2010 Airborne Magnetic Survey

on the

Queen Property

Merritt Area
(NTS 92H/16E)

Nicola Mining Division, South-Central British Columbia
Latitude 49° 53' N, Longitude 120° 12'W

For

Bitterroot Resources Ltd.

By

J.D. Rowe (B.Sc.),
C.J. Greig (M.Sc., P.Geo)
& J. Klein (M.Sc., P.Eng., P.Geo (LM))

February 7, 2011

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1.0 SUMMARY AND CONCLUSIONS

The Queen property, located 50 kilometres west of Kelowna, B.C. and 45 km southeast of Merritt, B.C., consists of one claim comprised of 20 MTO cells in the Nicola Mining Division. The claim, staked during 2009, is owned 100 percent by Bitterroot Resources Ltd.

Exploration on the property is targeting gold-bearing structures in intrusive or volcanic rocks similar to those found 6 km to the southwest on the Elk property, owned by Almaden Minerals Ltd.

Highway 97C (Okanagan Connector) transects the property providing excellent access. Physiography of the claim area consists of low hills on an upland plateau with limited bedrock exposure, estimated at less than 10 percent.

Previous work in the region by others focussed mostly on copper exploration during the 1960's to 1980's, during the development and mining of the nearby Brenda Cu-Mo deposit. More recent exploration in the region has concentrated on gold mineralization following discoveries made in the 1990's on the Elk property, where an extensive vein system contains a drill indicated and measured geological resource of approximately 9.26 million grams (300,000 ounces) of gold with an average grade of 5.9 g/t Au using a cut-off of 1 g/t.

The Queen property has a geological environment similar to that on the nearby Elk property. It straddles a contact zone between granodiorite and granite batholiths which are in contact to the east with andesitic to basaltic volcanics overlain, east of the property, by argillaceous sedimentary rocks.

Weakly mineralized gold-bearing quartz veins hosted by sheared, altered granite have been reported in rock-cuts along the highway on the western part of the claim. In the eastern area siliceous volcanic rocks with disseminated arsenopyrite are reported to have returned anomalous gold values.

Wide-spaced (400m x 50m) soil sampling, which was undertaken on the King claim in 1991 partly covered the area of the current Queen claim. That sampling identified areas of weakly to moderately anomalous gold near the northeast corner of the Queen claim in an area mapped as volcanic rocks.

The exploration work undertaken in 2010 entailed a high resolution, high sensitivity aeromagnetic (HRAM) survey over the Queen property and surrounding region. Data was collected along parallel flight lines spaced 100 meters apart in a north - south alignment. The nominal flying height was 80 meters above the terrain surface and the data point interval was approximately 6.5 meters relative ground spacing per sample point.

The survey defined a linear, west-northwest-trending magnetic high crossing the eastern part of the property that may be related to the contact of andesitic volcanic rocks with granitic rocks. Similar linear magnetic highs are evident in other areas along the batholith contact where fine disseminated pyrrhotite may account for the higher magnetic response. A magnetic low to the east of the claim quite closely correlates with sedimentary units comprised mostly of argillite and tuffaceous siltstone.

A west-northwest-trending magnetic low cutting across the central part of the property coincides moderately well with a shallow depression that may be the site of a fault structure with possible associated hydrothermal alteration. The geologic exploration model for this property consists of hydrothermal alteration and vein mineralization within large-scale structures that cut granitic rocks; therefore this magnetic low is a favourable exploration target area on the Queen property.

Grid soil sampling across areas of magnetic lows is recommended for the Queen property to test for possible gold-bearing alteration zones. All samples should be analyzed by multi-element ICP methods, as well as for gold, to test for enriched gold pathfinder elements such as As or Sb as well as to test for Cu-Mo porphyry-style mineralization similar to the nearby Brenda deposit.

Favourable coincident geochemical and geophysical targets in areas with shallow overburden should be trenched with an excavator to explore for possible mineralized sources of the anomalies.

2.0 INTRODUCTION

2.1 Location and Physiography (Figure1)

The Queen property is located 50 kilometres west of Kelowna and 45 kilometres southeast of Merritt in south-central British Columbia. It is centered on latitude 49 degrees 53' N and longitude 120 degrees 12' W within NTS Map area 92H/16E. Access to the property is via Highway 97C (Okanagan Connector) 40 km west from Westbank. The highway transects the western half of the claim. Access to the eastern part of the property is provided by secondary roads extending southerly from the Sunset Exit that ramps off of highway 97C.

The property encloses an area of approximately 416 hectares on a broad uplands plateau with limited relief. Elevations range from about 1580m to 1750m above sea level. Bedrock exposure is very limited, estimated at less than 10 percent, confined to highway rock-cuts and some steeper slopes in the east part of the claim. Northerly-flowing, small to medium size streams meander across the property but most have not eroded deeply enough through glacial overburden to expose bedrock.

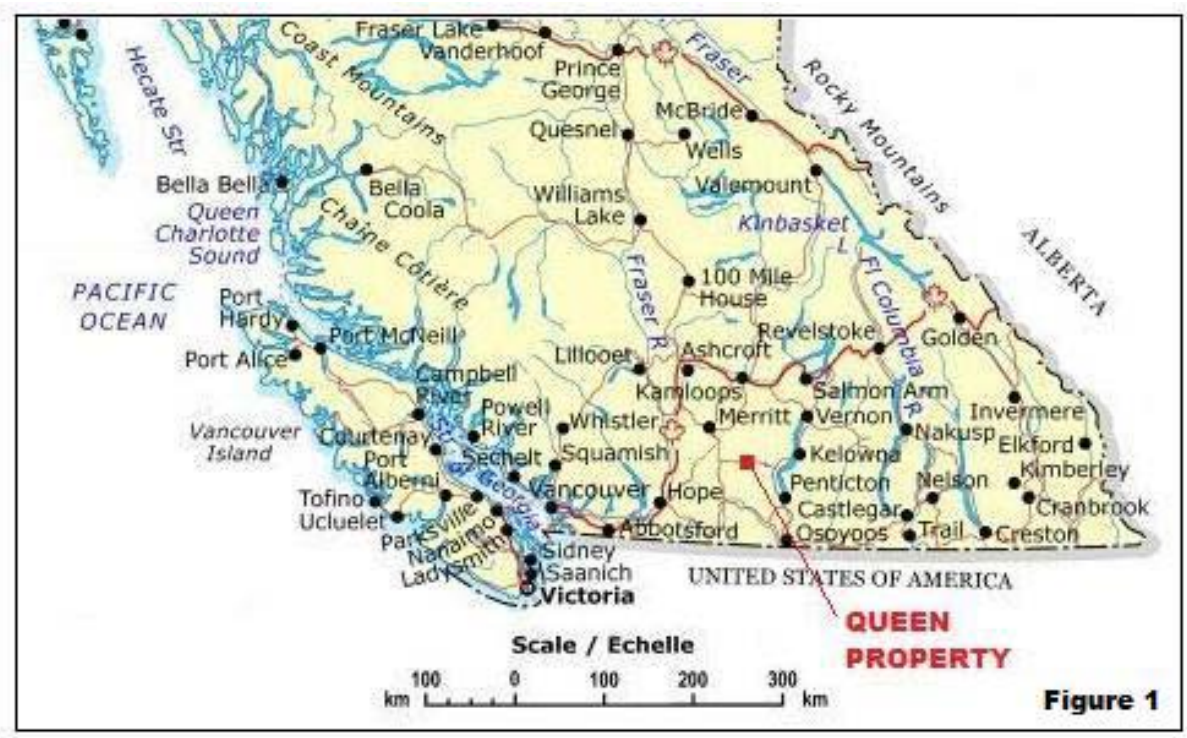


Figure 1

Forest cover comprises pine, fir, spruce and balsam. Clear-cut logging has been undertaken in the southern and eastern parts of the claim. Annual temperatures range from -20 degrees to 30 degrees C and precipitation is low to moderate. The area is basically snow-free from mid June through October.

2.2 Claim Data (Figure 2)

The Queen property consists of one MTO claim comprised of 20 cells. The current status of the Queen claim is indicated in Table 1, and the location is shown on Figure 2. The claim, located in the Nicola Mining Division, was staked in November, 2009 and is 100 percent owned by Bitterroot Resources Ltd.

Table 1. Claim Status as at February, 2011
Nicola Mining Division, British Columbia

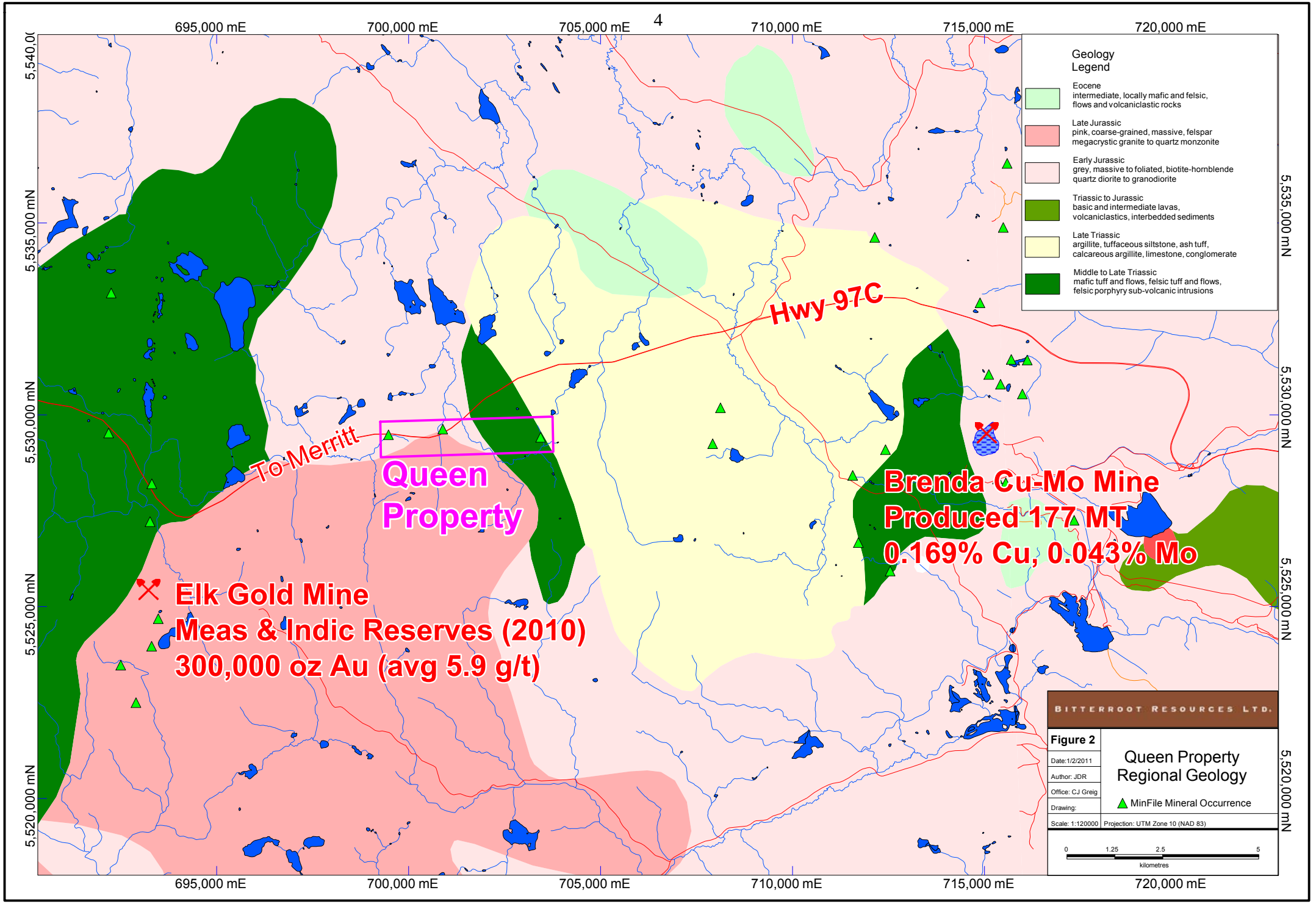
Name	Tenure No.	Area (hec)	Expiry Date
Queen	669164	416.36	Nov 14, 2011

2.3 History

Prior work in the area of the Queen claim included soil sampling undertaken by Kingsvale Resources on the King Property in 1991. That wide-spaced soil grid (400m x 50m) covered a large portion of the current Queen claim. The sampling identified weakly to moderately anomalous gold values near the north-eastern corner of the Queen claim in an area mapped as volcanic rocks; however, the anomaly was not pursued by further work. Prior to staking of the King property, reconnaissance rock samples collected by Cordilleran Engineering Ltd. had returned anomalous gold values as well as high values in silver and arsenic. A float sample of quartz-flooded granite with clots of pyrite chalcopyrite, galena and sphalerite reported to grade 24.1 g/t Au and 85.6 g/t Ag was collected less than 1 km south of the Queen claim boundary (Rowe, 1991).

A few kilometres to the northwest and also to the northeast of the Queen property, copper exploration was undertaken from the 1960's through the 1980's consisting of localized soil sample grids, EM/Magnetometer and I.P. surveys. Minor copper showings were discovered in volcanic and intrusive host rocks. The Brenda copper, molybdenum deposit, located 11 km east of the Queen property, was mined from 1970 to 1990 producing 177 million tonnes averaging 0.169% Cu and 0.043% Mo (Fig 2).

Six kilometres to the southwest, gold vein systems have been explored since 1986 by Fairfield Minerals Ltd., succeeded by Almaden Resources Ltd., on the Elk property. Geochemical and geophysical surveys, trenching and diamond drilling at Elk have revealed several gold-bearing structures, which have been recently calculated to contain a drill indicated and measured geological resource of approximately 9.26 million grams (300,000 ounces) of gold with an average grade of 5.9 g/t Au using a cut-off of 1 g/t (Almaden Resources Ltd Website).


695,000 mE
700,000 mE
705,000 mE
710,000 mE
715,000 mE
720,000 mE
5,540,0
5,535,000 mN
5,530,000 mN
5,525,000 mN
5,520,000 mN
Geology
Legend
Eocene
intermediate, locally mafic and felsic,
flows and volcaniclastic rocks
Late Jurassic
pink, coarse-grained, massive, felspar
megacrystic granite to quartz monzonite
Early Jurassic
grey, massive to foliated, biotite-hornblende
quartz diorite to granodiorite
Triassic to Jurassic
basic and intermediate lavas,
volcaniclastics, interbedded sediments
Late Triassic
argillite, tuffaceous siltstone, ash tuff,
calcareous argillite, limestone, conglomerate
Middle to Late Triassic
mafic tuff and flows, felsic tuff and flows,
felsic porphyry sub-volcanic intrusions
Hwy 97C
To Merritt
Queen
Property
Brenda Cu-Mo Mine
Produced 177 MT
0.169% Cu, 0.043% Mo
Elk Gold Mine
Meas & Indic Reserves (2010)
300,000 oz Au (avg 5.9 g/t)
BITTERROOT RESOURCES LTD.
Figure 2
Queen Property
Regional Geology
Date:1/2/2011
Author: JDR
Office: CJ Greig
Drawing:
MinFile Mineral Occurrence
Scale: 1:120000
Projection: UTM Zone 10 (NAD 83)
0
1.25
2.5
5
kilometres

3.0 GEOLOGY

3.1 Regional Geology (Figure 2)

Regional geology in the area of the Queen property is illustrated on Figure 2. This information was taken from B.C. Ministry of Energy and Mines, Geofile 2005-3 Map compiled by N.W.D. Massey et al, 2005.

The property straddles a contact zone between two batholiths which, to the east, are in contact with andesitic to basaltic volcanics overlain, farther to the east, by argillaceous sedimentary rocks. The northern batholith comprises white to grey, medium to fine grained granodiorite of Late Triassic to Early Jurassic age. To the south, this intrusive body is in contact with Late Jurassic coarse grained pinkish granite to granodiorite of the Osprey Lake batholith. The Nicola Group volcanic rocks to the east are comprised of Middle to Late Triassic andesite to basalt tuffs, flows and pyroclastics overlain, farther to the east, by a sequence of interbedded argillite, siltstone, tuff and minor limestone.

3.2 Property Geology and Mineralization (Figure 3)

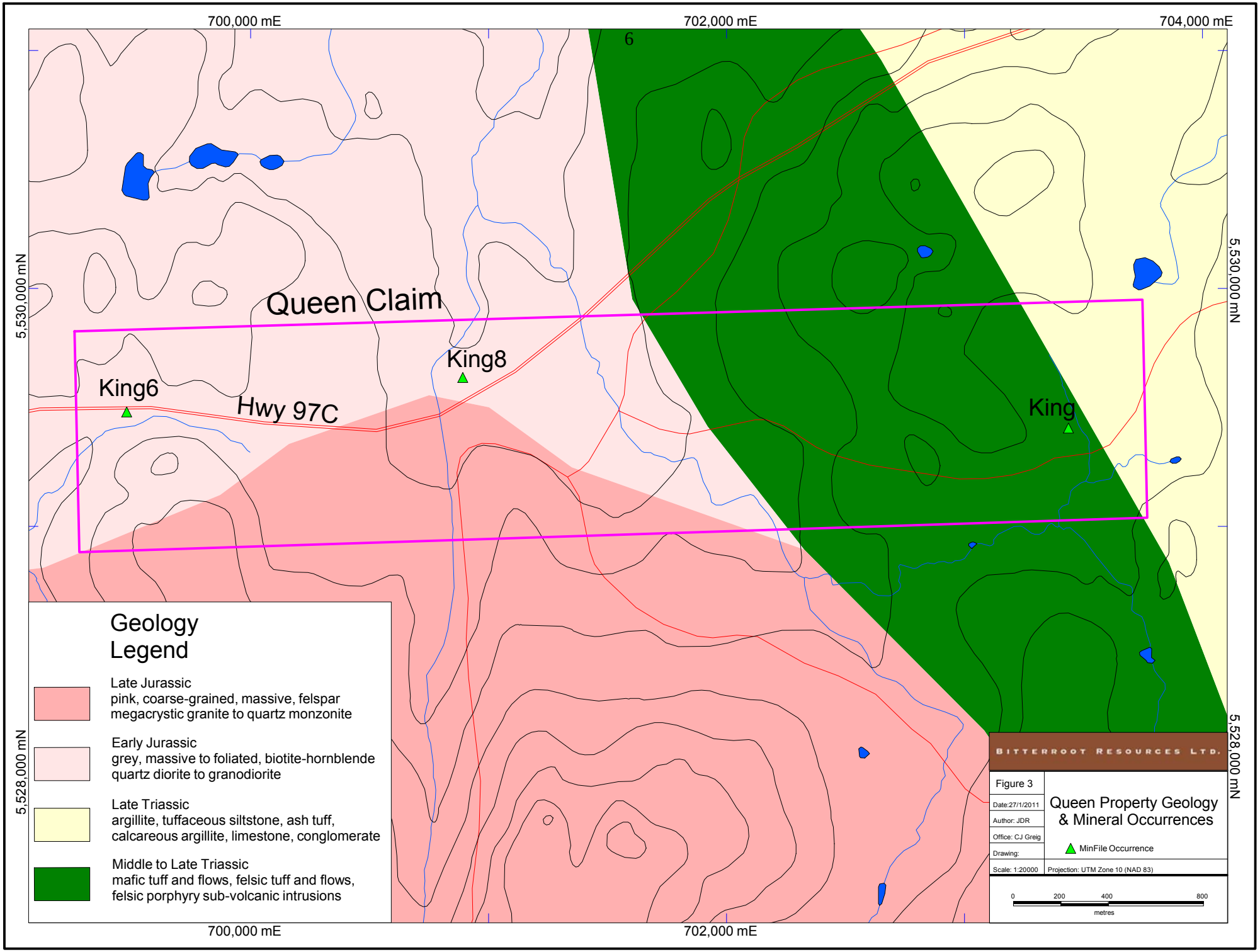
The geology of the property was not mapped during this program; however geological observations are summarized from a report on the King property (Rowe, 1991). Rock cut exposures along the highway on the west side of the property consist predominantly of coarse grained pinkish granite. Shear zones within the granite are often accompanied by argillic to phyllic alteration over widths of up to several metres with local narrow quartz veins emplaced in the shears. Black, iron and manganese oxides are common in the alteration zones. Andesite dykes up to 0.5m wide of probable Tertiary age have been observed cutting granite near mineralized quartz veins. Similar dykes are spatially associated with gold-bearing quartz veins on the nearby Elk property. Shears and vein structures measured on the property have predominantly east to northeast strikes and moderate to steep southerly dips. It has been observed that most of the gold-bearing structures in the region have similar trends.

MinFile records show 3 known mineral showings in the area of the Queen claim. These showing locations are plotted on Figure 3 and they are described below.

The King 6 showing consists of a drusy quartz vein, 10 centimetres wide that cuts coarse-grained, feldspar megacrystic granite of the Middle Jurassic Osprey Lake batholith. The vein is mineralized with scattered blebs of chalcopyrite. A selected sample analysed 0.41 gram per tonne gold and 7.8 grams per tonne silver (MinFile Number 092HNE297).

The King 8 showing consists of a shear zone, 70 centimetres wide, cutting coarse-grained, phyllic (sericitic?)-altered granite of the Middle Jurassic Osprey Lake batholith, near an andesitic dike. The showing is approximately 100 metres south of the contact with andesitic ash and lapilli tuff of the Upper Triassic Whistle Creek Formation (Nicola Group). A pyritic quartz-calcite vein/breccia is associated with the shear zone. A series of selected chips from the vein yielded 0.44 gram per tonne gold and 10.6 grams per tonne silver (MinFile Number 092HNE298).

The King showing comprises a quartz vein, 1 centimetre wide, cutting bleached, pyritic, andesitic ash tuff of the Upper Triassic Whistle Creek Formation (Nicola Group). A sample of selected chips analysed 0.68 gram per tonne gold (MinFile Number 092HNE299).


700,000 mE
702,000 mE
704,000 mE
5,530,000 mN
5,528,000 mN
6
Queen Claim
King6
King8
King
Hwy 97C
Geology Legend
Late Jurassic
pink, coarse-grained, massive, felspar megacrystic granite to quartz monzonite
Early Jurassic
grey, massive to foliated, biotite-hornblende quartz diorite to granodiorite
Late Triassic
argillite, tuffaceous siltstone, ash tuff, calcareous argillite, limestone, conglomerate
Middle to Late Triassic
mafic tuff and flows, felsic tuff and flows, felsic porphyry sub-volcanic intrusions
BITTERROOT RESOURCES LTD.
Figure 3
Queen Property Geology & Mineral Occurrences
Date:27/1/2011
Author: JDR
Office: CJ Greig
Drawing:
MinFile Occurrence
Scale: 1:20000
Projection: UTM Zone 10 (NAD 83)
0
200
400
800
metres

4.0 2010 EXPLORATION PROGRAM

4.1 Airborne Magnetic Survey (Figures 4-6)

The 2010 exploration program entailed a fixed-wing airborne magnetic survey over the Queen property that was part of a much more extensive survey covering claims to the north and east of the Queen claim, which are also owned by Bitterroot Resources Ltd. The survey was conducted by Firefly Aviation Ltd. of Calgary, Alberta, using the Kamloops airport as base of operations. Appendix 2 describes the survey platform and all main and auxiliary equipment used for the survey. Appendix 3 lists the survey specifications, operational logistics, map products, data collection, processing and archiving.

The purpose of this survey was to acquire high resolution, high sensitivity aeromagnetic (HRAM) data over the area of the property and surrounding region. To achieve this purpose, the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines (traverses) spaced 100 meters apart in a north - south alignment. Tie lines were flown normal to the traverses spaced at 500 meters. The nominal flying height was a pre-planned draped surface 80 meters above the terrain surface. The data point interval is approximately 6.5 meters relative ground spacing per sample point.

Between October 4 and October 14, 2010 the total number of line kilometres flown over the entire survey area was 3981 kilometres. Of that total, the Queen property, plus a 1 kilometre surrounding fringe zone, (as shown on the accompanying geophysical maps) amounted to 234 line kilometres. Therefore, the percentage of the total survey that relates to the Queen Property geophysical mapping is 5.8%. Cost of the survey for the Queen claim is apportioned accordingly.

4.2 Magnetic Survey Results and Interpretations (Figures 7-9)

Broad-waved magnetic zones cover the Queen claim with magnetic values ranging from 55,605 to 56,160 nanoTeslas. A magnetic high is located just north of Hwy 97C in the western part of the claim, however it is not outstanding compared to other highs in this area. It is most likely related to magnetite or pyrrhotite in granitic intrusive rock.

A linear, west-northwest-trending magnetic high crossing the eastern part of the property may be related to the contact of andesitic volcanic rocks with the batholith. Based on the trend of this magnetic high the Nicola volcanics possibly extend farther to the west-northwest than is interpreted on the geology map. Similar linear magnetic highs are evident in other areas along the batholith contact and the author has observed fine disseminated pyrrhotite in these contact zones which would account for the higher magnetic response.

An area of lower magnetic values to the east of the claim quite closely correlates with Late Triassic sedimentary units comprised mostly of argillite and tuffaceous siltstone.

A west-northwest-trending magnetic low cutting across the central part of the property coincides moderately well with a shallow stream gully. This depression may be the site of a fault structure with possible hydrothermal alteration that has destroyed magnetic minerals in the rock. The geologic exploration model for this property consists of hydrothermal alteration and vein mineralization within large-scale structures that cut granitic rocks; therefore this magnetic low is a favourable exploration target area on the Queen property.

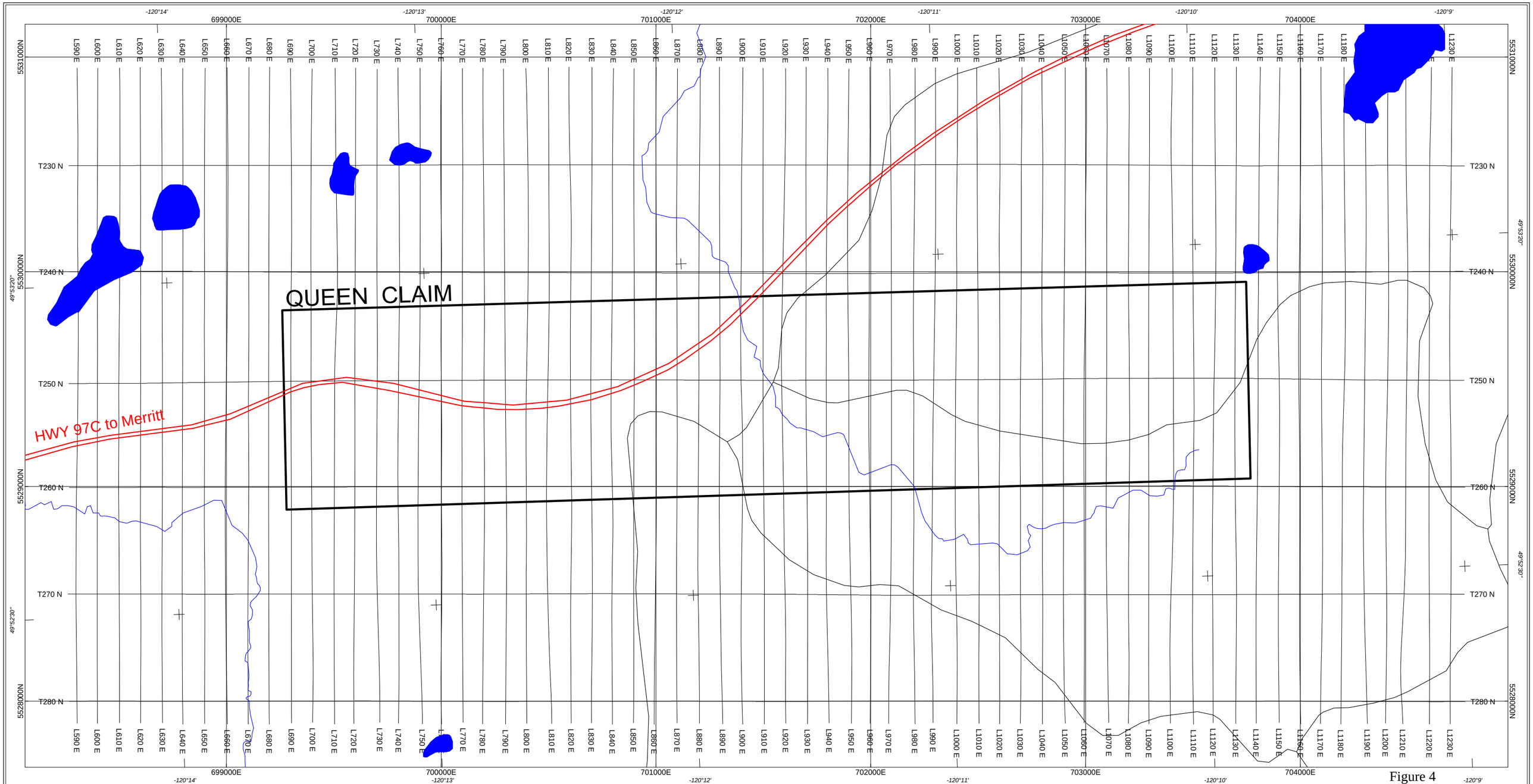


Figure 4

Scale 1:10000

200 0 200 400 600

(meters)

WGS 84 / UTM zone 10N

BITTERROOT RESOURCES Ltd.

QUEEN Claim, MERRITT area, South Central BC
2010 AIRBORNE MAGNETIC SURVEY
AIRBORNE SURVEY GRID

Survey flown by Firefly Airborne Surveys during October 5-14, 2010 along E-W lines spaced at 100m interval and N-S tie-lines at 500m employing a PA-31 Piper Navajo survey aircraft
MAP:NB_Q_Grid.map

by: J.Klein, January, 2010

Figure 4

QUEEN CLAIM

HWY 97C to Merritt

Figure 5

Digital Terrain
in meters

1585 1590 1600 1610 1620 1630 1640 1650 1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1803

Scale 1:10000

200 0 200 400 600
(meters)
WGS 84 / UTM zone 10N

BITTERROOT RESOURCES Ltd.

QUEEN Claim, MERRITT area, South Central BC
2010 AIRBORNE MAGNETIC SURVEY
DIGITAL TERRAIN IMAGE

Survey flown by Firefly Airborne Surveys during October 5-14, 2010 along E-W lines spaced at 100m interval and N-S tie-lines at 500m employing a PA-31 Piper Navajo survey aircraft
MAP:NB_Q_DTM.map

by: J.Klein, January, 2010

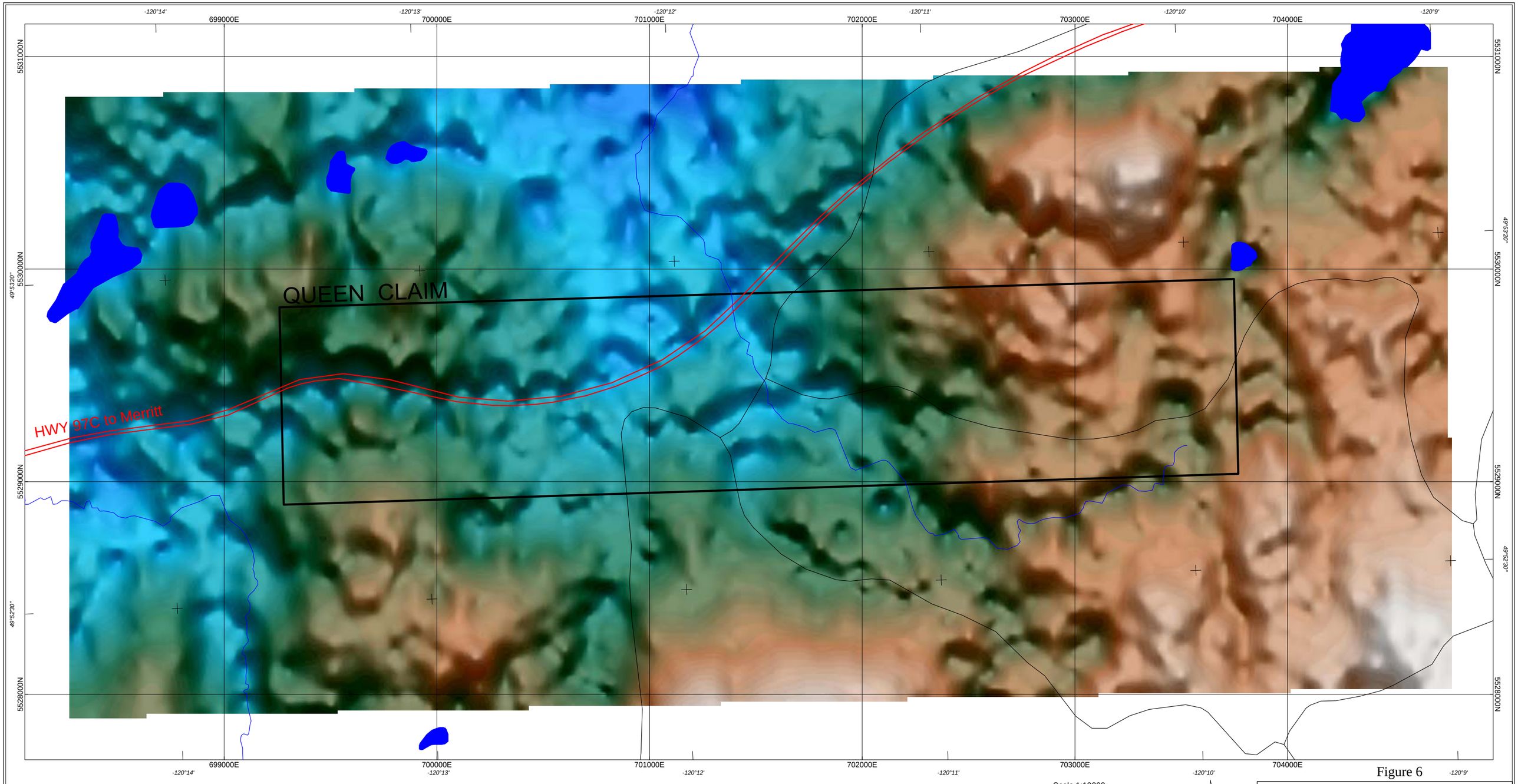


Figure 6

BITTERROOT RESOURCES Ltd.

QUEEN Claim, MERRITT area, South Central BC
2010 AIRBORNE MAGNETIC SURVEY
SHADOW IMAGE DIGITAL TERRAIN DATA (Sun: I=70d, D=0d)

Survey flown by Firefly Airborne Surveys during October 5-14, 2010 along E-W lines spaced at 100m interval and N-S tie-lines at 500m employing a PA-31 Piper Navajo survey aircraft
MAP:NB_Q_ShDTM.map

by: J.Klein, January, 2010

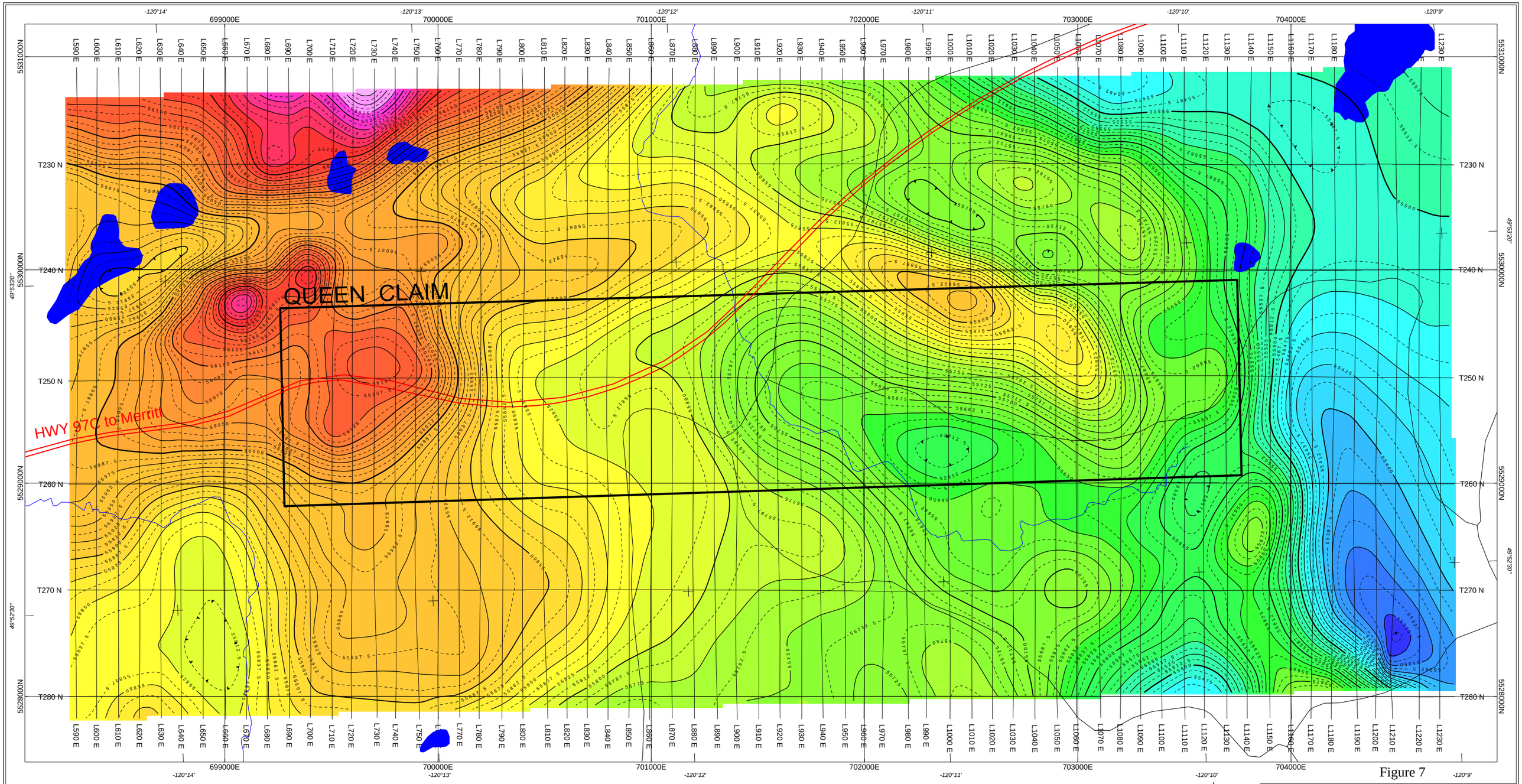


Figure 7

BITTERROOT RESOURCES Ltd.

QUEEN Claim, MERRITT area, South Central BC
2010 AIRBORNE MAGNETIC SURVEY
MAGNETIC DATA

Survey flown by Firefly Airborne Surveys during October 5-14, 2010 along E-W lines spaced at 100m interval and N-S tie-lines at 500m employing a PA-31 Piper Navajo survey aircraft
MAP:NB_Q_Mag.map

by: J.Klein, January, 2010

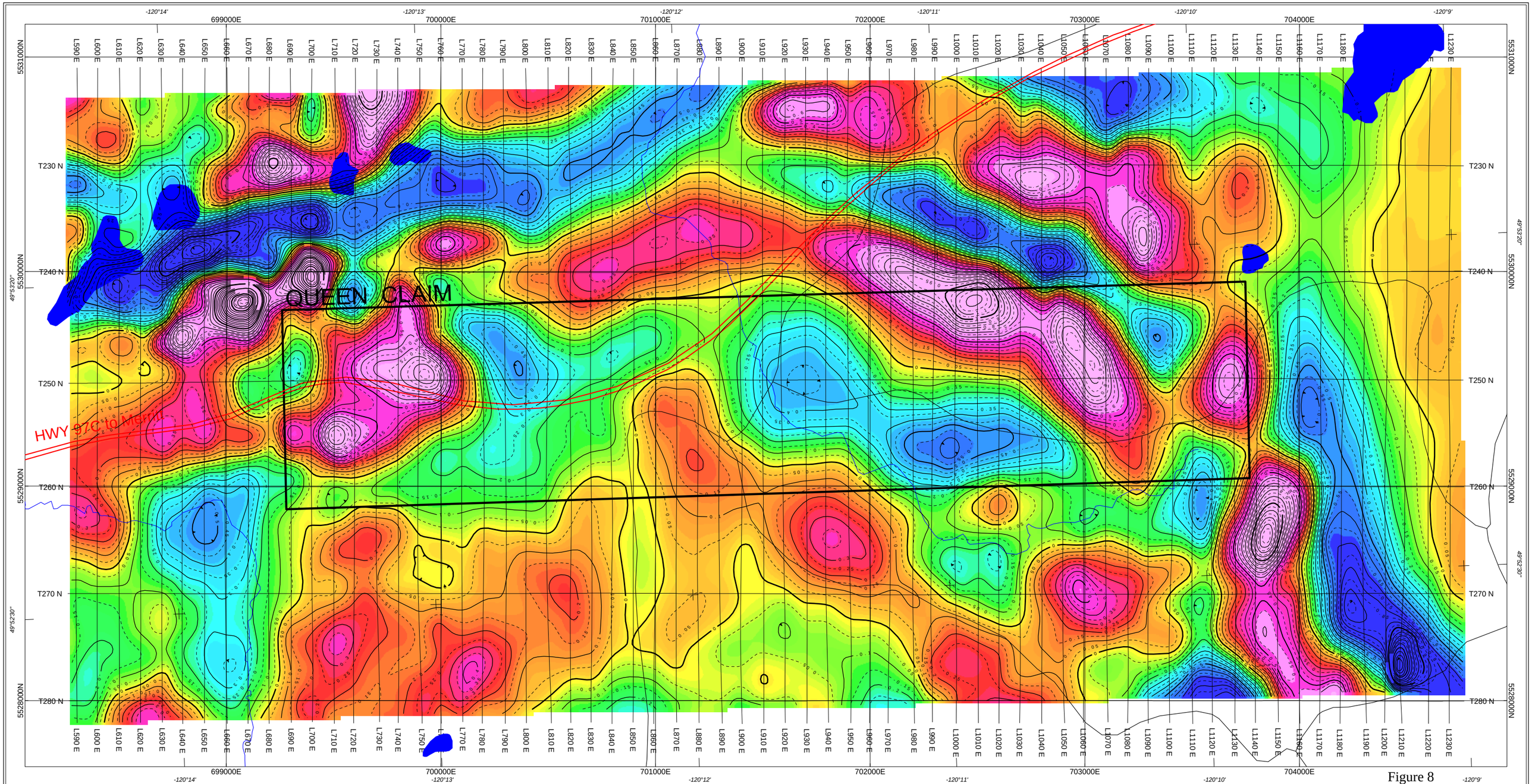


Figure 8

BITTERROOT RESOURCES Ltd.

QUEEN Claim, MERRITT area, South Central BC
2010 AIRBORNE MAGNETIC SURVEY
1st VERTICAL GRADIENT of MAGNETIC DATA

Survey flown by Firefly Airborne Surveys during October 5-14, 2010 along E-W lines spaced at 100m interval and N-S tie-lines at 500m employing a PA-31 Piper Navajo survey aircraft
MAP:NB_Q_1VGMag.map

by: J.Klein, January, 2010

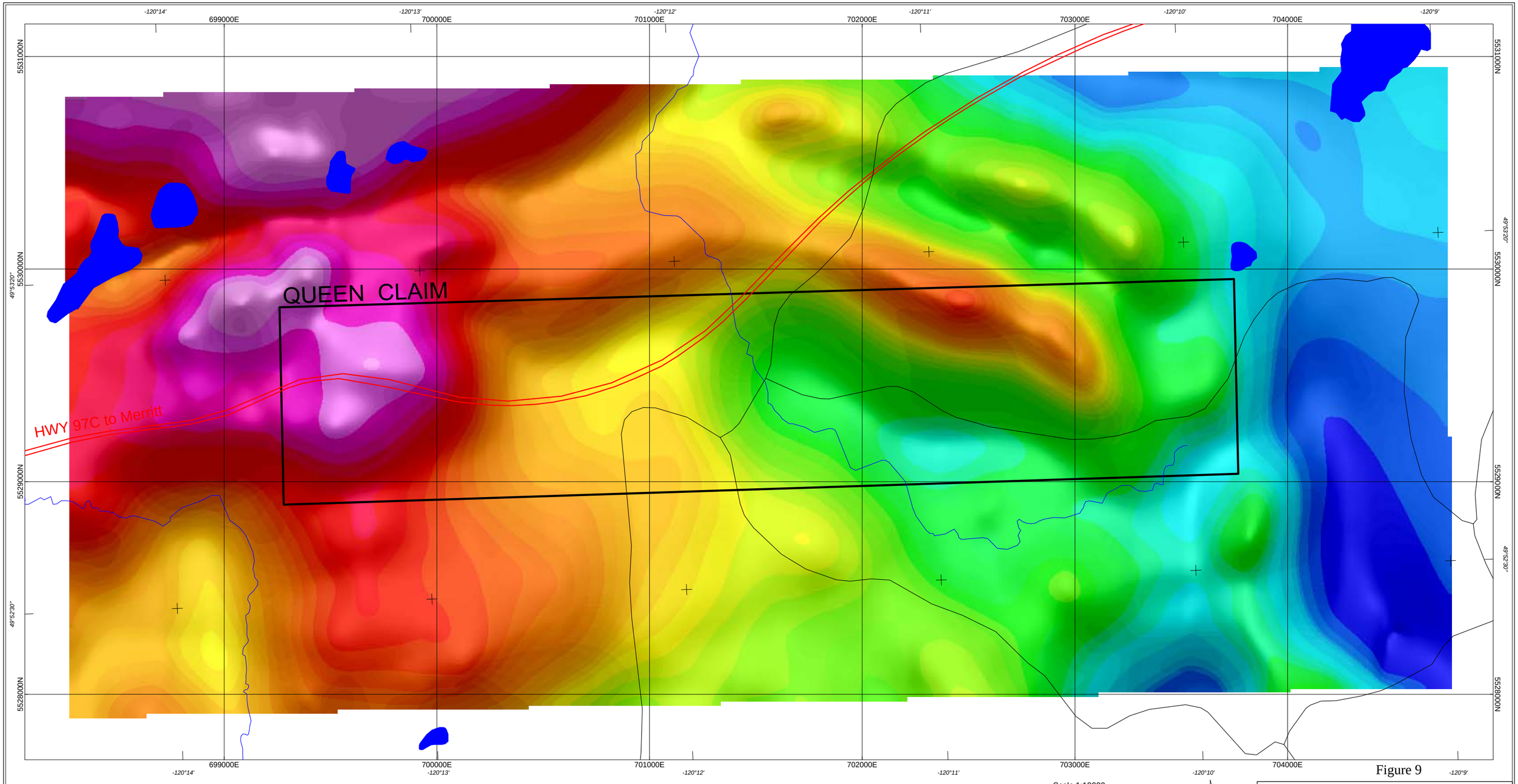


Figure 9

BITTERROOT RESOURCES Ltd.

QUEEN Claim, MERRITT area, South Central BC
2010 AIRBORNE MAGNETIC SURVEY
SHADOW IMAGE of MAGNETIC DATA (Sun: I=70d, D=0d)

Survey flown by Firefly Airborne Surveys during October 5-14, 2010 along E-W lines spaced at 100m interval and N-S tie-lines at 500m employing a PA-31 Piper Navajo survey aircraft
MAP:NB_Q_ShMag.map

by: J.Klein, January, 2010

5.0 RECOMMENDATIONS

Soil sampling on north-south trending, 200m-spaced lines with 50m sample intervals should be undertaken on the property, especially in the central and eastern parts, to test a north-northwest trending magnetic low for potential gold-bearing hydrothermal alteration zones.

Fill-in sampling at 50m x 50m spacings should be conducted around stations with values greater than 20 ppb gold to better define potential anomalous trends.

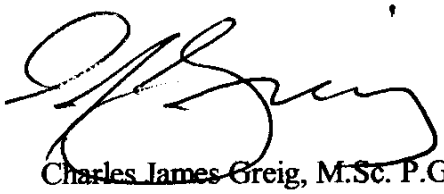
All samples should be analyzed for a 40-element suite by ICP methods, as well as for gold, to test for enriched gold pathfinder elements such as As or Sb as well as to test for Cu-Mo porphyry-style mineralization similar to the nearby Brenda deposit.

Known (MinFile) mineral showings should be located, mapped and sampled and the surrounding areas prospected to search for additional mineralization.

Areas with mineral showings or strongly anomalous gold geochemistry, coincident magnetic lows and an overburden depth less than four metres should be trenched to bedrock with an excavator. Trenches should be cleaned, mapped and chip sampled.

Respectfully submitted,

Jeffrey D. Rowe, B.Sc.
Geologist



Charles James Greig, M.Sc. P.Geo
Geologist

February 7, 2011

6.0 BIBLIOGRAPHY

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Rowe, J.D. (1991): 1991 Geochemical Report on the King 1-10 Mineral Claims, Assessment Report Number 21922

7.0 PERSONNEL

Firefly Airborne Surveys, Calgary, Alberta
Benjamin Guillon – Survey Pilot
Jeremy Weber – Equipment Operator and Field Data Processor
Bruce Evans – Project Manager
Christopher Campbell (Intrepid Geophysics) – Final Processing

Jeffrey Rowe, Penticton, BC – Geologist, Report Preparation
Charles Greig, Penticton, BC – Geologist, Report Preparation
Jan Klein, Vancouver, BC – Geophysicist, Data Interpretation, Map Preparation

8.0 STATEMENT OF EXPENDITURES

AIRBORNE GEOPHYSICAL CONTRACTOR
Firefly Airborne Surveys
5.8% of total survey cost apportioned to Queen Property…….. $3880

PROFESSIONAL SERVICES

J.D. Rowe	4 days x 500/day	$2000
C.J. Greig	1 day x 600/day	600
J. Klein	2 days x 800/day	1600

Total Expenditures…….. $8080

Appendix 1

Statements of Qualifications

I, Jeffrey D. Rowe, of 2537 Evergreen Drive, Penticton, British Columbia, Canada, hereby certify that:

1. I am a graduate of the University of British Columbia with a B.Sc. (Honours) (Geological Sciences, 1975) and have practiced my profession continuously from 1975 to 1999 and from 2007 to present.

2. I have been employed in the geoscience industry for over 25 years, and have explored for gold and base metals in North and South America for both senior and junior mining companies, on exploration properties as well as at a producing mine.

3. I am not aware of any material fact or material change with respect to the subject matter of the technical report that is not reflected in the technical report, the omission to disclose which makes the technical report misleading.

4. I am an author of the report entitled; "2010 Airborne Magnetic Survey on the Queen Property" dated February 7, 2011. I supervised a part of the work program reported on herein.

Dated at Penticton, British Columbia, this 7th day of February, 2011.

Respectfully submitted,

Jeffrey D. Rowe, B.Sc.

I, Charles James Greig, of 250 Farrell St., Penticton, British Columbia, Canada, hereby certify that:

1. I am a graduate of the University of British Columbia with a B.Comm. (1981), a B.Sc. (Geological Sciences, 1985), and an M.Sc. (Geological Sciences, 1989), and have practiced my profession continuously since graduation.

2. I have been employed in the geoscience industry for over 25 years, and have explored for gold and base metals in North, Central, and South America, and Africa for both senior and junior mining companies, and have several years of experience in regional-scale government geological mapping.

3. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia (license #27529).

4. I am a "Qualified Person" as defined by National Instrument 43-101.

5. I am not aware of any material fact or material change with respect to the subject matter of the technical report that is not reflected in the technical report, the omission to disclose which makes the technical report misleading.

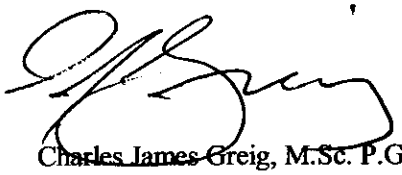
6. I own shares of Bitterroot Resources Ltd., which is the owner of the Queen Property.

7. I am an author of the report entitled; "2010 Airborne Magnetic Survey on the Queen Property" dated February 7, 2011. I supervised a part of the work program reported on herein. I have been involved with exploration on behalf of Bitterroot Resources Ltd. since 1996.

8. I have read National Instrument 43-101 and Form 43-101F1 and the technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.

Dated at Penticton, British Columbia, this 7th day of February, 2011.

Respectfully submitted,



Charles James Greig, M.Sc. P.Geo

APPENDIX 2

AIRBORNE MAGNETIC SURVEY

EQUIPMENT SPECIFICATIONS

1 AIRCRAFT

The survey was carried out using a Piper PA-31 Navajo aircraft, registration C-FOOO, configured with a specially designed rigid-mount tail boom for geophysical survey operations. The aircraft is equipped with a high sensitivity magnetometer and a full on-board real time compensation recording computer, and related equipment. It is a single engine aircraft with full avionics, including real time differential 3D GPS navigation.

The aircraft has been modified to conduct airborne geophysical surveys. Considerable effort has been made to remove all ferruginous materials near the sensor and to ensure that the aircraft electrical systems do not create any noise.

2 AIRBORNE GEOPHYSICAL EQUIPMENT

The airborne geophysical system has one, high sensitivity, cesium vapor magnetometer. Ancillary support equipment include tri-axial fluxgate magnetometer, radar altimeter, barometric altimeter, GPS receiver and a navigation system which includes a left/right indicator and a screen showing the survey area with real time flight path. All data are collected and stored by the data acquisition system. The following provides the detailed equipment specifications.

Cesium Vapor Magnetometer:

Manufacturer Geometrics
Model G-822
Resolution 0.001 nT counting @ 0.1 per second
Sensitivity +/-0.005 nT
Dynamic Range 15,000 to 100,000 nT
Fourth Difference 0.02 nT

Tri-Axial Magnetic Field Sensor (for compensation, mounted in the tail boom proximal to the CS-2 pod):

Manufacturer Billingsley Magnetics
Model TFM 1000
Internal Noise at 1 Hz - 1 kHz; 0.6 nT rms
Bandwidth 0 to 1 kHz maximally flat, -12 dB/octave roll off beyond 1 kHz
Frequency Response 1 HZ - 100 Hz: +/- 0.5%
100 Hz - 500 Hz: +/- 1.5%
500 Hz - 1 kHz: +/- 5.0%
Calibration Accuracy: +/- 0.5%
Orthogonality +/- 0.5% worst case
Package Alignment +/- 0.5% over full temperature range
Scaling Error absolute: +/- 0.5%
between axes: +/- 0.5%

Radar Altimeter:

Manufacturer King
Model KRA-10A
Accuracy 5% up to 2,500 feet
Calibrate Accuracy 1%
Output Analog for pilot; Converted to digital for data acquisition

Differential 3D GPS Receiver:

Manufacturer Novatel
Model ProPack LB Plus
Differential Source CDGPS
Type Continuous tracking, L1 frequency, C/A code (SPS), 12 channel (independent)
Position Sensitivity twice per second
Accuracy position (differentially corrected) ~1.0 meter position (SA implemented) 100 meters, position (no SA) 30 m, velocity 0.1 knot, time recovery 1 pps, 100 nsec pulse width
Data Recording all GPS data and positional data logged by onboard DGR33A on compact flash

Navigation Interface (with pilot and operator readouts):

Manufacturer AG-NAV Inc.
Model P141
Data Input Real time processing of GPS output data
Pilot Readout Left/Right indicator / forward line projection screen
Operator Readout Screen modes: map, survey and line
Data Recording All data recorded in real time on Compact Flash disk via DGR33A

Data Acquisition System:

Manufacturer RMS Instruments
Model DGR33A with Chart Recorder
Operating System MS-DOS
Microprocessor RMS4183A
Memory On board up to 128 MB, via SCSI Compact Flash Interface
Clock real time; hardware implementation of MC14618 in the integrated peripherals controller

I/O Slots 5 AT and 3 PC compatible slots
Display Electro – luminescent 640x400 pixels
Graphic Display Scrolling analog chart simulation with up to 5 windows operator selectable; freeze display capability to hold image for inspection
Recording Media 128 MB SCSI Compact Flash Drive
Sampling Programmable. Rate for this program set at 1 Hz.
Inputs 32 differential analog inputs
Serial Ports 2 RS-232/RS422
Parallel Ports 4 channel Serial I/O; 4 channel ARINC

Magnetometer Processor:

Manufacturer Geometrics

Model
Input Range 20,000 - 100,000 nT
Resolution 0.001 nT
Bandwidth 0.7, 1 or 2 Hz
Input Signal TTL, CMOS, Open collector compatible or sine wave with decoupler
Input Impedance TTL>1K Ohm

Magnetic compensation for aircraft and heading effects is done in real time. Raw magnetic values are also stored and thus if desired, compensation with different variables can be run at a later time.

Magnetic Compensation System:

Manufacturer RMS Instruments
Model AADCII
Operating System MS-DOS
Inputs 1 to 4 high sensitivity magnetometers
Input Frequency Range 70khz to 350khz
Magnetic Field Range 20,000 to 100,000 nT
Front End Counter 100 MHz
Resolution 1 pT
Compensation Perf. Improvement ratio 10 to 20 typical for total field
Accuracy of Compens. 0.035 nT standard deviation for the entire aircraft flight envelope in the bandwidth 0 to 1 hz typical
Data Output Rate 10 hz maximum
Internal System Noise less than 1 pT
Vector Magnetometer 3-Axis Fluxgate over sampled, 16 bit resolution
Outputs 3 Serial RS232C ports, max rate 19.2 Kbaud
Magnetometer data output
Direct Interface with GR33A
Parallel output port, 16 bit with full handshaking
4 Analog outputs with 12 bit resolution.

Power Supplies:

Power Distribution Unit manufactured by Analytic Systems Ltd. interfaces with the aircraft power and provides filtered and continuous power at 27.5 VDC to all components.

3 MAGNETOMETER BASE STATION

High sensitivity base station data are provided by a GEM GSM-19 Overhauser magnetometer, data logging onto a dedicated PC module.

Magnetic Sensor:
GEM GSM-19

Magnetic Processor:
Manufacturer GEM
Model GSM-19 Overhauser Mag
Input Range 15,000 - 100,000 nT
Resolution 0.1 nT

Bandwidth 1 or 2 Hz
Input Signal TTL, CMOS, Open collector compatible or sine wave with decoupler
Input Impedance TTL>1K Ohm

Logging Software:

Logging software by GEM-Terraplus Ltd. Compatible to PC with RS 232 input; supports real time graphics, automatic startup, compressed data storage, selectable start/stop times, automatic disk swapping, plotting of data to screen or printer at user selected scales, and fourth digital difference and diurnal quality flags set by user.

4 GPS BASE STATION

Ground GPS data was collected to perform any required post-flight differential correction to the flight path. The ground GPS base station equipment is described below:

Manufacturer Novatel
Model Novatel OEM2 Card
Type Continuous tracking, L1 frequency, C/A code (SPS), 10 channel
WAAS/Omnistar/CDGPS Enabled
Position Update once per second
Accuracy with SA implemented 100 meters, no SA 30 meters, velocity 0.1 knot, time recovery 1 pps, 100 nsec pulse width
Data Recording all GPS raw and positional data logged by PC based data logger

APPENDIX 3

AIRBORNE MAGNETIC SURVEY

SURVEY SPECIFICATIONS, OPERATIONAL LOGISTICS, DATA COLLECTION, DATA PROCESSING AND MAP PRODUCTS

The purpose of this survey was to acquire high resolution, high sensitivity aeromagnetic (HRAM) data over an area located ~35 kilometres SW of Kelowna, British Columbia. To achieve this purpose, the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines (traverses) spaced 100 meters apart in a north - south alignment. Tie lines were flown normal to the traverses spaced at 500 meters. The nominal flying height was a pre-planned draped surface 80 meters above the terrain surface. Between October 4 and October 14, 2010 the total number of line kilometres flown and accepted over the Queen block is 234 km, and more specifically 52.7 km over the Queen claim proper. The first acquisition flight was completed on October 5, and the final acquisition flight was completed on October 14, 2010. There were a total of seven (7) survey flights completed over a large area of which the Queen block was a part.

CONTRACTOR
The survey was conducted by Firefly Airborne Surveys a division of Firefly Aviation Ltd. with offices located at Unit #4 550 Hurricane Drive, Springbank Airport, Calgary, Alberta T3Z 3S8. Telephone (403) 246-8083, fax (403) 202-1493.

SURVEY AREA
The survey area is located approximately 35 kilometres southwest of Kelowna, British Columbia. The survey was conducted over an area as defined by Bitterroot Resources Ltd.

LINES AND DATA
Traverse Line Direction 360 and 180 degrees true azimuth.
Line Interval 100 m
Tie Line Interval 500 m flown orthogonal to survey lines.
Terrain Clearance 80 meters pre-planned drape mode.
Average ground speed 65 meters/second
Data point interval: Magnetic: ~6.5 meters relative ground spacing per sample point.

TOLERANCES
a) Line spacing: At no point did the traverse or control lines deviate more than one third of the designated flight line spacing over a period of one kilometer of line flown.
b) Terrain clearance: All flight lines were within tolerance of the planned drape surface.
c) Diurnal magnetic variation: As per specifications, with data not acquired during magnetic storms or short term disturbances which exceeded survey specifications.
d) Missing data: Any lines with channels or portions of channels missing from the database were reflown.

NAVIGATION AND RECOVERY
The satellite navigation system was used to ferry to the survey site and to survey along each line using UTM coordinates. The survey coordinates of the survey outline for navigation purposes and flight path recovery were calculated from the project area coordinates.

The navigation accuracy is variable depending on the number and condition of the satellites, however with use of the real time differential 3D GPS navigation it is generally less than five meters and typically in the 1 to 3 meter range. Post-flight differential correction of the flight path, which corrects for satellite range errors, improves the accuracy of the flight path recovery to approximately within one to three meters.

OPERATIONAL LOGISTICS

The main base of operations for the survey was the airport located at Kelowna, British Columbia. The base station magnetometer and GPS equipment were located in a magnetically quiet location at the airport.

Fuel for the aircraft was secured at the Kelowna airport. Accommodations for the field crew were secured in Kelowna.

The field crew consisted of:
Benjamin Guillon – Survey Pilot
Jeremy Weber – Equipment Operator and Field Data Processor

The data processing crew consisted of:
Bruce Evans – Project Manager
Jeremy Weber – Senior Processor, Quality Control
Christopher Campbell (Intrepid Geophysics) – Final Processing

Field operations were conducted at the project between October 4 and 14, 2010. The aircraft and crew mobilized to the project on October 4, 2010, and conducted initial calibration and compensation flights during October 5, 2010. The aircraft and crew demobilized from the project area on October 14, 2010 and arrived back at the Calgary base on the same day. The final acquisition flight was completed on October 14. In total 7 acquisition flights were conducted.

DATA PROCESSING

After each mission the flight data was fully field processed and quality-checked. Each line of data was viewed on-screen, displaying raw mag, compensated mag, ground mag, noise, radar altitude, Lat/Long, flight path, and in-grid/out-of-grid. These, with the digital review, were the basis for the data QC. Any flight lines that exceeded the survey specifications due to aircraft positioning, diurnal variations or noise were noted for reflight, and forwarded to the flight crew for re-collection.
The generalized processing procedure during the survey consisted of the following:

1) Import all flight and base data into Geosoft Montaj.
2) Edit DIURNAL channel to remove any uncharacteristic spikes and linearly interpolate across any gaps.
3) Establish table of mean terrain clearances at intersection locations from tie line data to provide elevation guidance for survey line navigation. Grid differences in elevations at intersections of tie and survey lines to provide quality check on elevation control and tag any for reflight.
4) Edit flight path channels to remove any false spikes and linearly interpolate gaps.
5) Edit RAWMAG channel to remove any false spikes and linearly interpolate gaps.
6) Create new channel as MAGDC = (MAG1 - BASEMAG) + base constant.
7) Perform lag correction and heading correction to MAGDC channel.
8) Perform tie line leveling using all the survey line data to level the tie lines.
9) Perform preliminary survey line leveling using the leveled tie lines; preliminary leveled channel is labeled MAG_PRELEV.

10) All data were viewed on the screen on a line-by-line basis using the interactive Geosoft Montaj database to inspect for quality, required tolerances and data integrity.
11) Produce preliminary flight path map and gridded magnetic intensity map including shadowing.
12) Plot survey line and tie line flight paths and profiles for quality control inspection.

DATA ARCHIVING

The data is archived in a text file and Geosoft Montaj database format as follows:

flight	Flight Number
line	Line Number
date	Flight Date
gtime	GPS time (seconds)
UTM83_Zone10N_X	UTM X Post processed
UTM83_Zone10N_Y	UTM Y Post processed
galt_raw	Raw GPS altimeter
galt_fin	GPS altimeter Post processed
radalt_raw	Radar altimeter (mV)
radalt_mf	Radar altimeter (m) LP filt applied
topolev	Leveled calculated topographic (m)
fx	Fluxgate X-axis (nT)
fy	Fluxgate Y-axis (nT)
fz	Fluxgate Z-axis (nT)
rawmag	Uncompensated TMI (nT)
cmag	Compensated TMI (nT)
maglag	Lag corrected from CMAG (nT)
res_mag	IGRF removed from MAGLAG (nT)
mag_igrf	IGRF constant added back into data (nT)
magfinal	Final leveled TMI (nT)

MAP PRODUCTS

Maps are presented at a scale of 1:10,000 for the following gridded outputs:
Survey grid on basic topography
Digital Terrain, linear scale contour interval 5 meters
Shadow Image of Digital Terrain (Sun: I=70º, D=0º)
Magnetic data, linear scale contour interval 12.5 nT
Shadow image of Magnetic data (Sun: I=70º, D=0º)
1st Vertical Derivative of the Magnetic data, linear scale contour interval 0.05 nT/m