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2016 AGATE ASSESSMENT REPORT

UAV-AIRBORNE MAGNETIC SURVEY "Featuring Pioneer Exploration Consultants' UAV-MAG™ System

Name Eli 11-14 Gab 35, 37, 39 Ultra 1-30, 37-65, 67-72 Ultra 73-80, 81-90 Tell 1-4 Ult 1-7, 21-67 Ult 70-71,74-75, 77, 79 Ult 84, 86, 88, 90, 105-121, 123 Ult 8-21, 142-152, 177 - 192 Jen 1-40, 120, 251 VMS 1-12 UM 1-12, 17-35, 42-45, 50-63 UM 39-41, 62-65 UZ 1-34, 37-68, 70, 72, 74, 76, 78 UZ 80, 82-85, 87, 89 UZ 199-202, 219-53, 255, 57, 59

Grant Number YC18433-36 YC19079, 81, 83 YC19001-30, YC19098-126, 128-133 YC19398-405, YC26106-115 YC19406-409 YC19376, YC25938-43, YC26239-285 YC26288-89, 92-93, 95, 97 YC26302, 04, 06, 08, 323-39, 41 YC26359-83, YC40233-48 YC26408-449 YC53937-948 YE69101-12, 17-35, 42-45, YE69150-163 YE69976-74, YE69977-80 YE69701-34, 37-68, 70, 72, 74, 76, 78 YE69780, 82-85, 87, 89 YE69899-902, 919-953, 955, 57, 59

NTS: 115 B 16 60°54'N 138°15'W Whitehorse Mining District Yukon Territory, Canada Report Prepared for: Group Ten Metals 1450-789 Hastings Street Vancouver, BC V6C 1H2 Report Prepared by: James Rogers Work Performed: February 1 – 8, 2016

Work Program Managed and Operated by:

LONGFORD EXPLORATION

services

longfordexploration.com

14501 Kidston Rd. Coldstream, BC, V1B 1R7 Tel: (778) 809-7009 www.longfordexploration.com Survey Flown Using:



Pioneer Exploration Consultants Ltd.

UAV-MAG[™] System 277 2366 Avenue C North Saskatoon, SK, S7L 5X5 Tel: (306) 715-6802 www.pioneerexploration.ca

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1. Introduction

This report describes a UAV-MAG[™] geophysical survey carried out on behalf of Longford Exploration (Longford) by Pioneer Exploration Consultants (Pioneer) on the Ultra Property, near Kluane Lake, Yukon Territory, Canada.

The principal geophysical sensors included in Pioneer's exclusive UAV-MAG[™] system, comprised of a Gem Systems GSMP 35A high sensitivity potassium vapor sensor, specially designed and configured for Pioneer's UAV flight system. Ancillary equipment included a Novatel GPS navigation system, IMU, laser altimeter, multiplexor (MUX) data acquisition unit, and a UTC time synchronized base station magnetometer. Raw streaming magnetometer data at a rate of 5 times per second, along with IMU, GPS and laser altimeter data was collected and stored on board the UAV, and retrieved post flight.

The total line kilometers flown was 28.9. The survey flying described in this report took place between February 1st and February 10th. The data were examined for the extension of a bedrock magnetic anomaly discovered during a previous ground based geophysical magnetometer survey program. A discussion of the results is presented in the interpretation section of this report. This report also describes the survey specifications, data processing and data presentation.

2. Property Description, Location and Access

The Ultra Property is located in southwest Yukon and is centered approximately 40km northwest of Haines Junction, Yukon within NTS map sheet 115B16. The Kluane Front Ranges form a narrow facade to the St. Elias Mountains, rising steeply from the Shakwak Valley to a maximum elevation of 8500 feet. The slopes are steep and uniform with long straight talus screes; in general terms the Front Ranges comprise two or three major ridges parallel to the main front connected by high saddles and dissected within the project area by major transverse V-shaped valleys containing the Jarvis River and Silver Creek.

The forest cover of this area is light, with treeline at approximately 4000 feet elevation. Black spruce, white spruce, balsam, poplar and white poplar dominate the forested slopes; alder willow and sub-alpine flora are found at and above the timberline. Game is plentiful as the project area lies wholly within the Kluane Game Sanctuary.

Airstrips are located at Haines Junction and Silver City and charter helicopter and fixed wing service is available at Haines Junction and seasonally at Silver City. Commercial accommodation is available in Haines Junction and Silver City, and the former remains the best venue for staging exploration in the project area with most of the support services and casual labour pool available that early stage exploration requires.



Access to the northern and eastern most sections of the property can be obtained via the old Alaska Highway (now a 4x4 road) extending southeast from Boutellier Summit. Northwest sections and upper parts of the property are accessed by helicopter. Access to the property from the Alaska Highway was facilitated for this winter time survey by snowmobiling from the Alaska Highway along deactivated seasonal roads, and into the claim group through a newly broken snowmobile trail. The Survey crew was accommodated in Haines Junction, YT.

3. Property History

The project area has been intermittently explored since 1892 during which year Jack Dalton and E.J. Glave made an overland trip with four packhorses from the Chilkat River to the shores of Kluane Lake over a foot path which the Chilkat First Nations had used for the preceding two centuries as a trading route to the interior of the Yukon. Dalton established trading posts and improved the trail as far north as the Nordenskold River. Klondike prospectors used the Dalton Trail extensively during the 1898-1900 period enroute to the goldfields of the Klondike, but prospecting in the Front Ranges was not established until about 19903 when Silver City (or Kluane) was settled at the eastern end of Kluane Lake and became the center of mining activity in the region. Silver City boasted a post office, N.W.M.P. post and Mining Recorder; a wagon road led east through Champagne to Whitehorse. The threat of Japanese invasion sparked the building of the Alaska Highway in 1942 and the Haines Road followed in 1944. Improved access in the post war period brought on an exploration boom, although no lode mining production is known from the immediate project area. Placer mining has been intermittent in the project area, with the best producer being Kimberley Creek.

A number of regional programs focused on the Front Ranges from 1966 through 1986, including programs conducted by Noranda Exploration Company Ltd. Several exploration campaigns have targeted Ni-Cu-PGE and Au mineralization within the Ultra group and a database of geochemical samples, airborne and ground geophysics, and geological mapping has been developed.

4. Geological Setting

The Ultra Property is underlain by the Alexander Terrane to the southwest and Wrangell Terrane to the northeast, together comprising the accreted Insular Super Terrane. The southwestern portion of the project area is underlain by clastic rocks of the Upper Jurassic to Lower Cretaceous Dezadeash formation. To the northeast, the Dezadeash Formation is in fault contact with the Upper Triassic Nikolai Group comprising amygdaloidal basaltic and andesitic flows with local tuff, breccia, thin bedded shale and bioclastic limestone. Towards the northwestern portion of the project area near Silver Creek and Boutilier Creek the Kluane Ranges Intrusive Suite of grey medium to coarse grained biotite-hornblende granodiorite, quartz diorite, quartz monzonite and hornblende diorite locally intrude the Wrangellian strata. The Late Triassic Kluane



Ultramafic Suite, thought to be the subvolcanic feeder of the Nikolai volcanics intrudes the Upper Triassic Chitistone Group within the Wrangellian Strata.

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Figure 1 Ultra Property overview showing areas of 2016 and 2014 Survey.





Figure 1 Ultra Property overview showing areas of 2016 and 2014 Survey.





Figure 2 Yukon Quartz Claim Grant Numbers.

/ Longtord Exploration – Report on an Airborne Geophysical Survey 2016-1







Figure 3 Regional geology after Yukon Geological Survey.











Figure 5 Combined first vertical derivative of 2016 survey and reprocessed 2014 walkmag survey.



5. Survey Specifications and Procedures

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Area Name	Line Spacing	Line Azimuth	Total Survey (km)	Dates Flown
Ultra	50	037	10.402	02/06/2016
Ultra	50	037	18.5	02/08/2016

The survey specifications are summarized in the following table:

A total of 9 individual flights ranging from 1km to 4km in total line length were flown in order to obtain proper coverage of the survey area and ensure that safe terrain clearance and line of sight with the UAV survey system was maintained.

Nominal sensor terrain clearance was 50m. The magnetometer was suspended from the craft in a fixed orientation by a flexible nylon cable and sensor cables by a length of 2.0m in order to reduce UAV noise and interference. Nominal survey speed was maintained between 7-10 m/s (25-36 km/h). Scan rates for data acquisition were 5 times per second for the magnetometer, gps, laser altimeter, and IMU. This translates into a geophysical reading about every 1-2 meters along the flight track. Flight line position (X,Y,Z) was recorded in real time by GPS, WGS84 Latitude/Longitude and UTM Coordinates.

Navigation of the UAV was maintained by GPS-Compass-barometric altimeter assisted autonomous flight control on the UAV system. Pre-programmed flight plans were uploaded to the UAV upon takeoff, and the craft flew the flight lines autonomously, returning to its takeoff location, or a pre-programed landing location once the lines were completed. Landing and Takeoff were conducted manually by the UAV pilot and ground crew.

The operator was responsible for ensuring the Potassium Vapor magnetometer was properly warmed up prior to departure and that the instruments operated properly during flight. A flight log was also maintained noting the times, locations and any anomalous ground features within the survey area. No surface infrastructure was present on the ground within the survey area.

A new data file was recorded for each flight and stored in real time on-board the UAV with a USB and back-up FlashCard solid state memory. On return of the craft, the magnetometer was shut off and data was downloaded and checked for errors. Survey lines which showed noisy data were re-flown. No flight lines were re-flown due to excessive deviation as the autonomous flight navigation was able to maintain position extremely well.



6. Aircraft and Equipment

6.1 UAV-Multicopter

An Infinite Jib Surveyor Coaxial Hexacopter UAV (S/N) 2075 was used as the survey platform. The UAV is owned and operated by Pioneer Exploration Consultants Ltd. Installation of the geophysical and ancillary equipment was carried out by Pioneer at their main office in Saskatoon, SK after interference testing with Gem Systems at their offices in Ontario. The UAV and Mag system was transported by Air North Cargo from Edmonton, AB to Whitehorse, YK, then from Whitehorse to Haines Junction by vehicle, and to the survey site by snowmobile. Figure 2 shows the UAV system in the field with the magnetometer sensor package installed.



Figure 6 Pioneer's UAV-MAG[™] system.



6.2 Magnetometer

The Pioneer UAV-MAG[™] system employs the Gem Systems GSMP-35A potassium Vapor magnetometer sensor which is custom designed and installed as a towed bird configuration with two meters' separation between the craft and the sensor. The reported sensitivity of the magnetometer is 0.3 pT at 1Hz with an absolute accuracy of ± 0.1 nT and a dynamic range of 20,000 to 100,000 nT.

Magnetometer Sensor Specifications: GSMP-35A Potassium Vapor Magnetometer (Gem Systems, Canada).

- Sensitivity: 0.3 pT @ 1Hz
- Heading Error ± 0.05nT between 10 and 80 degrees and 360 degrees' full rotation about axis
- Resolution: 0.0001 nT
- Absolute Accuracy: ± 0.1 nT
- Dynamic Range: 20,000 to 100,000 nT
- Gradient Tolerance: 35,000 nT/m
- Sampling rate: up to 20Hz
- Orientation: Optimum angle 35 degrees between sensor head axis and field vector



6.3 Ancillary Systems



Figure 7 Airborne instrument rack.

Magnetometer Base Station

A Gem Systems GSM 19 Overhauser base station magnetometer was set up each day at least one hour prior to flight to record the diurnal variations of the Earth's magnetic field. The base station was automatically time synchronized to UTC time using a GPS-integrated GSM-19 mobile magnetometer by Gem Systems. The Base Station Location for the survey was : WGS 84 Z 7N 658085mE 6755313mN.

The base station data was collected at a sampling rate of once every 6 seconds to an accuracy of 0.01 nT. The data was downloaded and recorded each day using GEMLink v.5.3 software.





Figure 8 Base station location and setup.

Radar Altimeter

The micro-laser altimeter (MLM-120) was used to record accurate real-time altitude information during flight. It was capable of detecting ranges up to 120 meters in distance.

Navigation Subsystem

A VN-200 integrated Inertial Measurement Unit (IMU) and Novatel GPS antenna from Vector were used to record the absolute position (XYZ) and pitch, yaw and roll of the magnetometer and UAV. The recording acquisition time was 5 times per second.





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Digital Acquisition System

A MUX Multiplexor data acquisition and power distribution system by Gem Systems was used to collect and record the analog data stream, and combine the data from the separate sensors into a single string. The data was recorded as .txt files on a 16Gb FlashCard and removable USB stick.

All ancillary equipment except the magnetometer base station was contained onboard the UAV craft during flight.

7. Personnel

Field Party Chief: Michael Burns Field Data Processors: Michael Burns / Kiyavash Parvar UAV Pilot: Michael Burns Project Manager/UAV Ground Crew / Spotter: James Rogers Field Labour: Marcel Dulac Office Data Processing & Report: Michael Burns, James Rogers and Kiyavash Parvar

8. Data Processing and Presentation

All post-field data processing was carried out using Geosoft Montaj, Matlab and Microsoft Excell processing software. Presentation of flight lines and final maps used ESRI ArcMap and Oasis/Geosoft Montaj. Results were gridded using minimum curvature and a grid cell size of 8 meters.

8.1 Base Map

The geophysical images accompanying this report are positioned using the WGS 1984 datum. The survey geodetic GPS positions have been map projected using the Universal Transverse Mercator projection in Zone 7N. A summary of the map datum and projection specifications are as follows:

- Datum: WGS 1984 UTM Zone 7N
- False Easting, Northing: 500,000.0m, 0.0m
- Central Meridian: -111.0m
- Scale Factor: .9996
- Latitude of Origin: 0.0
- Linear Unit: Meter (1)

The skeletal topography was obtained from the Canada NTDB base maps for the survey area.



8.2 Flight Path and Terrain Clearance

The position of the UAV survey multicopter was achieved autonomously through the use of a GPS-Compass, Inertial Measurement Unit (IMU) and a barometric altimeter. A 30m minimum terrain clearance threshold was applied to all flights during the flight planning process. Survey flights were flown at variable above ground altitudes in order to accurately drape the survey grid over topography. Certain areas such as steep cliffs and extreme topographic changes were flown at higher average altitudes in order to maintain terrain clearance and still collect useful data. Topographic effects within the final processed data are negligible.

8.3 Magnetic Data

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The Magnetic Data was first quality checked and any points lacking sufficient georeferenced data or excessive noise were removed. The resulting data was processed as mosaics throughout the survey area as data was collected each day. A final combination of all data formed the final results. In addition to the stand alone airborne survey, the results were also combined with previous data from a ground-based magnetometer survey.

Initial processing subjected the data to several filters, an upward continuation filter, a FFT filtration to derive the analytical signal which is a measure of the total derivative field, and vertical derivative filters. The filtered aeromagnetic data were then corrected for diurnal variations using the magnetic base station data and tie line intersections. A correction for the regional reference field (IGRF) was applied to combine the UAV data with previous ground magnetic survey results. The corrected profile data were interpolated onto a grid using the minimum curvature technique with a grid size of 8 meters.





Figure 9 Flight survey lines mid-survey showing Total Field (RTP) results.





9. Survey Results and Discussion

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9.1 Target Model Considerations

Outcrop is present along ridges and topographic highs within the survey area. The survey was positioned at the North West margin of a previous ground based magnetometer survey to test the extent of the anomaly discovered during the ground survey.

The target(s) of the airborne and coincident ground magnetometer surveys were proposed to be intrusive ultramafic dikes, cutting the host metapelites.

A survey line spacing of 50m was chosen in order to detect potentially small anomalies. Flight lines were flown at an azimuth of 37 degrees east of north to cross cut the stratigraphy and target at a perpendicular angle. Flight altitudes between 50m to 60m were maintained.

9.2 Discussion

The main anomaly detected by ground methods was observed to continue along strike to the North West, and was detected during the UAV-MAGTM airborne survey. Additional surveying within the current claim block to extend the survey grid around the extent of the anomaly, and ground-based exploration, including mapping and sampling, of the anomalies is recommended.

10.Statement of Costs

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	Item	Description	Dates	Rate	Units	Qty	Total
Personnel	Mike Burns	UAV pilot, Geologist	February 1, 2, 6 (1/2 day), 7, 8, 10	\$ 400.00	per day	6.5	\$ 2,600.00
	James Rogers	Project Manager	February 1, 2, 6 (1/2 day), 7, 8, 10	\$ 400.00	per day	6.5	\$ 2,600.00
	Marcel Dulac	Labourer	February 2, 5, 6	\$ 250.00	per day	3	\$ 750.00
Equipment	Dodge 3500 4x4 Truck			\$ 200.00	per day	5.5	\$ 1,100.00
	16-foot flat deck trailer			\$ 40.00	per day	5.5	\$ 220.00
	Snowmobile Skandic 500 Wide Track			\$ 200.00	per day	3.5	\$ 700.00
	Snowmobile Arctic Cat 240			\$ 200.00	per day	2	\$ 400.00
	Snowmobile Polaris 550			\$ 200.00	per day	4.5	\$ 900.00
	Magnetometer base station rental			\$ 65.00	per day	5.5	\$ 357.50
	Chainsaw, (3) gps units, (3) VHF Radios, satellite phone, snow shoes, (2) axe, winter survival equipment			\$ 150.00	per day	5.5	\$ 825.00
	Snowmobile gas and 2-stroke oil			\$ 20.00	per sled day	5.5	\$ 110.00
Food and Lodging	Food			\$ 40.00	per man day	15	\$ 600.00
	Lodging, Private rental 100 Rainbow Crescent Haines Junction			\$ 100.00	per night for 2 people	6	\$ 600.00
	Lodging, Skky hotel February 1st			\$ 103.95	per room per night	2	\$ 207.90
Travel	Kilometers			\$ 0.55	per km	1034	\$ 568.70
Geophysical Survey	Airborne UAV - Magnetometer survey (collection and processing)			\$ 100.00	per line km	27.8	\$ 2,780.00
Report Preparation	Four days at \$375/day James Rogers			\$ 1,500.00	per day	1	\$ 1,500.00
			1			TOTAL	\$ 16,819.10



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11. Statement of Qualifications

I, James Douglas Rogers, with business address at 6970 Napier St., Burnaby, BC, V5B 2C4 do hereby certify that:

- 1. I authored this report on the Ultra Property, Whitehorse Mining District, Yukon Territory, Canada.
- 2. I supervised and participated in the UAV Survey program and I am therefore personally familiar with the geology of the claim group and the work conducted in 2016.
- 3. I have been employed in exploration for base and precious metals as a geologist assistant and project manager across Canada, Equatorial Africa and Peru since 2007.
- 4. I attended Simon Fraser University from 2010-2014 with a major in Geology
- 5. I do not have a direct interest in the operations of IDM Mining or the Agate Property.

Dated this 11th day of September, 2016

James Rogers President and CEO Longford Exploration Services LTD



12.Appendices

Appendix 1: Instrument Specification Sheet

GSMP-35UAV Potassium Vapour Magnetometer Sensor

- Precise time synchronization of field and base station units using a built-in GPS option.
- Flexible scheduling (up to 30 on/off periods).
- Manual start-up.
- Sensitivity 0.3 pT @ 1 Hz; (0.1 pT option)
- Heading Error + / 0.05 nT between 10 and 80 degrees and 360 degrees full rotation about axis
- Resolution 0.0001 nT
- Absolute Accuracy +/- 0.1 nT
- Dynamic Range 20,000 to 100,000 nT
- Gradient Tolerance 35,000 nT/m
- Sampling 1, 2, 5, 10, 20 Hz (higher optional)
- Orientation optimum angle 35 degrees between sensor head axis and field vector



Appendix 2: UAV Specification Sheet

INFINITE JIB INC SURVEYOR 630

SPEED:	
Maximum speed	40 KNOTS GS
Cruise at 75% power	20 KNOTS GS
Working speed	10 KNOTS GS
RANGE:	
@ Maximum speed	20 NM
@ Cruise 10% capacity remaining	10 NM
@ Working Speed 20% capacity remaining	4 NM
Infinite Jib recommends to follow local guidelines to maxi within sight at all times.	mum range, craft shall remain
Time 25 min recommended flight times with 20% power c	apacity left before reserves.
Time 30 min, MAX flight times with 10% power capacity le	ft before reserves.
Rate of Climb	1950 FPM
Service Ceiling	300 FEET
Infinite Jib recommends operators to follow local Service (Ceiling guidelines.
MAXIMUM OPERATING ALTITUDE:	
Altitude above sea level	19,000 FEET
MAXIMUM WEIGHT:	
Takeoff	24.2 lb (11kg)
No batteries or sensors	10.7 lb (4.85 kg)
Maximum Useful Load	13.5 lb (6.1 kg)
Maximum Payload	8 0 lb (3 6kg)
Typical Sensor Payload (camera)	1 3 lb (6kg)
Typical Takeoff Weight with Payload	17.5lb(7.9kg)
Craft configured with camera for Photogrammetric flights	17.515 (7.516)
FUEL CAPACITY:	
2 x 6 Cell Batteries connected in parallel for redundancy	
Max Voltage	25.2 Volts
Minimum Voltage	18.0 Volts
Recommend Landing Voltage	21 Volts
Battery Capacity	11.0Ah X 2 batteries, 22.0 Ah
Total	2



Battery Weight	5.5lb (2.5kg)		
PROPULSION:			
Motors	4120 - 400kV		
Motor maximum thrust	9.4lb (4.25kg)		
Max current at max thrust	37Amps		
Max craft thrust	48lb (21.7kg)		
Maximum lift capacity	32lb (14.4kg)		
(6 motors coax design = 15% loss in efficiency)			
Thrust to hover	17.5lb (7.9kg)		
Thrust per motor	3.3lb (1.5kg)		
Current at hover per motor	7.5Amps		
Hover as a percentage of total motor capacity	35% Power		
PROPELLERS:			
Diameter	17 in (43.2cm)		
Fixed Pitch	5.8 in (14.7cm)		
Construction	Carbon fiber		

BASIC CONFIGURATION: Motor Qty 6 Motors **Boom Configuration** Y6 configuration with trailing single boom. Motor Configuration Coaxial design with two motors per boom Motor Rotation CW and 3 CC

PROPELLER LIFT AREA Area covered by 3 rotor disk coax configuration 160 sq in (1032.26sq cm) (53.4 sq in per boom) The above performance figures are based on calculations derived from thrust and flight

tests conducted under controlled conditions by Infinite Jib Inc. Conditions and specifications will change slightly between craft due to numerous factors affecting flight performance.

DIMENSIONS: (Measured blade tip to blade tip)	
Overall Height	21 in (53.3 cm)
Overall Length	43 in (109.2 cm)
Overall Width	48 in (121.9 cm)
Measured blade tip to blade tip	÷.,
Landing Gear Width	14 in (35.6 cm)
Propeller Ground Clearance	12 in (30.5 cm)

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Counter rotating propellers 3

Appendix 3: Maps

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Map 3: First Vertical Derivative (RTP)

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Map 4: First Vertical Derivative (RTP) UAV + Ground

