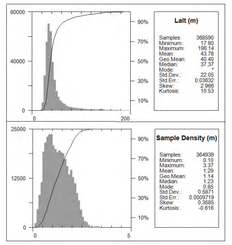
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




### Legend

- Water Bodies.....
- Jaycee Tin Survey Block Boundary.....
- Claim Outlines.....
- Actual Flight Lines.....

**DATA REFERENCE**

Magnetic data have been compensated and corrected for temporal variations, lag, and heading, and then leveled to generate the Total Magnetic Intensity (TMI) grid. Refer to report for details. The TMI is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

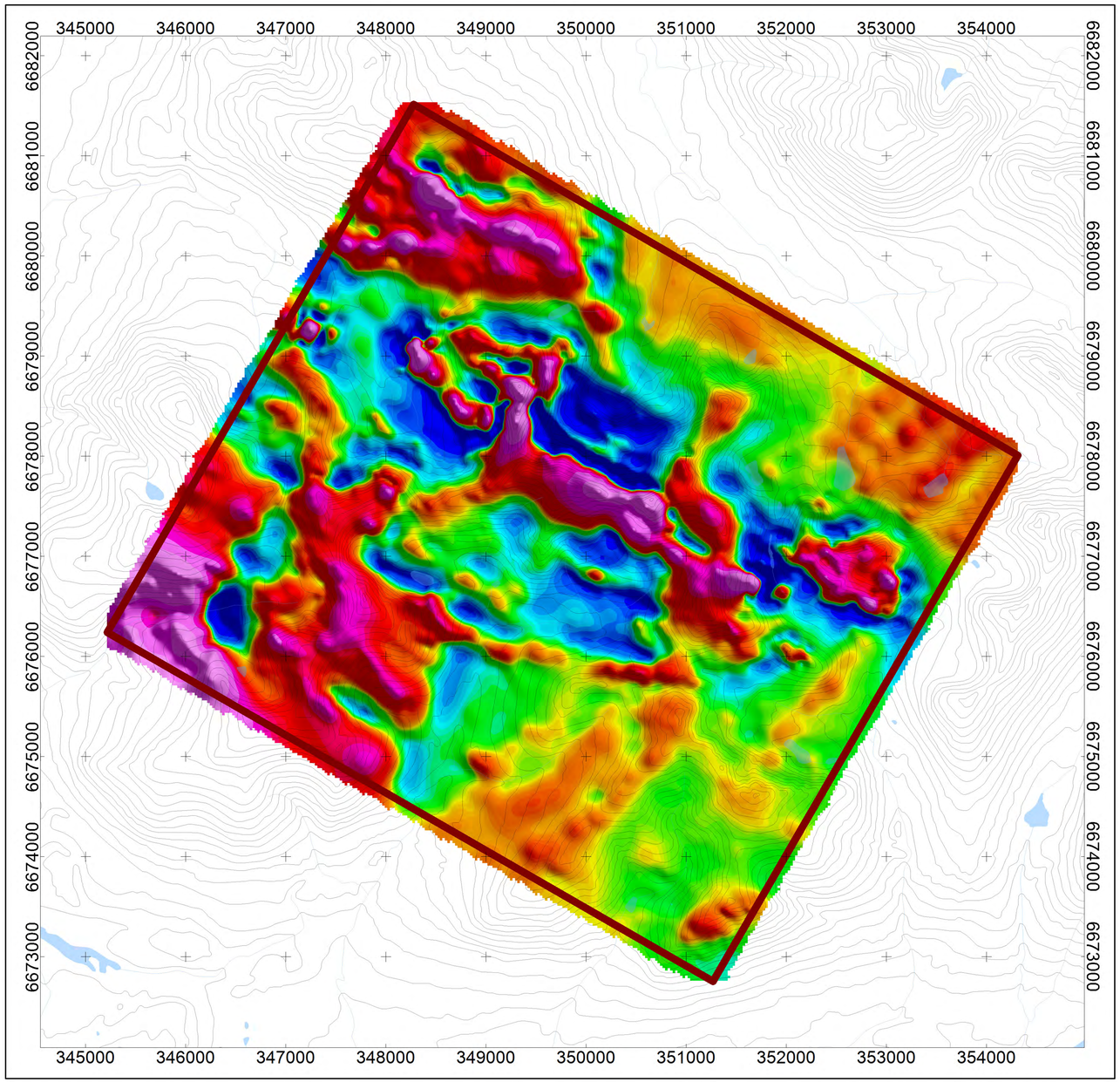
## Magnetic Map

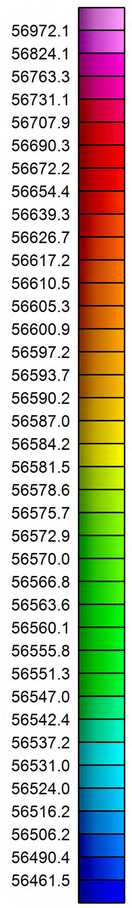
Jaycee Tin Survey Block
Total Magnetic Intensity with Actual Flight Lines

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate3
TMI_wFL



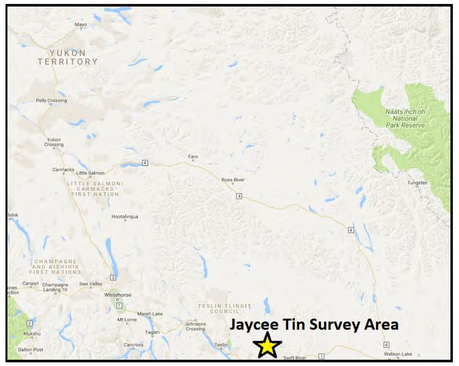




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

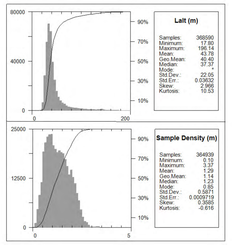
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Magnetic data have been compensated and corrected for temporal variations, lag, and heading, and then leveled to generate the Total Magnetic Intensity (TMI) grid. Refer to report for details. The TMI is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

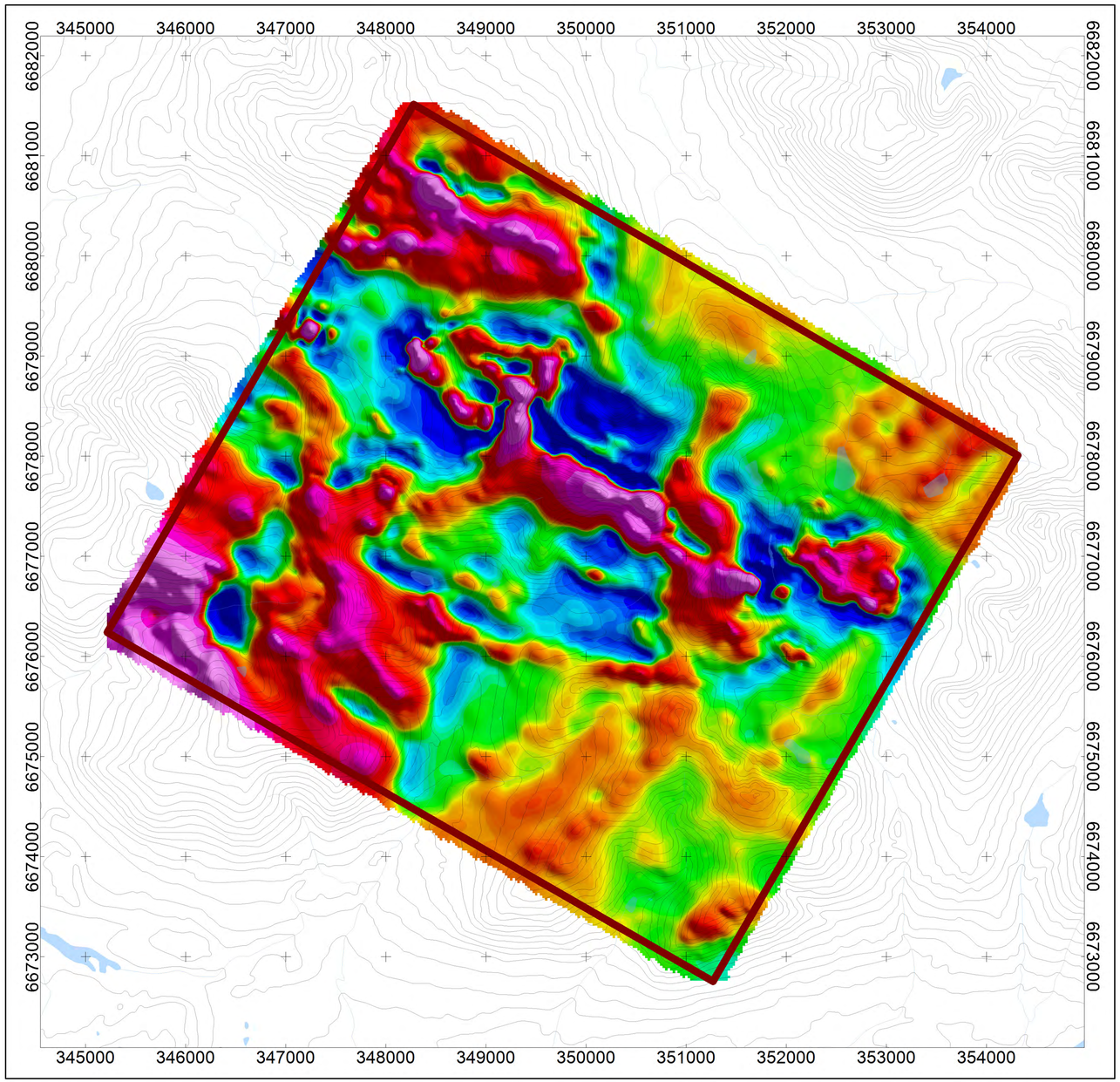
## Magnetic Map

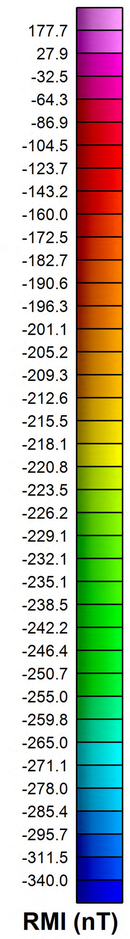
Jaycee Tin Survey Block
Total Magnetic Intensity

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate4
TMI



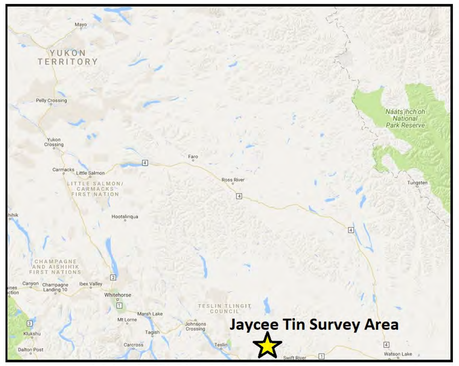




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

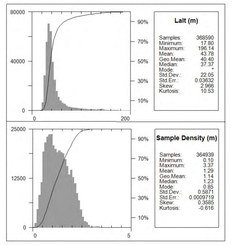
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Residual Magnetic Intensity (RMI) is computed by taking the difference between Total Magnetic Intensity (TMI) and IGRF. Refer to report for details. The RMI is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

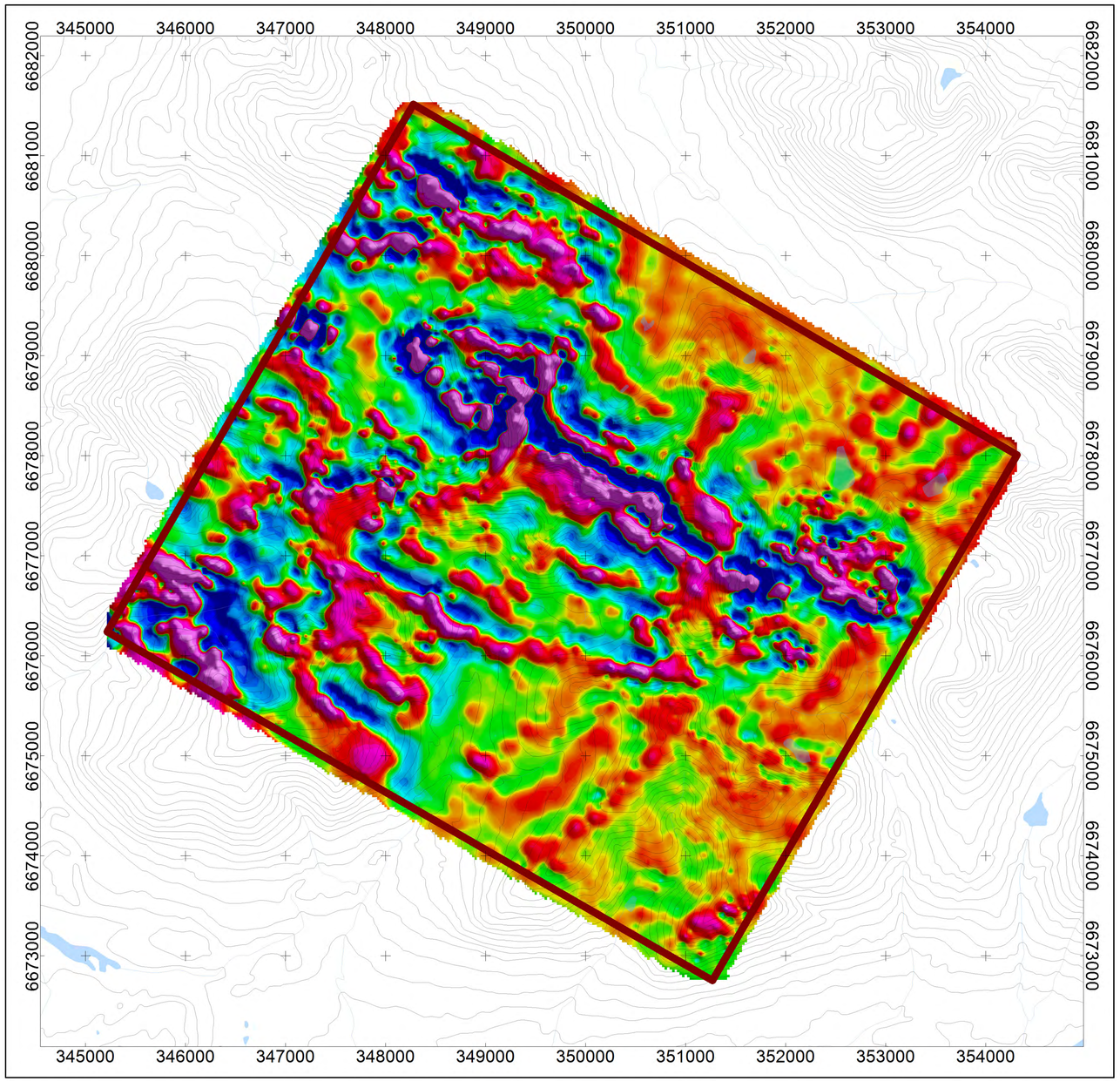
## Magnetic Map

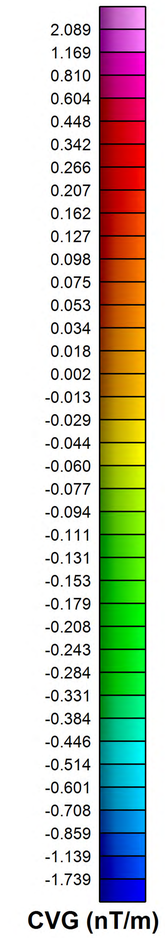
Jaycee Tin Survey Block
Residual Magnetic Intensity

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate5
RMI



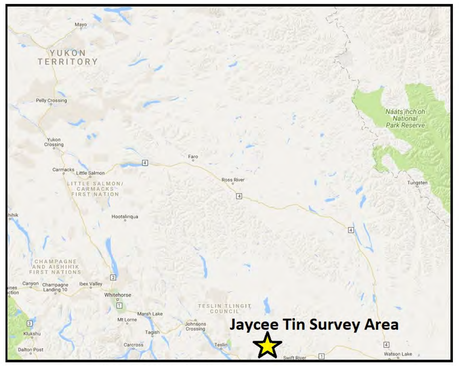




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

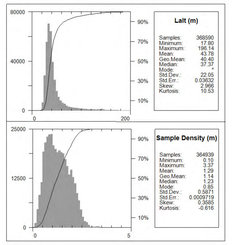
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

The Calculated Vertical Gradient (CVG) is the first vertical derivative of Residual Magnetic Intensity (RMI). Refer to report for details. The CVG is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

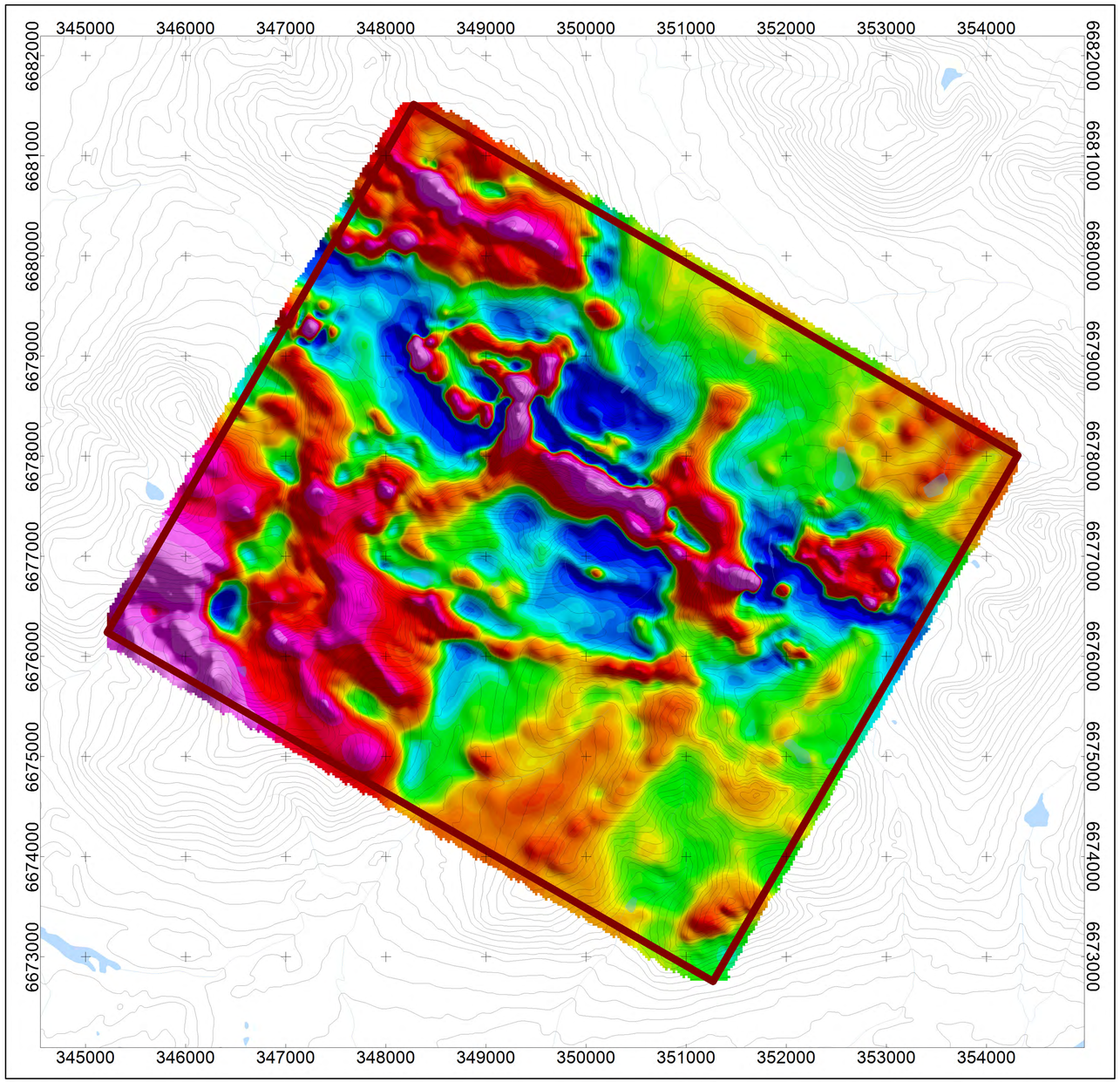
## Magnetic Map

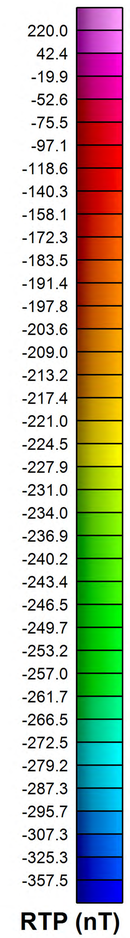
Jaycee Tin Survey Block
Calculated Vertical Gradient

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate6
CVG



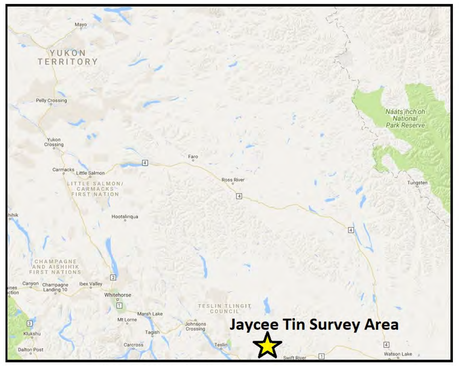




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

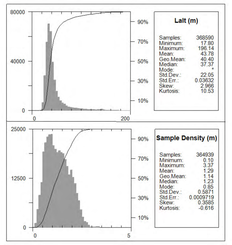
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

The Reduced to Magnetic Pole (RTP) is computed from Residual Magnetic Intensity (RMI). Refer to report for details. The RTP is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

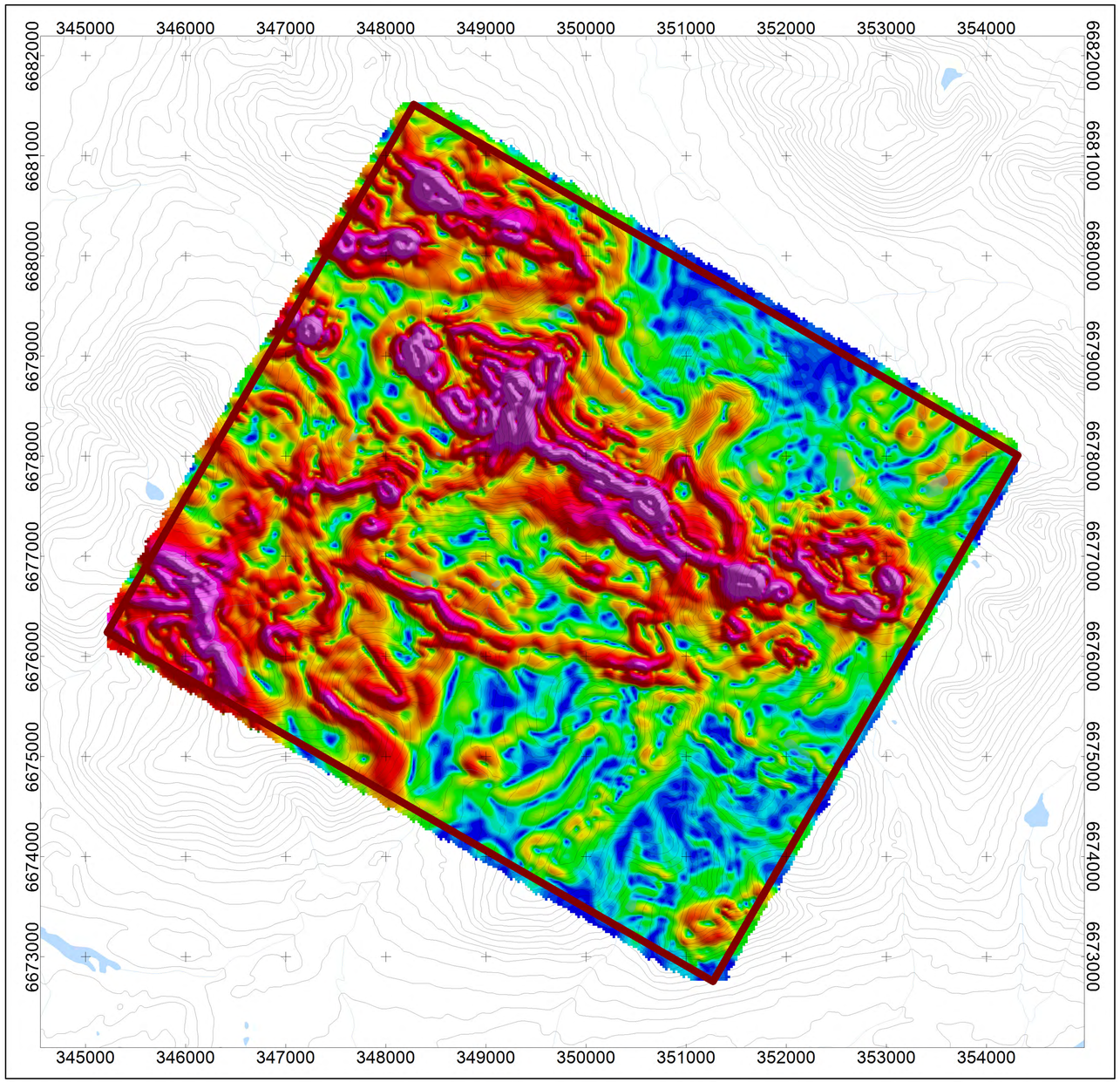
## Magnetic Map

Jaycee Tin Survey Block
Reduced to Magnetic Pole

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate7
RTP

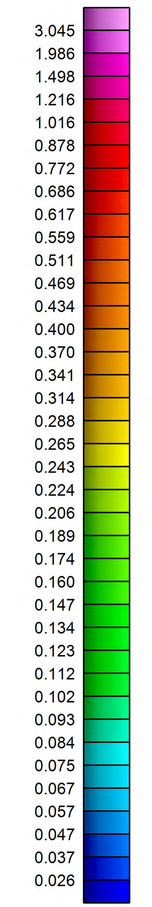


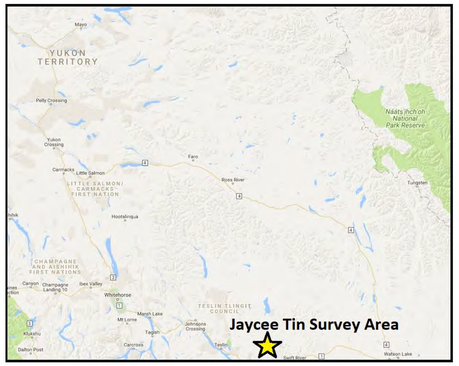

Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

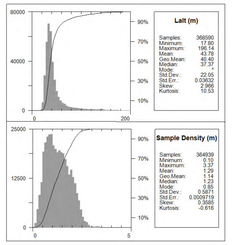
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

The Calculated Horizontal Gradient (CHG) is the magnitude of the horizontal gradient of Residual Magnetic Intensity (RMI). Refer to report for details. The CHG is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

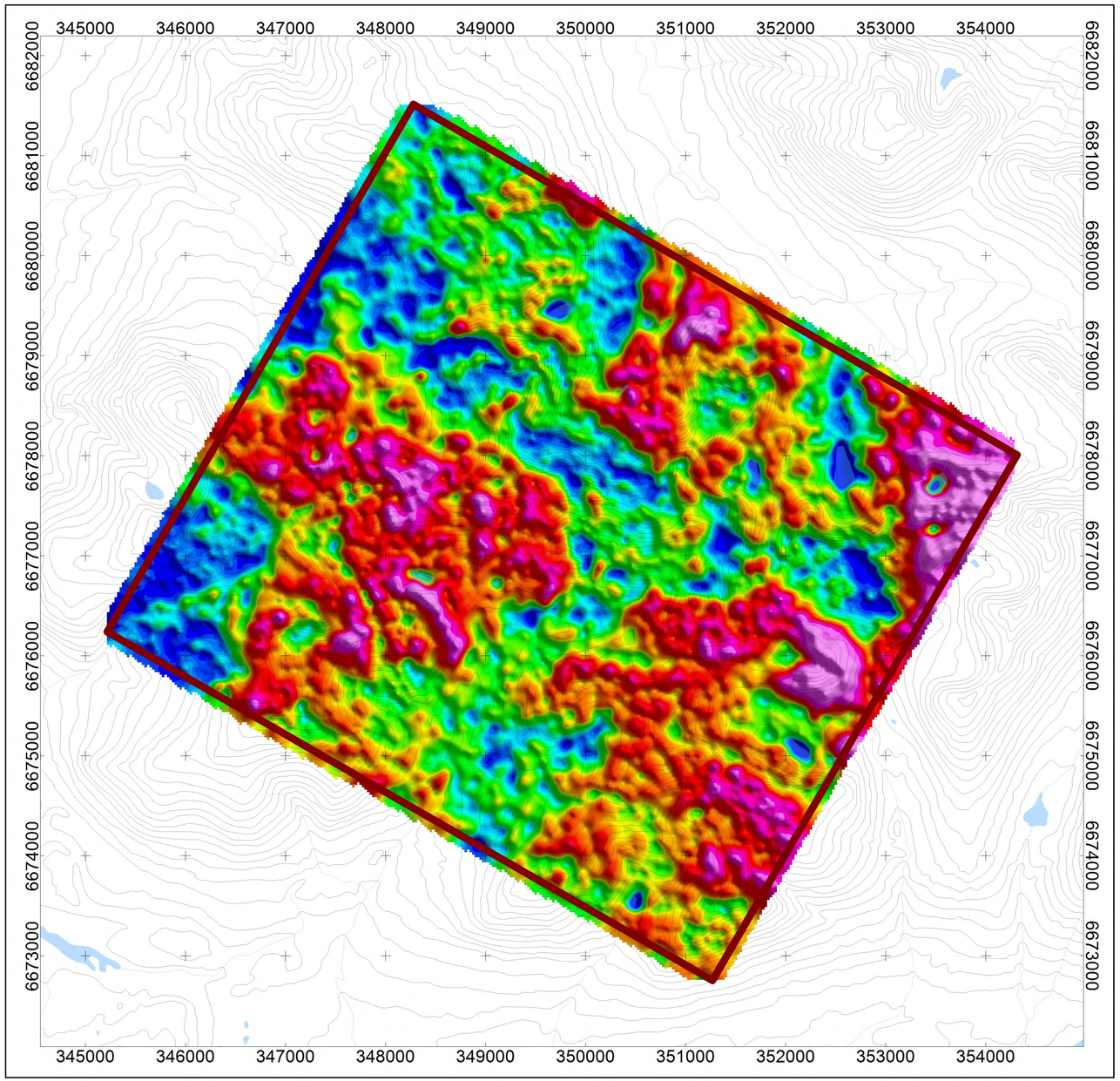
## Magnetic Map

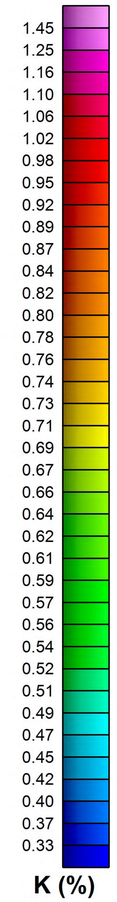
Jaycee Tin Survey Block
Calculated Horizontal Gradient

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate8
CHG



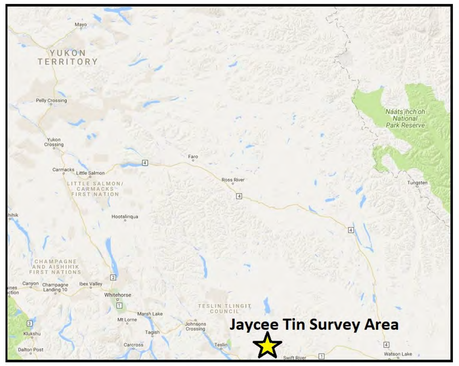




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

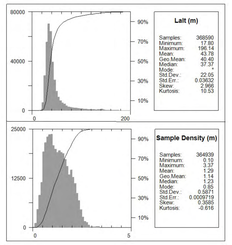
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

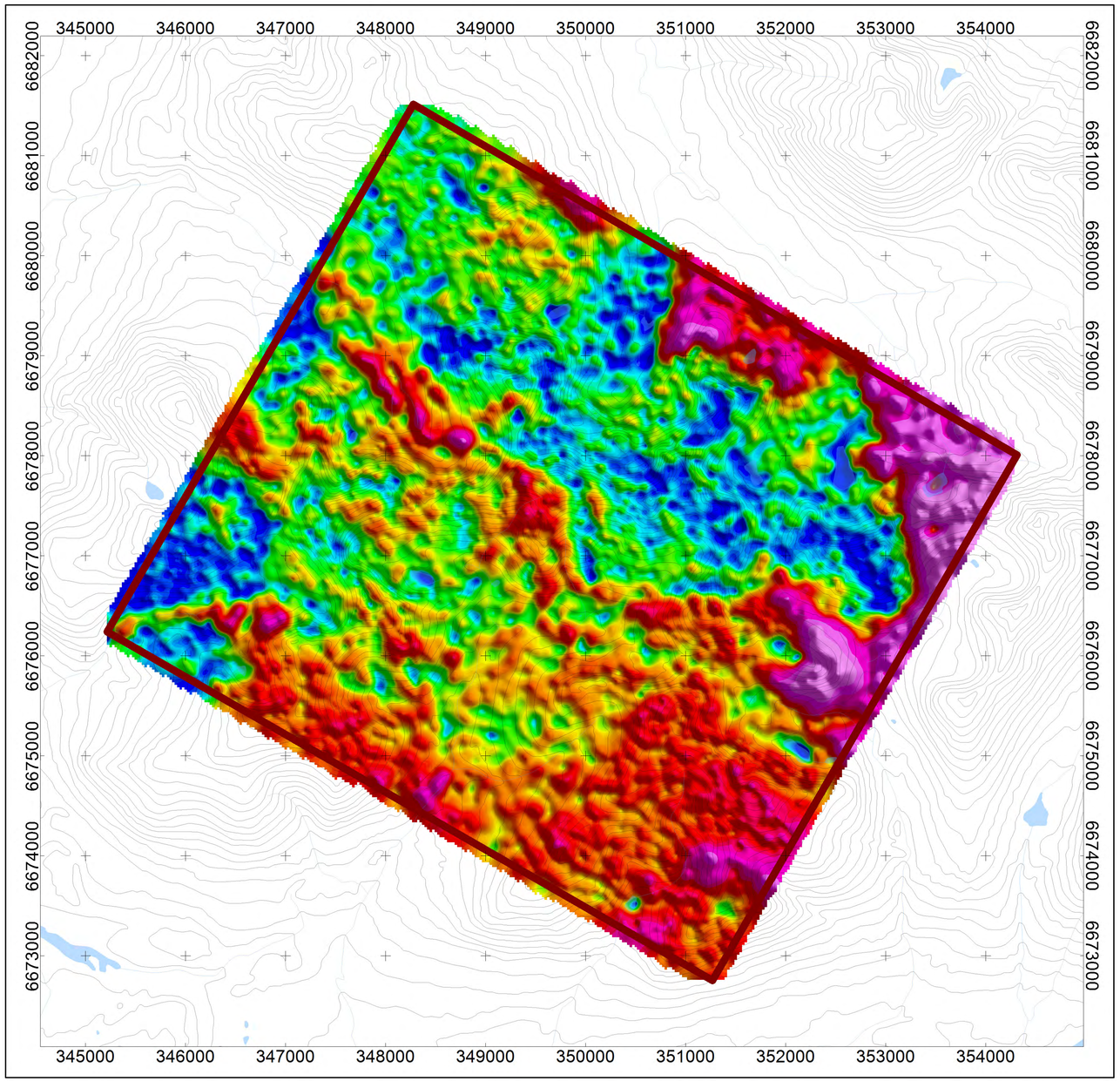
## Radiometric Map

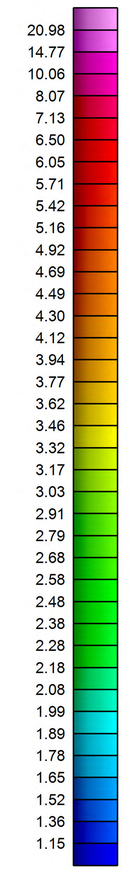
Jaycee Tin Survey Block
Potassium - Percentage

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate9
%K



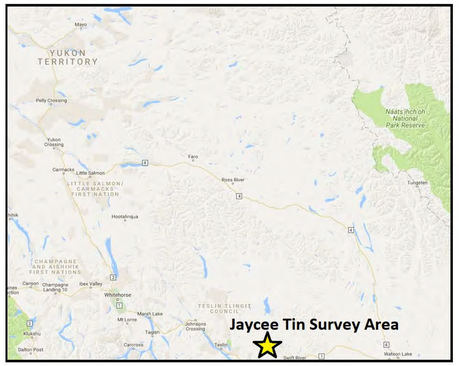




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

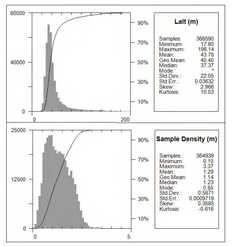
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

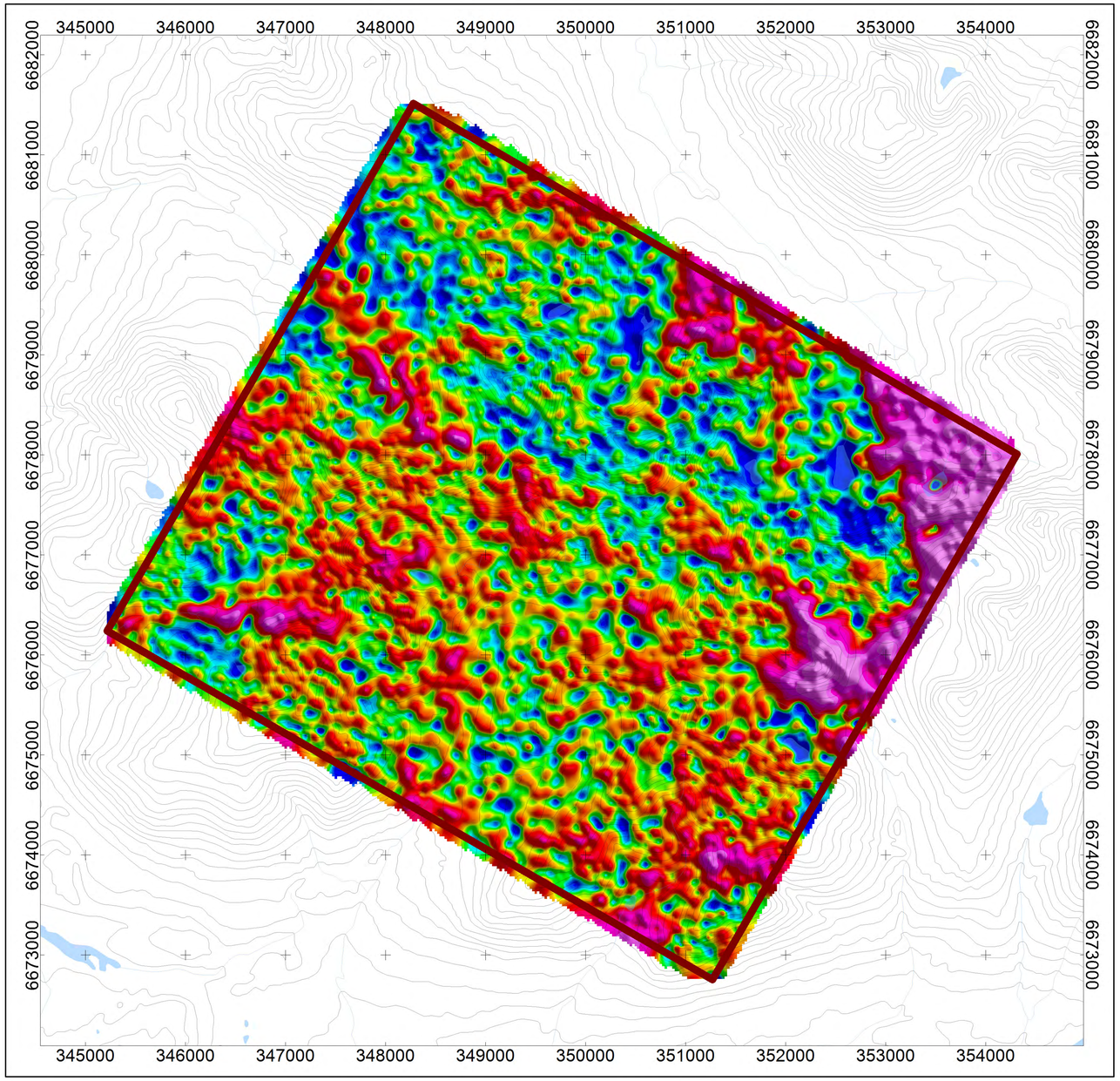
## Radiometric Map

Jaycee Tin Survey Block
Thorium - Equivalent Concentration

Precision GeoSurveys

Job#18110
Aug 1, 2018

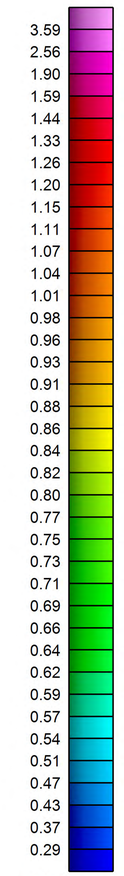
Plate10
eTh

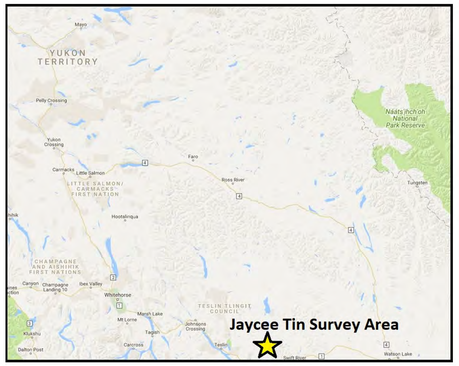



Scale 1:25000

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

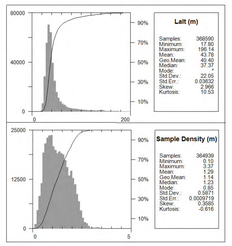
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

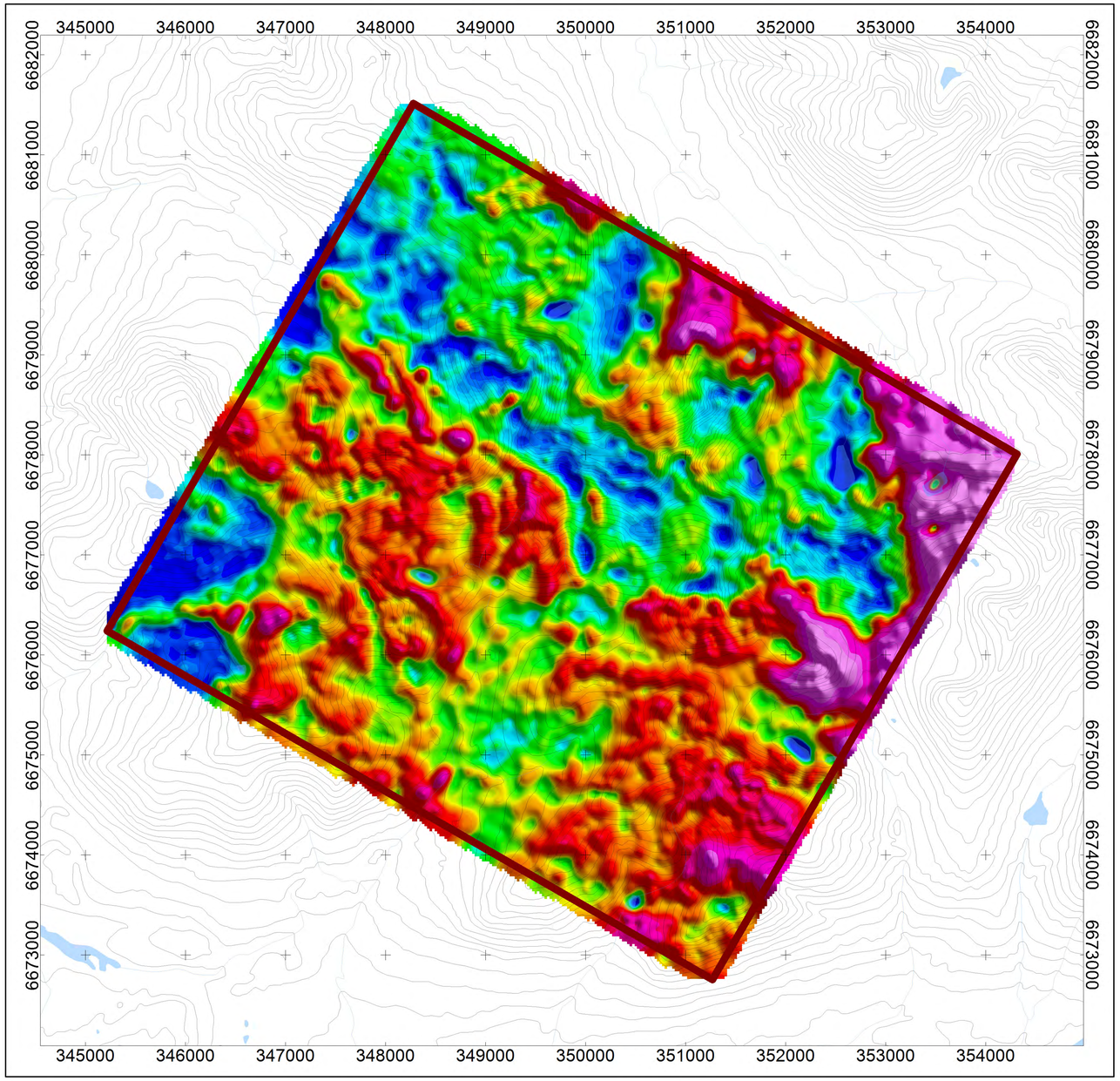
## Radiometric Map

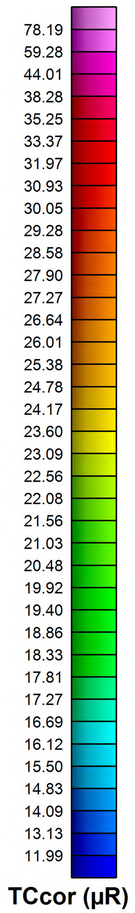
Jaycee Tin Survey Block
Uranium - Equivalent Concentration

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate11
eU

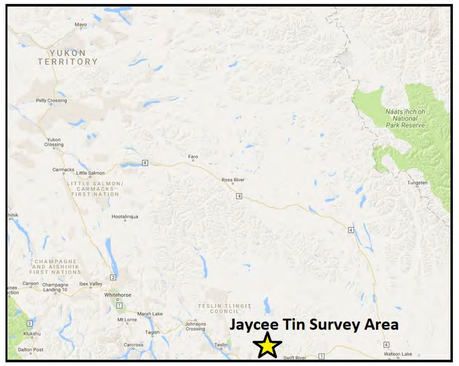



Scale 1:25000

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

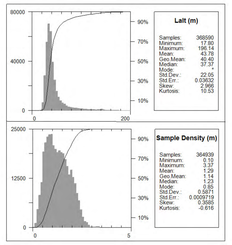
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

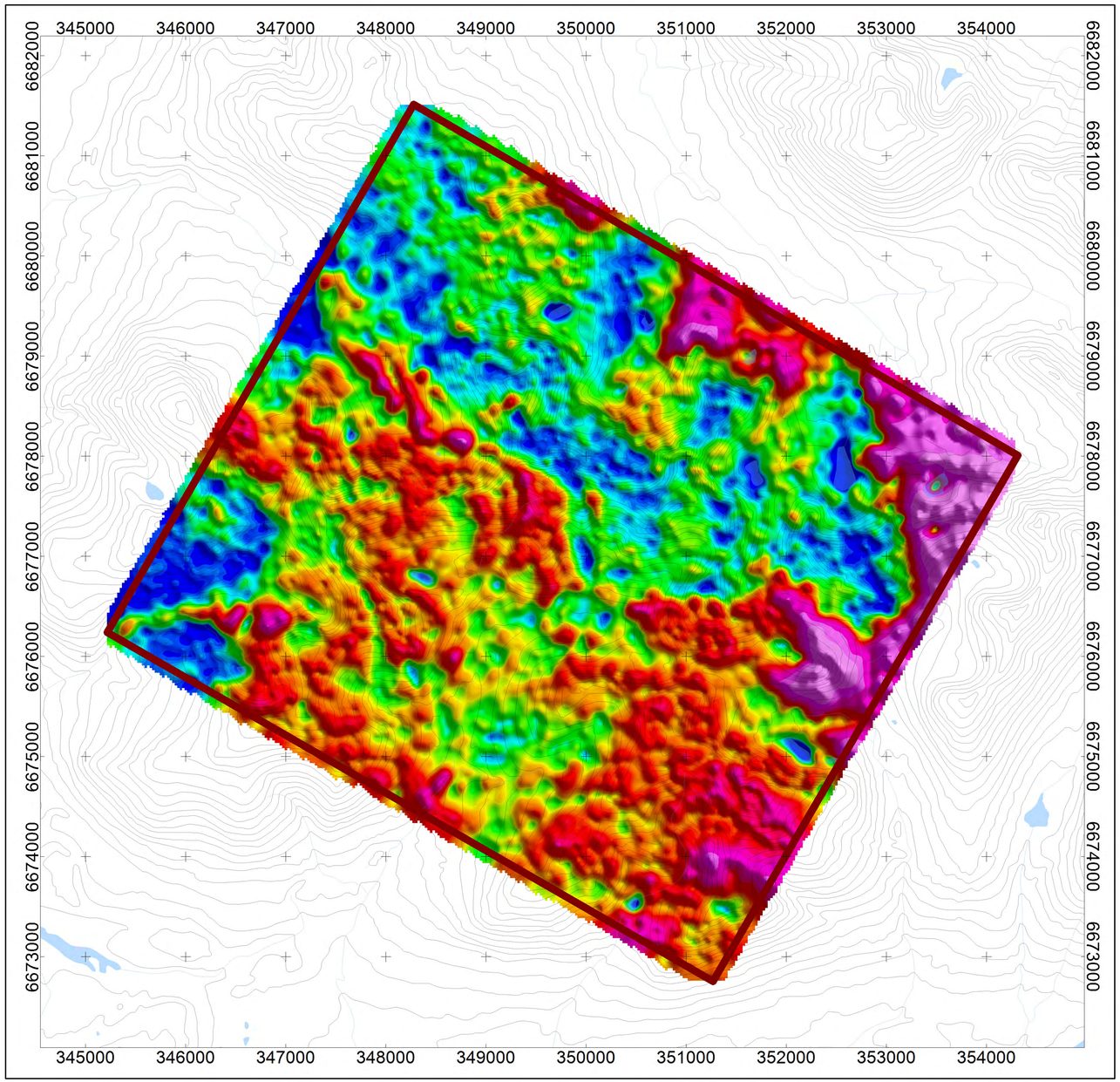
## Radiometric Map

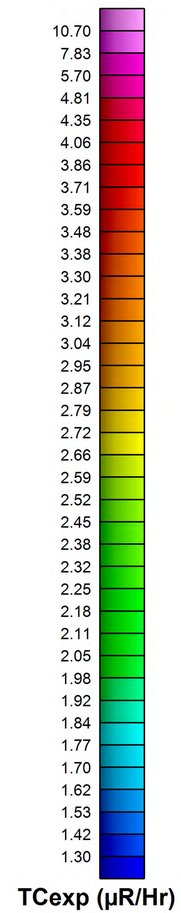
Jaycee Tin Survey Block
Total Count - Equivalent Dose Rate

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate12
TCcor

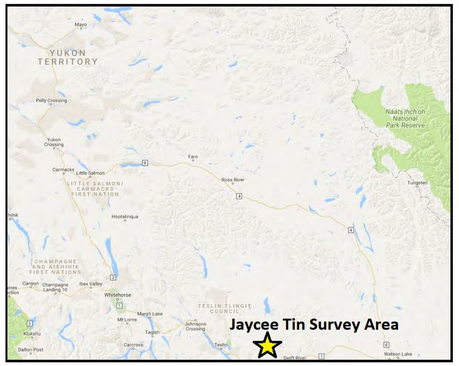



Scale 1:25000

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

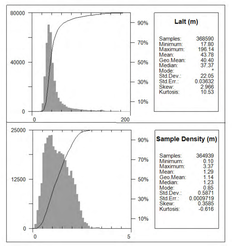
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

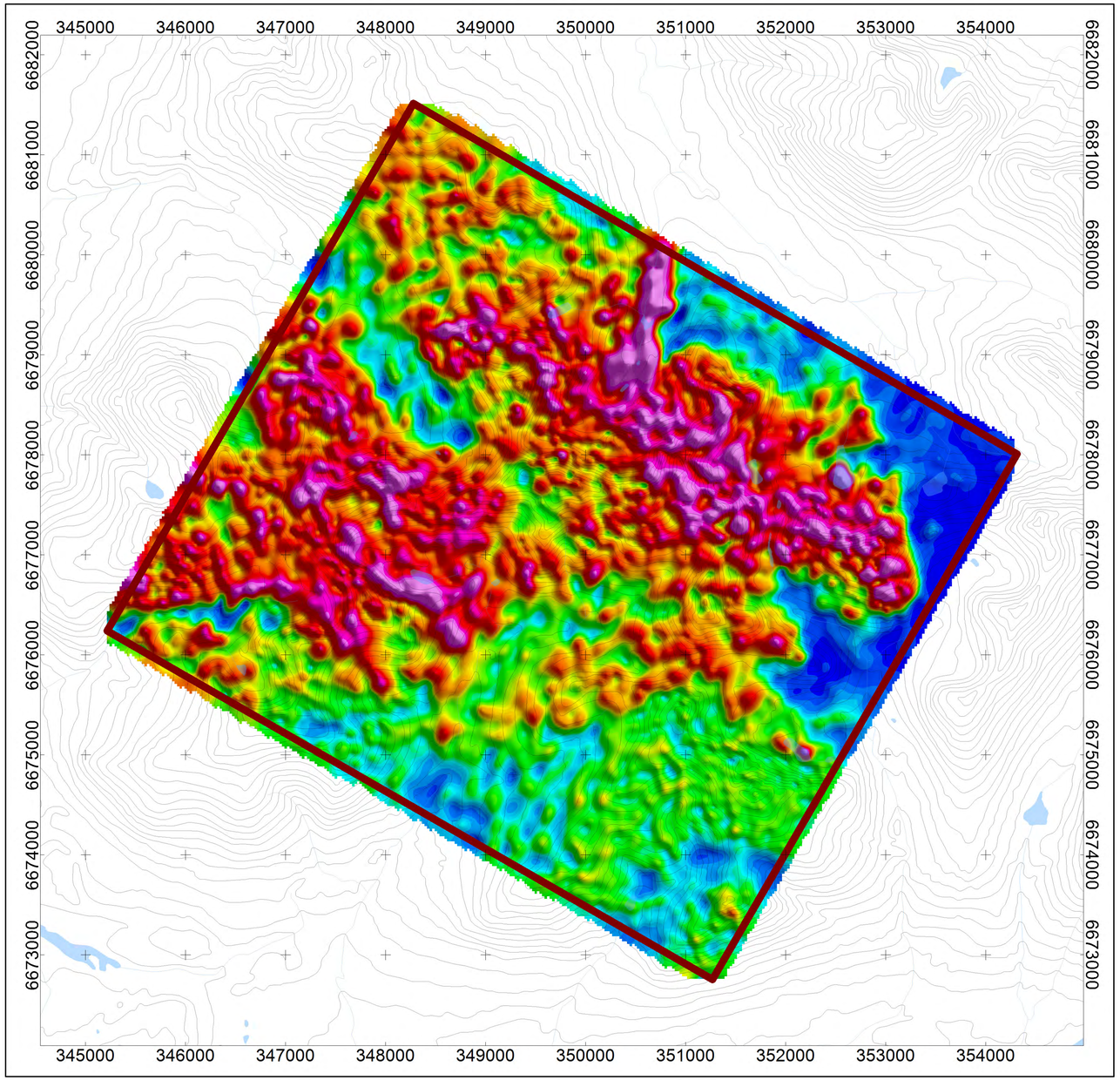
## Radiometric Map

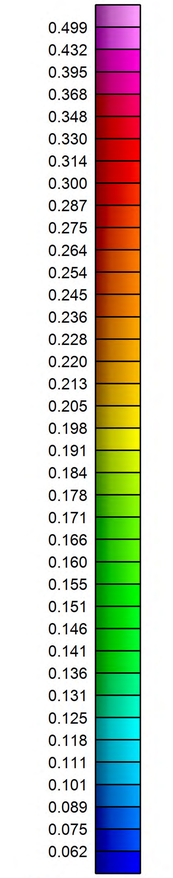
Jaycee Tin Survey Block
Total Count - Exposure Rate

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate13
TCexp



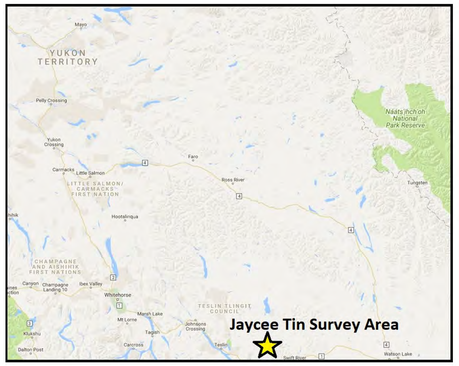




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

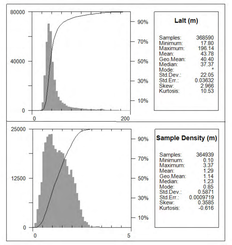
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

Water Bodies.....
Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

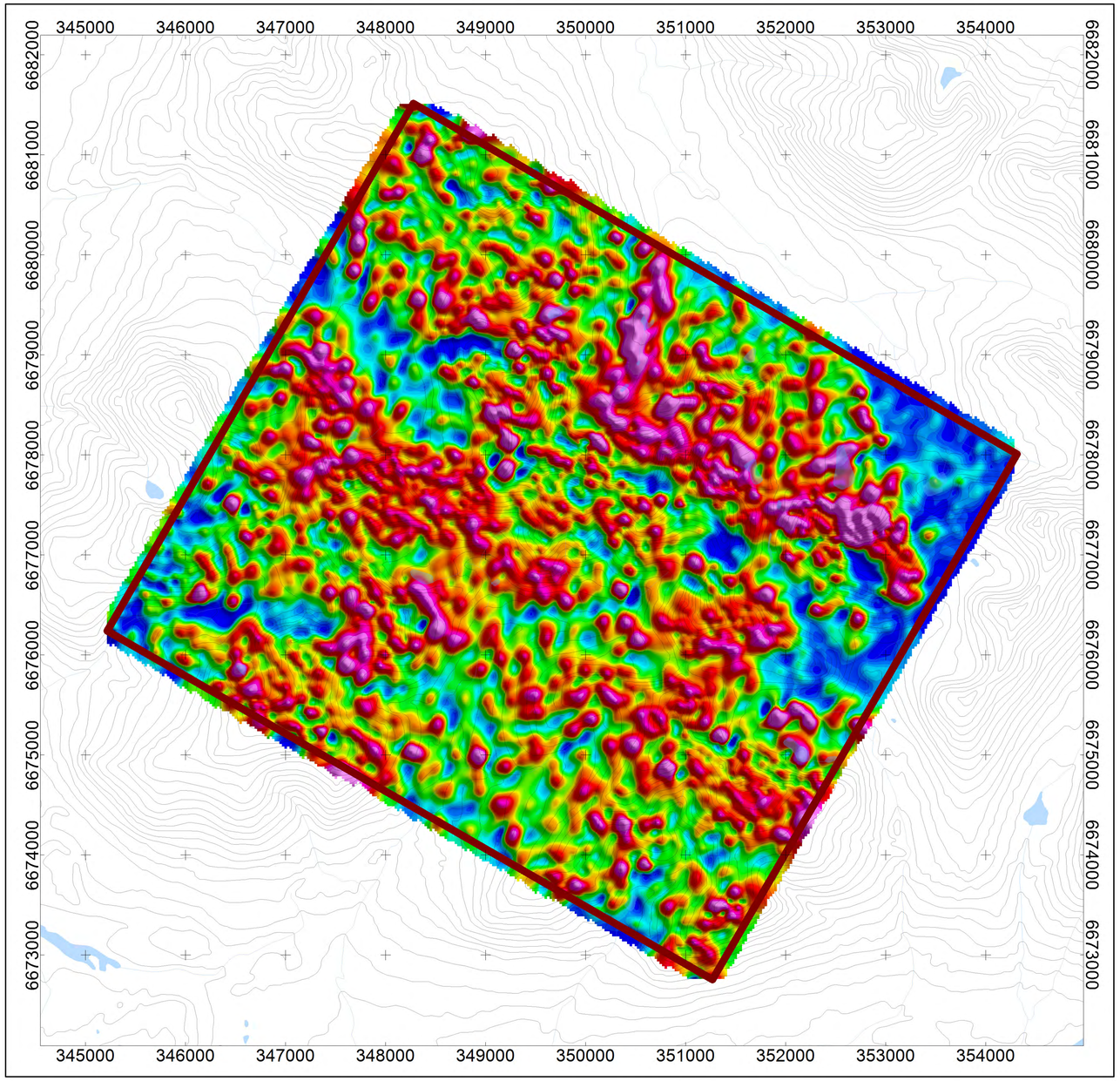
## Radiometric Map

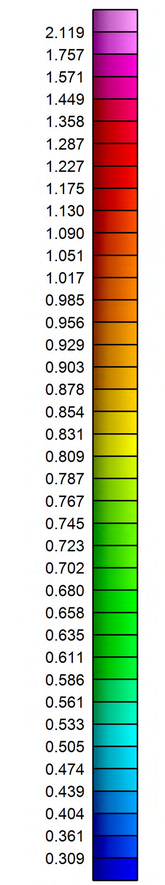
Jaycee Tin Survey Block
Potassium over Thorium Ratio

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate14
%K/eTh



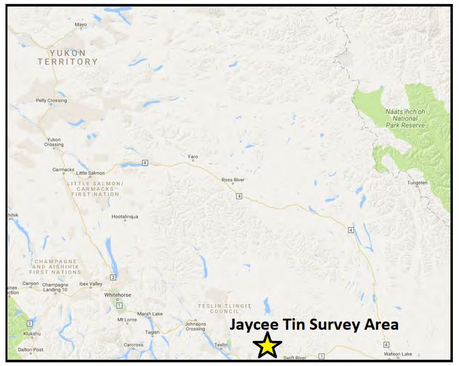




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

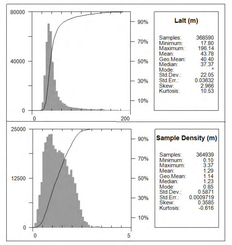
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

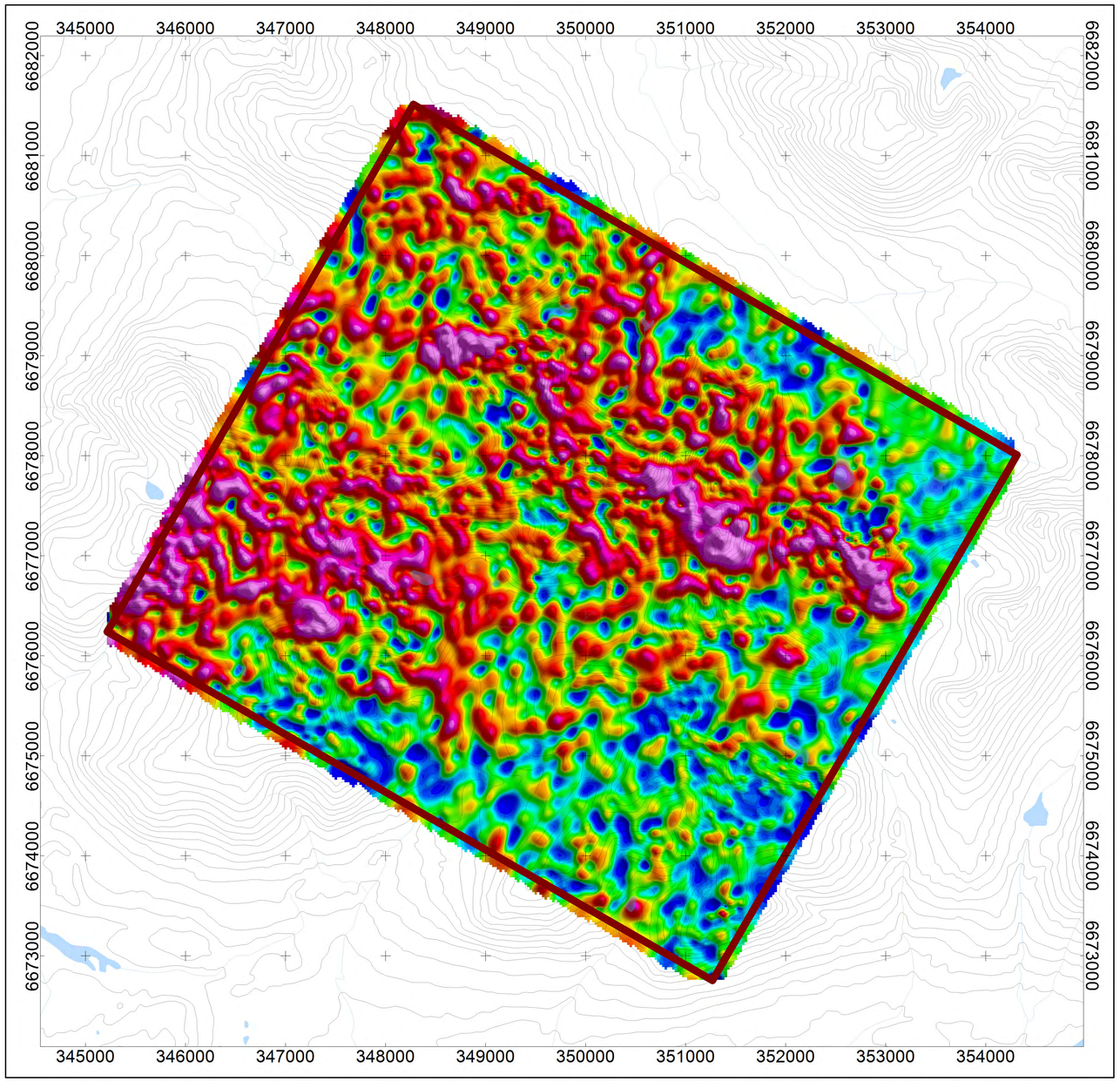
## Radiometric Map

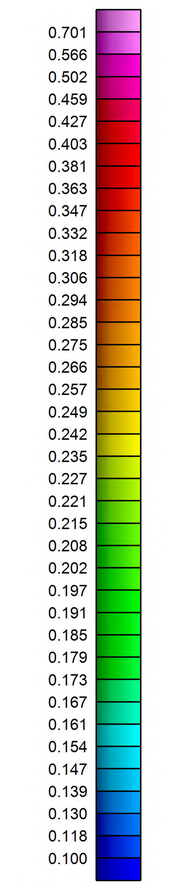
Jaycee Tin Survey Block
Potassium over Uranium Ratio

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate15
%K/eU



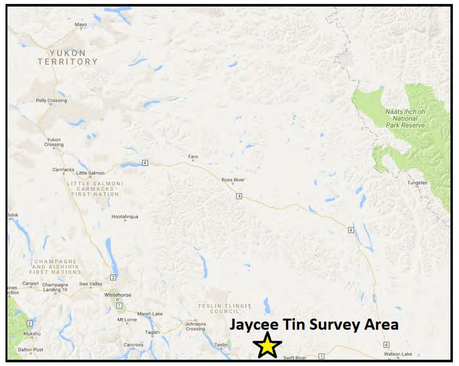




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

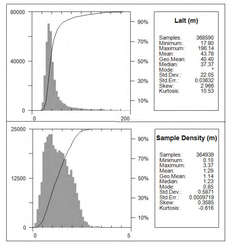
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

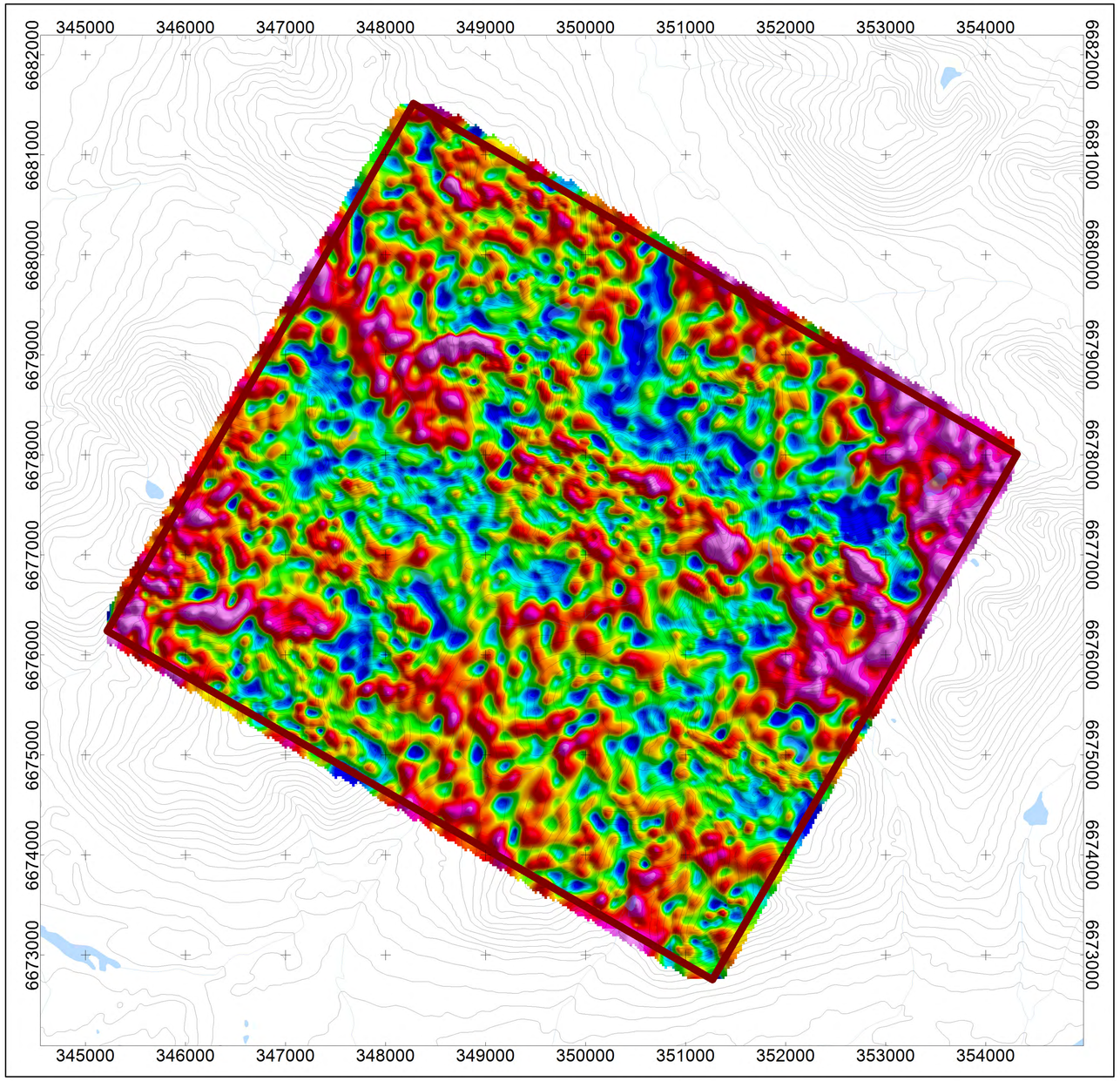
## Radiometric Map

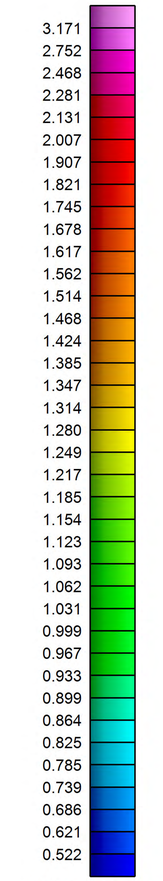
Jaycee Tin Survey Block
Uranium over Thorium Ratio

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate16
eU/eTh



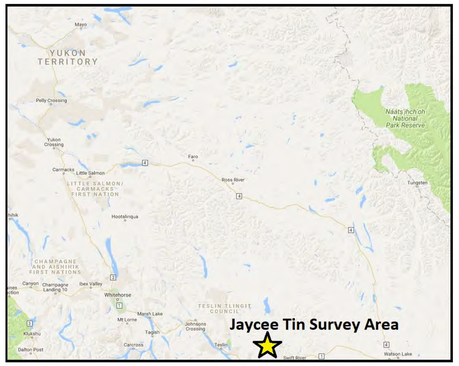




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

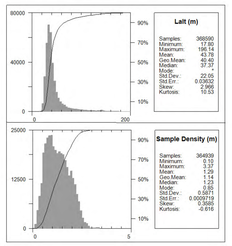
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |

**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

National Topographic Data Base (NTDB), Canada. Ottawa, ON: Government of Canada, Natural Resources Canada, Center for Topographic Information. Contour interval at 100 ft.
URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

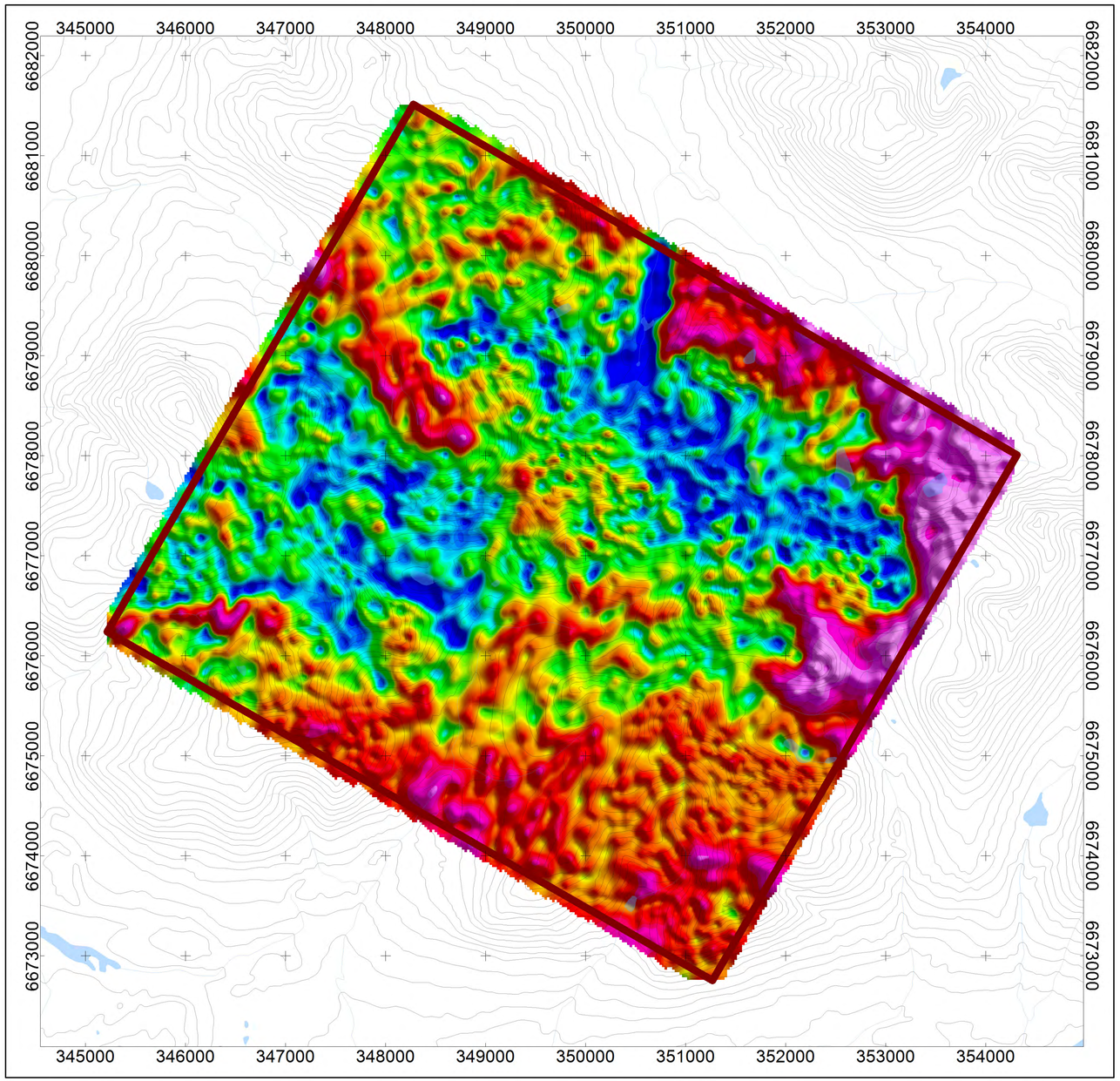
## Radiometric Map

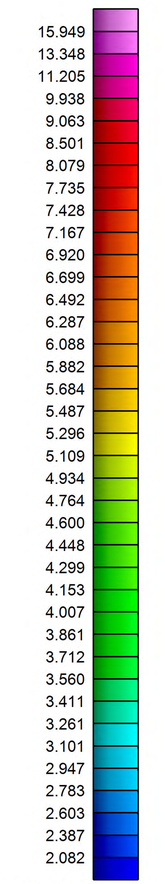
Jaycee Tin Survey Block
Uranium over Potassium Ratio

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate17
eU/%K



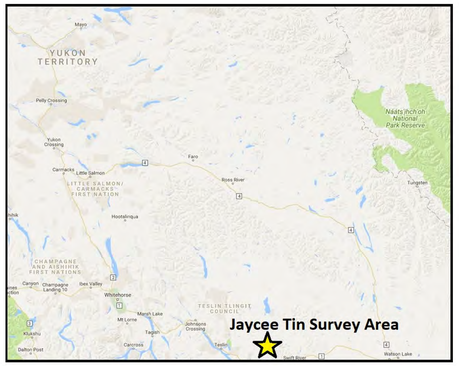




Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

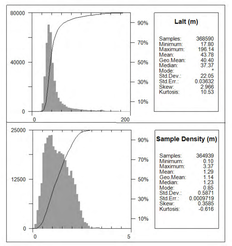
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....
Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

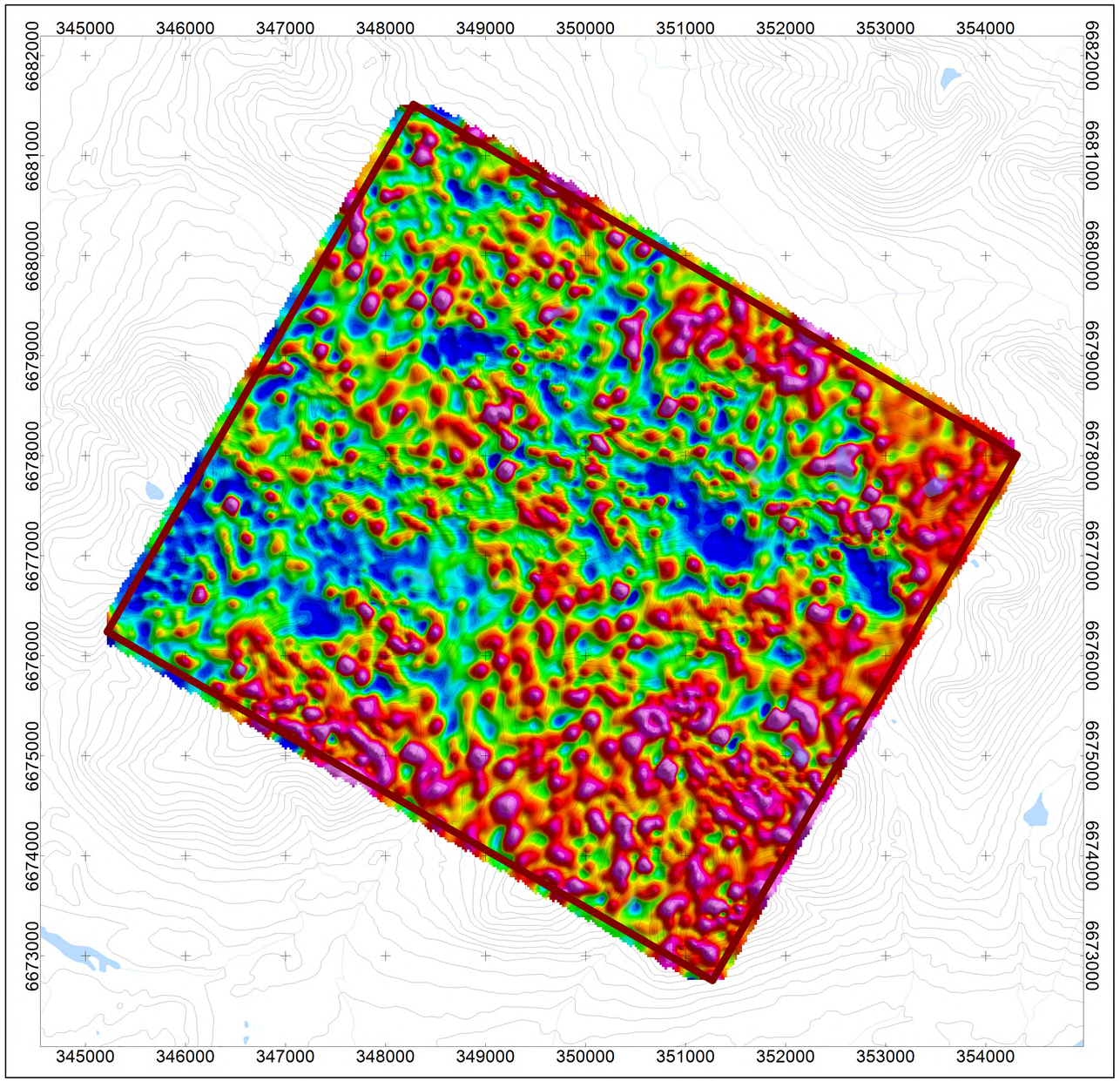
## Radiometric Map

Jaycee Tin Survey Block
Thorium over Potassium Ratio

Precision GeoSurveys

Job#18110
Aug 1, 2018

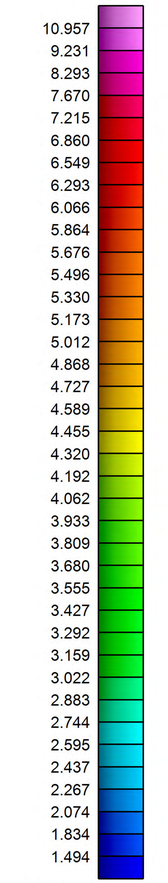
Plate18
eTh/%K

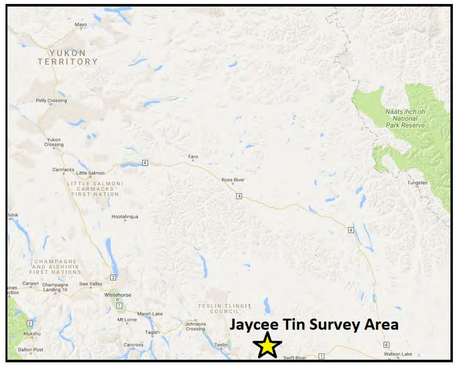



Scale 1:25000

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

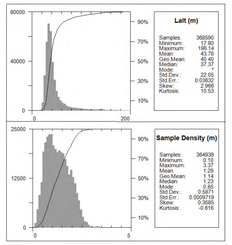
Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |

**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

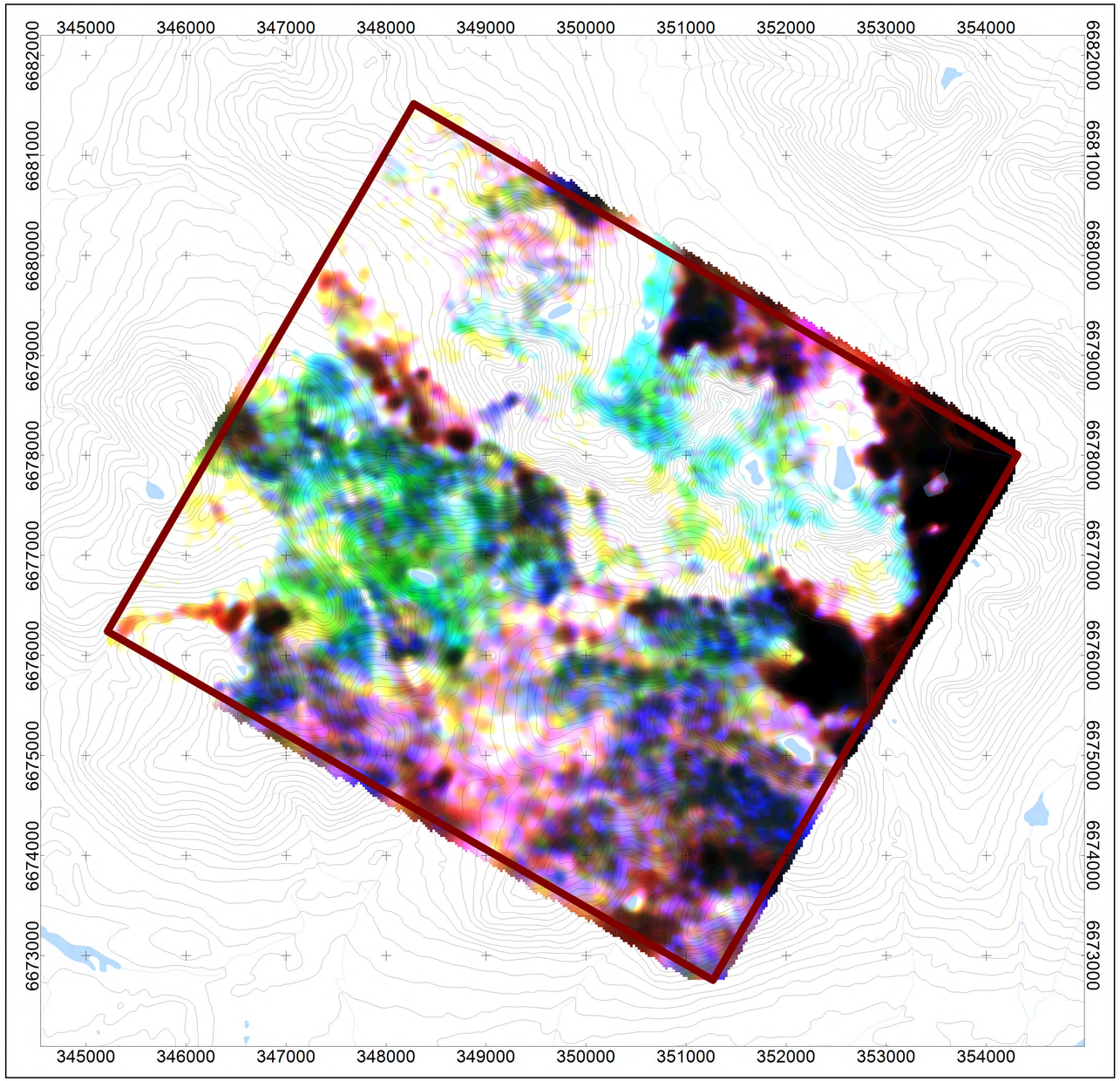
## Radiometric Map

Jaycee Tin Survey Block
Thorium over Uranium Ratio

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate19
eTh/eU

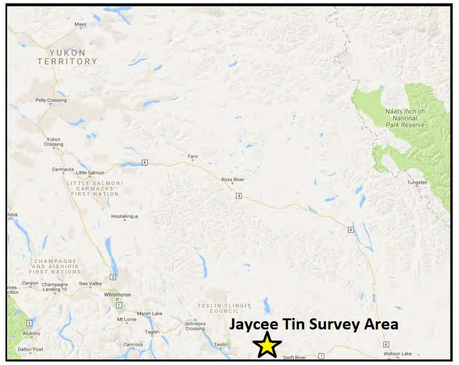



Scale 1:25000

500 0 500 1000 1500

(meters)

*WGS 84 / UTM zone 9N*




## National Topographic System

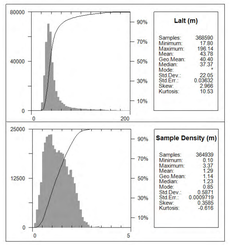
| | |
|---|---|
| 105C08 ENGLISH CREEK | 105B05 MORRIS LAKE |
| 105C01 MORLEY LAKE | 105B04 DORSEY LAKE |

**MAP PROJECTION**

Projection: Universal Transverse Mercator Zone 9N
Datum: WGS 84
Local Datum Transform: World

**JAYCEE TIN SURVEY SPECIFICATIONS**

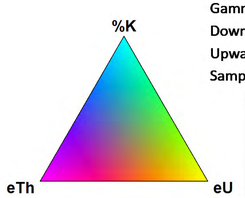
| | |
|---|---|
| Survey Date(s): | July 7, 2018 to July 9, 2018 |
| Survey Base: | Teslin, Yukon |
| Aircraft Type: | Airbus AS350 |
| Registration: | C-GSVY |
| Survey Technology: | Magnetic and Radiometric Survey |
| Mean Flight Height: | 43.8 meters |
| Survey Line Spacing: | 100 meters |
| Survey Line Direction: | 030°/210° |
| Tie Line Spacing: | 1000 meters |
| Tie Line Direction: | 120°/300° |




**AIRBORNE SURVEY SYSTEM**

| | |
|---|---|
| Magnetometer Sensor: | Scintrex CS-3 Cesium |
| Configuration: | Stinger with 3 axis compensation |
| Sample Rate: | 20 Hz |
| Sensitivity: | 0.0006 nT √Hz rms |

| | |
|---|---|
| Gamma Ray Spectrometer: | Pico Envirotec GRS-10 Gamma Spectrometer |
| Downward-Looking Crystals: | 16.8 litres of NaI(Tl) crystals |
| Upward-Looking Crystal: | 4.2 litres of NaI(Tl) crystal |
| Sample Rate: | 1 Hz |




**Legend**

Water Bodies.....

Jaycee Tin Survey Block Boundary.....

**DATA REFERENCE**

Radiometric data have been corrected for effective height, aircraft, cosmic, radon, stripping ratios, and attenuations, and then converted to apparent radioelement concentrations. The radiometric data is represented as a grid and drawn with a histogram-equalized color shade; sun illumination inclination at 45° and declination at 045°.

**TOPOGRAPHIC REFERENCE**

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URL <http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/ntdb_bndt/>[2007]

# Jaycee Prospecting Syndicate

## Radiometric Map

Jaycee Tin Survey Block
Ternary Map

Precision GeoSurveys

Job#18110
Aug 1, 2018

Plate20
TM

# Appendix D - Application for a Certificate of Work

Yukon
Energy, Mines and Resources

QUARTZ MINING ACT FORM 4 SECTION 56

# APPLICATION FOR A CERTIFICATE OF WORK

Office Date Stamp

I, Keerah Lutz,

Agent for Mark Fekete

of 303 7e Rue, bur. 210, Val-d'Or, Quebec J9P 0G5

Phone 819 354 5244

Client I.D. Number: _____

make oath and say that:

1. I am the owner, or agent of the owner, of the mineral claim(s) to which reference is made herein.

2. I have done, or caused to be done, work, on the following mineral claim(s): (Here list claims on which work was actually done by number and name)

See attached Schedule A - "Claim List for Cert of Work 2018 Jaycee"

situated at approx. 4km northwest of Dorsey Lake Claim sheet No. 105B04

in the Watson Lake Mining District, to the value of at least $13,678.57 dollars,

since the 1st day of July 2018,

to represent the following mineral claims under the authority of Grouping Certificate No. _____.
(Here list claims to be renewed in numerical order, by grant number and claim name, showing renewal period requested).

See attached Schedule A - "Claim List for Cert of Work 2018 Jaycee"

3. The following is a detailed statement of such work: (Set out full particulars of the work done indicating dates work commenced and ended in the twelve months in which such work is required to be done as shown by Section 56).

Airborne Geophysical Survey (Magnetic and Radiometrec) done July 7 to 9, 2018

- 475 line km (42.5 km2), $40,800.00 total; 126 line km (11.3 km2), $10,838.40 on JC1 to JC54

Rock Assays (3 samples on) done July 16, 2018, $340.17 on JC10

Report done October 22 to November 1, 2018, $2500 on JC1 to JC101

Sworn before me at _____ this _____ day of _____ 20 ____.

Notary Public

Owner or Authorized Agent

Access to Information and Protection of Privacy Act
The personal information requested on this form is collected under the authority of and used for the purpose of administering the Quartz Mining Act. Questions about the collection and use of this information can be directed to the Mining Recorders Office, Mineral Resources, Department of Energy, Mines and Resources, Yukon Government, Box 2703, Whitehorse, Yukon Territory, Y1A 2C6 (867) 667-3190

Claim List for Cert of Work 2018 Jaycee

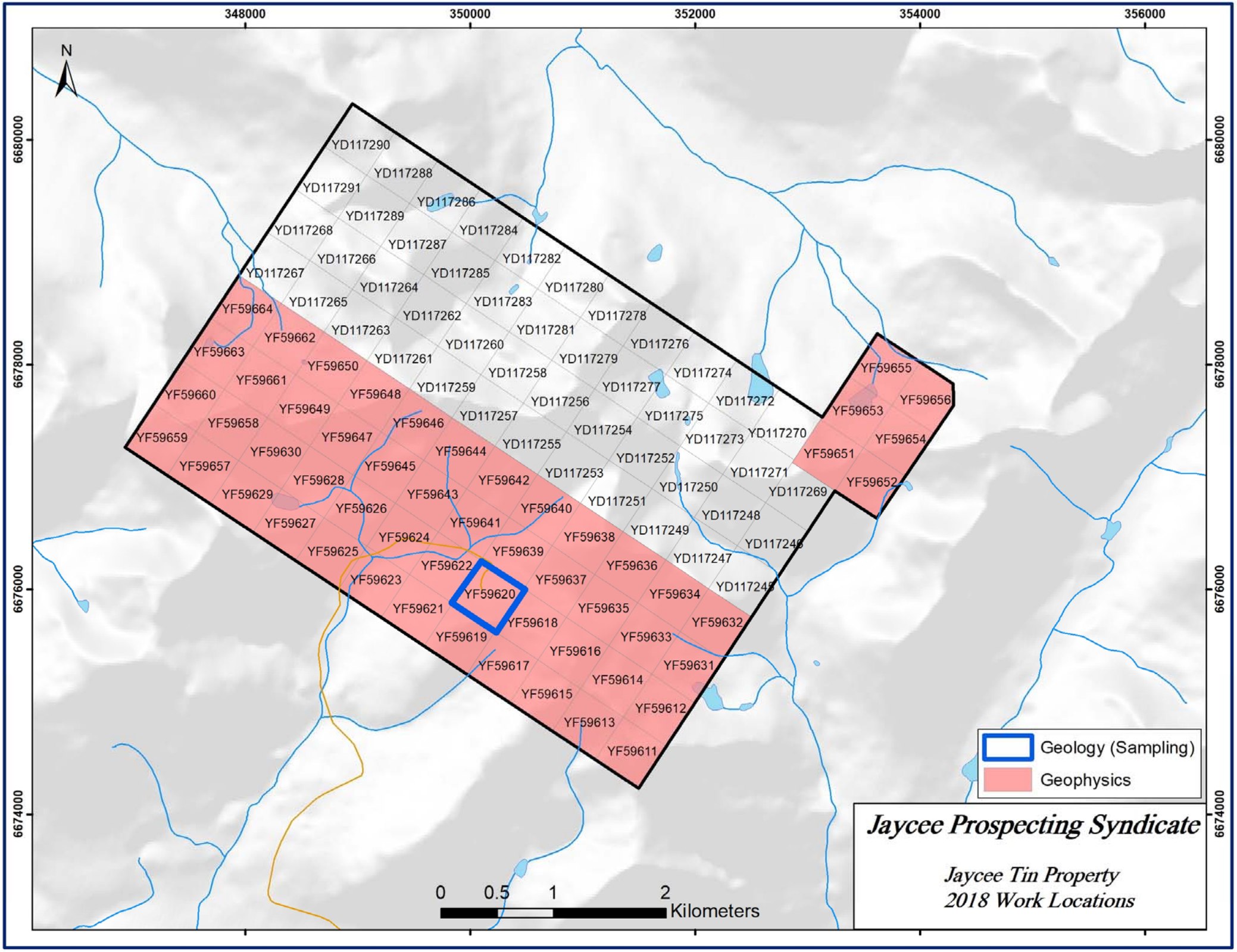
| Claim Information | | | | | Actual Work Done by Claim | | | Renewal | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Grant No. | Claim Name | Claim No. | Expiry Date | Extend to Date | Sampling | Report | Geophysics | Years | Annual Fee | Total |
| YF59611 | JC | 1 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59612 | JC | 2 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59613 | JC | 3 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59614 | JC | 4 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59615 | JC | 5 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59616 | JC | 6 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59617 | JC | 7 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59618 | JC | 8 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59619 | JC | 9 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59620 | JC | 10 | 2019-02-16 | 2020-02-16 | $340.17 | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59621 | JC | 11 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59622 | JC | 12 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59623 | JC | 13 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59624 | JC | 14 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59625 | JC | 15 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59626 | JC | 16 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59627 | JC | 17 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59628 | JC | 18 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59629 | JC | 19 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59630 | JC | 20 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59631 | JC | 21 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59632 | JC | 22 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59633 | JC | 23 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59634 | JC | 24 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59635 | JC | 25 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59636 | JC | 26 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59637 | JC | 27 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59638 | JC | 28 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59639 | JC | 29 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59640 | JC | 30 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59641 | JC | 31 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59642 | JC | 32 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59643 | JC | 33 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59644 | JC | 34 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59645 | JC | 35 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59646 | JC | 36 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59647 | JC | 37 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59648 | JC | 38 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59649 | JC | 39 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59650 | JC | 40 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59651 | JC | 41 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59652 | JC | 42 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59653 | JC | 43 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59654 | JC | 44 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59655 | JC | 45 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59656 | JC | 46 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59657 | JC | 47 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59658 | JC | 48 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59659 | JC | 49 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59660 | JC | 50 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59661 | JC | 51 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59662 | JC | 52 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59663 | JC | 53 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YF59664 | JC | 54 | 2019-02-16 | 2020-02-16 | | $24.75 | $200.71 | 1 | $ 5.00 | $ 5.00 |
| YD117245 | JC | 55 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117246 | JC | 56 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117247 | JC | 57 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117248 | JC | 58 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117249 | JC | 59 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117250 | JC | 60 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117251 | JC | 61 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117252 | JC | 62 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117253 | JC | 63 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117254 | JC | 64 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117255 | JC | 65 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117256 | JC | 66 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117257 | JC | 67 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117258 | JC | 68 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117259 | JC | 69 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117260 | JC | 70 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117261 | JC | 71 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117262 | JC | 72 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117263 | JC | 73 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117264 | JC | 74 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117265 | JC | 75 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117266 | JC | 76 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117267 | JC | 77 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117268 | JC | 78 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |

Claim List for Cert of Work 2018 Jaycee

| Claim Information | | | | | Actual Work Done by Claim | | | Renewal | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Grant No. | Claim Name | Claim No. | Expiry Date | Extend to Date | Sampling | Report | Geophysics | Years | Annual Fee | Total |
| YD117269 | JC | 79 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117270 | JC | 80 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117271 | JC | 81 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117272 | JC | 82 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117273 | JC | 83 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117274 | JC | 84 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117275 | JC | 85 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117276 | JC | 86 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117277 | JC | 87 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117278 | JC | 88 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117279 | JC | 89 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117280 | JC | 90 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117281 | JC | 91 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117282 | JC | 92 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117283 | JC | 93 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117284 | JC | 94 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117285 | JC | 95 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117286 | JC | 96 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117287 | JC | 97 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117288 | JC | 98 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117289 | JC | 99 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117290 | JC | 100 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| YD117291 | JC | 101 | 2019-09-17 | 2021-02-17 | | $24.75 | | 1.5 | $ 5.00 | $ 7.50 |
| | | | | | | | | | | |
| | | | | Columm Total | $340.17 | $2,500.00 | $10,838.40 | 124.5 | $ 5.00 | $ 622.50 |
| | Check Column less Expenses (Should be Zero) | | | | $0.00 | $0.00 | $0.00 | | | |
| | Number of Claims where work was done | | | | 1 | 101 | 54 | | | |
| | | Expenses from Statement of Costs | | | $340.17 | $2,500.00 | $10,838.40 | | | |
| | | Work required for requested renewal | | | $12,450.00 | | | | | |
| | | | | Surplus (Deficit) | $1,228.57 | | | | | |
| | | | | | | | | | | |
| Renewal Fees = | | 124.5 | years @ | $5.00 | $622.50 | | | | | |
| | | | | | | | | | | |

Statement of Expenses 2018 Jaycee

| **Airborne** | | | **Rate** | | | **Amount** |
|---|---|---|---|---|---|---|
| **5250** | Wages and Contract | | | | | |
| | Precision No. 1838 | 1 | invoice @ | $40,000.00 | $40,000.00 | |
| | Heli-Dynamics No. 705 | 1 | invoice @ | $800.00 | $800.00 | |
| | Adjustment for work off claims | | | | -$29,961.60 | |
| | | | | | | $10,838.40 |
| **Geology** | | | | | | |
| **5355** | Report & Maps | | | | | |
| | Breakaway No. 1252 | 1 | invoice @ | $2,500.00 | $2,500.00 | |
| | | | | | | $2,500.00 |
| **5356** | Analysis | | | | | |
| | Bourlamaque No. B18-0484 | 1 | invoice @ | $46.36 | $46.36 | |
| | Bureau Veritas No. VANI313499 | 1 | invoice @ | $212.81 | $212.81 | |
| | Bureau Veritas No. VANI314156 | 1 | invoice @ | $58.80 | $58.80 | |
| | Bureau Veritas No. VANI314570 | 1 | invoice @ | $22.20 | $22.20 | |
| | | | | | | $340.17 |
| | | | | | | |
| **Totzl** | | | | | | **$13,678.57** |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Kilometers
Geology (Sampling)
Geophysics
Jaycee Prospecting Syndicate
Jaycee Tin Property
2018 Work Locations