Assessment Report on the

### 2011 AIRBORNE GEOPHYSICAL SURVEY

on the

## **PROSPECTOR MOUNTAIN PROPERTY, YUKON**

 Grant Number
 Claim Name

 YB66122 - YB66233
 HAYES 1 - HAYES 112

 YB97090 - YB97216
 HAYES 131 - HAYES 239

 YD33632 - YD33663
 HAYES 240 - HAYES 271

WHITEHORSE MINING DISTRICT Date(s) Worked: June 24 to July 02

NTS Map 115I05 UTM 352,000E; 6,927,000N (NAD 83, Zone 8)

Prepared by:

Ryan Congdon, BSc, Geologist

#### Prepared for:

Silver Quest Resources Ltd. P.O. Box 11584 Suite 1410 – 650 West Georgia Street Vancouver, British Columbia, V6B4N8

December 14, 2011

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## SUMMARY

The Prospector Mountain property operated by Silver Quest Resources Ltd. (Silver Quest) contains a well defined north-north-westerly structural corridor known as the Bonanza Zone. It hosts a 1.2 (km) long gold-silver-copper anomaly that contains numerous high grade showings. Prospector Mountain is located in west-central Yukon approximately 200 kilometres (km) south-southeast of Dawson City and approximately 90 km west of Carmacks (Figure 1).

This report discusses the airborne magnetic and radiometric geophysical survey that was carried out from June 24 to July 02, 2011, totalling 673 line km on the Prospector Mountain property. The geophysical survey provided valuable data, providing insights into geological units and north northwest structural trends.

# INTRODUCTION

This report describes an airborne magnetic and radiometric geophysical survey conducted on the Prospector Mountain property on from June 24 to July 2, 2011. Work on the Prospector Mountain property was completed for Silver Quest by Aeroquest Airborne of Mississauga, Ontario. The author was on the property site during the program and the Statement of Qualifications is contained within this report.

The objective of the airborne geophysical survey was to further evaluate the mineralized potential of the Property by collecting magnetic and radiometric data to aid in geological and structural interpretation.



Figure 1 – Location Map

# **CLAIM DATA AND OWNERSHIP**

Silver Quest Resources Ltd. optioned the Hayes 1 – Hayes 239 claims from Tarsis Capital Corp. in December 2009, and acquired the remaining claims (Hayes 240 – Hayes 271) via staking in 2010. The Prospector mountain property comprises 271 contiguous quartz claims and covers a total area of approximately 5,600 hectares (ha). The claim block centers on 352,000E and 6,927,000N (NAD 83, Zone 8) on NTS map sheet 115105 as shown on (Figure 2). Quartz claims are registered with the Whitehorse Mining Recorder. Claim data is listed below.

#### Table 1 – Claim Data

Grant Number	Claim Name	Registered Owner	Operator
YB66122 - YB66233	HAYES 1 - HAYES 112	Tarsis Capital Corp.	Silver Quest
YB97090 - YB97216	HAYES 131 - HAYES 239	Tarsis Capital Corp.	Silver Quest
YD33632 - YD33663	HAYES 240 - HAYES 271	Silver Quest	Silver Quest

# **PROPERTY DESCRIPTION**

#### **LOCATION**

The Prospector Mountain property is located in the Hayes Creek area of west-central Yukon approximately 200 km south-southeast of Dawson City and approximately 90 km west of Carmacks (Figure 1).

### **CLIMATE AND GEOMORPHOLOGY**

The Prospector Mountain property lies within the Dawson Range. The property covers Prospector Mountain on the east, the headwaters of Hayes Creek in the centre and Apex Mountain to the west. Most of the property is above treeline and covered by alpine vegetation. Local elevations range from 1,100 to 1,965 metres (m) above sea level. Lower elevations are thinly vegetated by dwarf willow, alder and spruce trees. The parts of the property that are above tree line commonly contain felsenmeer and boulder fields.

The property area escaped continental glaciation, but has undergoes seasonal, alpine glaciation. Because of the lack of a large regional glaciation outcrops are rare. Ridge tops and slopes are generally covered by subcrop, felsenmeer and talus.

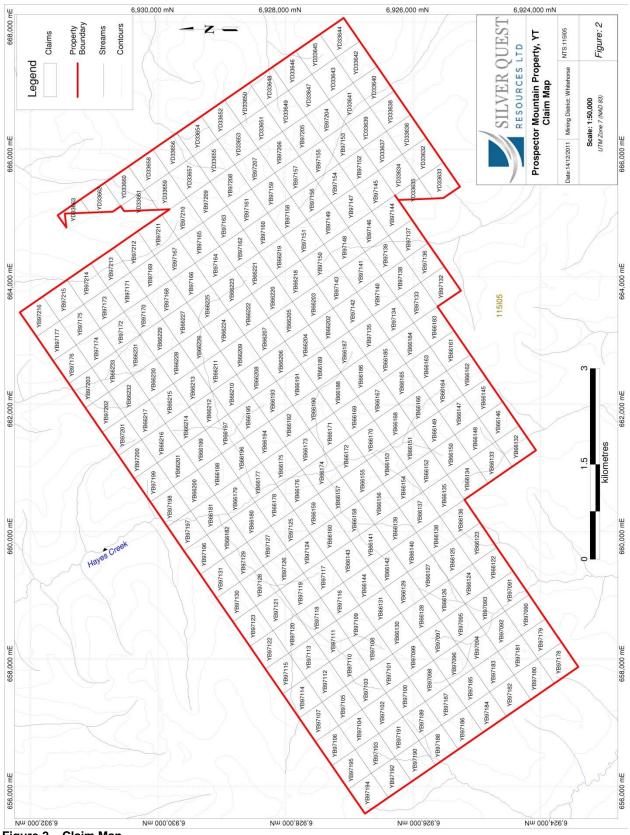


Figure 2 – Claim Map

#### **INFRASTRUCTURE**

Access to the Prospector Mountain property in 2011 was via small plane (Beaver or Navajo) operated by Tintina Air of Whitehorse to the Rude Creek Airstrip located on Silver Quests Rude Creek property approximately 45 km to the northwest. Access between the airstrip and camp as well as around the property was via an A-Star helicopter operated by Trans North Helicopters, of Whitehorse or Bell 206 Long Ranger operated by Trinity Helicopters, of Yellowknife. Helicopters were based out of Silver Quest's 2011 Prospector Mountain Camp.

Alternatively, there is road access to Northern Freegold's Revenue camp located approximately 40 km east of Prospector Mountain. Supplies can be driven along this 4 wheel drive road and then mobilized to site via helicopter. The Casino Winter trail is also an option for taking supplies in during the winter months. The trail passes approximately 12 km north of the property.

### HISTORY

#### **PREVIOUS WORK**

Several phases of exploration have focused on porphyry and epithermal potential of the Prospector Mountain area since the 1960s, utilizing silt, soil and rock geochemistry, mechanical trenching, geophysics and diamond drilling.

International Mines Services Ltd. completed the first recorded work in the area during the late 1960s and the summer of 1970. Stream sediment samples and grid soil samples collected during their program were only analyzed for copper, lead and molybdenum. Minor lead-zinc anomalous zones were associated with narrow quartz veins, however the results were considered poor and no further work was recommended at that time (Waugh, 1970).

During 1970, Phelps Dodge of Canada Corporation Limited performed soil geochemical sampling, prospecting and mapping but only minor copper, lead, zinc anomalies were identified (Smith, 1971). Their work suggested that lead and zinc are positively correlated but poorly correlated with copper. Occidental Minerals Corporation of Canada also conducted grid soil sampling, mapping and prospecting in the area in 1971, including across the Bonanza Zone. Six northwest trending copper-zinc-molybdenum anomalies were identified. Follow-up

Induced Polarization (IP) geophysics was recommended, but not completed (Allebone and Mehrotra, 1971).

In 1979, Archer Cathro re-assayed the 1969 soil samples that had only been analysed for copper, lead and molybdenum. Results identified several silver anomalies which were staked and vended to the NAT Joint Venture (50/50 between Chevron Canada Limited and Armco Mineral Exploration Ltd.). In the period from 1979 to 1982, 50 precious metal-bearing epithermal veins/lineaments were identified, mapped and sampled (Archer, 1981; Eaton, 1982; Onasick and Archer, 1981). These known veins are generally associated with recessive north-easterly trending lineaments near ridge tops, many of which yielded samples containing multi-ounce silver and multi-gram gold.

Troymin Resources Ltd. further explored the Prospector Mountain property in the late 1990s, focusing on the porphyry potential in the east and vein targets to the west (Casselman, 1998, 1999; Doherty and Ouellette, 1997). This work included two small grids (Lightening and No Sweat) and approximately 13.5 line km of Induced Polarization (IP) surveys. The lightning grid was subsequently drilled by two core holes (336m) targeting inverted chargeability IP anomalies and historical copper and/or molybdenum soil geochemical anomalies. Sufficient disseminated pyrite was encountered in monzonite to explain the IP chargeability anomalies but no significant base or precious metal results were returned.

In 2009, Tarsis Resources explored the property assessing the merits of the historical porphyry and vein targets (Wengzynowski, 2010). This work included broad alteration mapping and prospecting of the east and west sides of the claim block. The majority of the gold-bearing rock samples collected from the eastern part of the property plot within a well defined north-northwesterly trending structural corridor termed the Bonanza Zone. It hosts a series of high-grade gold-silver-copper showings along a 1,200 m portion of the trend near the eastern contact between Prospector Mountain Suite monzonite and the Carmacks Suite volcanic rocks. Ten samples from this area returned between 14 and 82 g/t gold.

Several historic trenches on the western vein targets were re-sampled in 2009. Results generally supported historic evaluations. Individual samples returned up to 17.35 g/t gold, 557 g/t silver and 33.8% lead. All veins examined are hosted by Carmacks Suite volcanic rocks and are mostly associated with north to northeast trending recessive lineaments. The veins consist

of steeply-dipping, highly sheared quartz and multi-colour clay gouge containing varying amounts of arsenic oxides and lead sulphide/sulphate.

#### **RECENT HISTORY**

Silver Quest optioned the Prospector Mountain property from Tarsis Capital Corp. in December 2009. A two phase program was conducted for Silver Quest by Equity Exploration Ltd. during the summer of 2010. Phase One was completed in June and July 2010 by a 3 person crew and included the collections of 84 rock samples, 221 soil samples, geological mapping and a ground magnetic survey. Phase Two was conducted in September 2010 and expanded on the knowledge gained in Phase One. Phase Two included 8 diamond drill holes (1,463 m) across the north-northwest trending gold anomalies of the Bonanza Zone. The best drill intervals returned were 3.48 grams per tonne (g/t) gold over 3.40 m (hole PM10-01) and the broadest mineralized zone was 0.76 g/t gold over 11.2 m (hole PM10-05) (Baker, 2011).

# **GEOLOGICAL SETTING**

#### **REGIONAL GEOLOGY**

The Prospector Mountain property is situated within the Yukon-Tanana Terrane in west-central Yukon. This area is characterised by various pericratonic terranes that were accreted to the ancestral continental margin of North America in the early Jurassic. During the mid-Cretaceous the pericratonic terranes were intruded by a northwest-southeast trending plutonic suite known as the Dawson Range plutonic belt (Hart et al. 2004), which trends northwest through the Prospector Mountain property. The Yukon Tanana Terrane consists mainly of a poorly exposed assemblage of poorly-deformed metamorphic rocks derived from a variety of igneous and sedimentary protoliths (Jaworski, 2001).

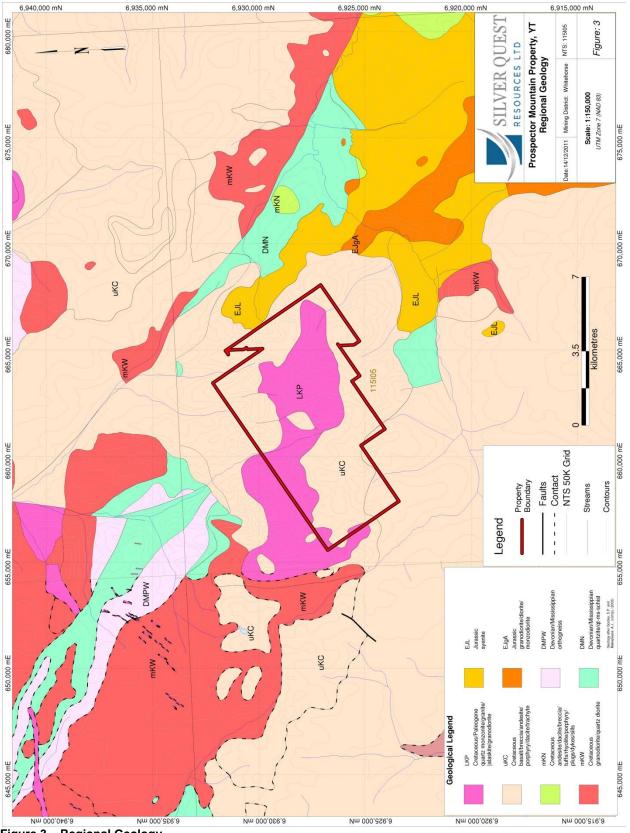


Figure 3 – Regional Geology

#### **PROPERTY GEOLOGY**

The property is underlain by the 70 Ma Carmacks Suite volcanics which comprise a variety of andesites, present as both breccias and flows. Intruded into the Carmacks in the central and western parts of the property is the Prospector Mountian Suite quartz monzonite. These monzonites generally contain biotite and hornblende crystals with textures that range from equigranular to porphyritic with potassium feldspar phenocrysts up to 2 cm long. The two rock suites are generally thought to be coeval in age, as dikes of monzonite are found within the andesites and dikes of andesite are found within the monzonites (Baker 2011).

Numerous, late stage andesite dikes up to 20 m wide, intrude the Prospector Mountain Suite quartz monzonites. These are most notably present on the ridge west of the Prospector Mountain Peak. They dykes appear to be north trending, steeply dipping structures. Some dikes are associated with hydrothermal clay alteration, fine tourmaline rosettes and gold mineralization (Baker, 2011). The monzonite is also cut by fracture filling of magnetic +/- pyrite veinlets with sericitezed plagioclase and K-feldspar alteration. Magnetite veinlets are locally replaced by hematite. (Allan et al. 2011)

Dikes of the Prospector Mountain Suite can also be found on the western side near the top of Prospector Mountain Peak. These monzonite dikes are porphyritic and are cut by mm to cm scale specularite-quartz-tourmaline-chalcopyrite-pyrite veins with quartz-sericite-tourmaline veins. Alteration zones are typically bleached and hornblende phenocrysts are typically replaced by fine grained tourmaline (Allan et al. 2011)

Outcrop exposures are rare but when present are characterized as frost-heave, blocky subcrop and felsenmeer. These exposures underlie the majority of the property.

## GEOPHYSICS

An airborne magnetic and radiometric geophysical survey was conducted on the Prospector Mountain property on behalf of Silver Quest by Aeroquest Airborne. An A-star 350BA Helicopter owned and operated by Abitibi Helicopters Ltd. of Calgary, Alberta and survey personnel were based at Silver Quest's 2011 Prospector Mountain Camp. The principle geophysical sensor was a helicopter stinger mounted caesium vapour magnetometer. The secondary sensor was Aeroquest's Airborne Gamma Ray Spectrometer (AGRS) system which was installed in the helicopters cabin (Areoquest Airborne, 2011).

The total survey coverage was 673 line km flown in 61/240 degrees of heading line direction. Survey flying took place on June 24 to July 2, 2011. A full report completed by Aeroquest describing survey logistics, data processing, presentation and specifications of the survey is provided in Appendix 1. The report is titled "Report on a Helicopter – Borne Magnetic and Radiometric Survey" dated August, 2011. Full survey data is provided in Appendix 2.

# **DISCUSSIONS AND CONCLUSIONS**

Final maps of the geophysical magnetic and radiometric survey are provided in Appendix 1. The airborne magnetic and radiometric data from the Prospector Mountain property shows a strong contrast between the intrusive monzonites of the Prospector Mountain Suite (high Th/K – moderate to low magnetic signature) and the andesitic Carmacks volcanics (low Th/K – high magnetic signature). A variety of fault sets orientated approximately 350 degrees N and 080-100 degrees north are fairly apparent in the Total Magnetic Intensity. It is inferred from initial observations the property can be sub-divided into three main fault blocks. The eastern most N-S fault places intrusive monzonite adjacent to Carmacks volcanics, suggesting that the eastern block has been dropped to the east (Allan et al. 2011).

The magnetic survey also indicates a series of lineaments trending 330 – 340 degrees north in the area of the Bonanza zone. Based on field observations, these magnetic features can be explained by a combination of sub-parallel faults, vein/alteration and dikes. Faults, veins and alteration associated with gold mineralisation have demonstrated magnetite destruction. It is thought that these features may be secondary faults broadly related to larger scale faulting in the area. (Allan et al. 2011).

# RECOMMENDATIONS

Further, geological mapping and prospecting as well as geochemical sampling is recommended throughout the property. Interpretation of geophysical data together with geochemical results in combination with geological mapping will aid in targeting structural lineaments, geological contacts and alteration zones for drill testing.

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# STATEMENT OF QUALIFICATIONS

I, Ryan J. F. Congdon, BSc, of Suite 1605-1146 Harwood Street, Vancouver, British Columbia, hereby certify that:

I am a graduate of the Curtin University of Perth, Australia having obtained the degree of Bachelor of Science in Applied Geology, 2005.

I am a graduate of the Curtin University of Perth, Australia having obtained the degree of Bachelor of Science in Environmental Biology, 2005.

I am a member of the Australian Institute of Mining and Metallurgy.

I have been employed in the mineral exploration and mining industry in Western Australia every field season (November-February) between 2003 and 2005.

I have been continuously employed as a geologist in the mineral exploration and mining industry since 2006.

I am currently employed as a Geologist by Silver Quest Resources Ltd. Suite 1410-650 West Georgia Street, Vancouver, British Columbia, Canada, V6B 4N8.

I am the author of the report entitled "2011 Airborne Geophysical Survey on the Prospector Mountain Property Yukon" dated December 14, 2011.

I participated in the geological work reported herein.

Dated this 14<sup>th</sup> day of December, 2011.

Ryan J. F. Congdon, BSc Geology

# STATEMENT OF EXPENDITURES

	Quantity			Rate			Cost	_
		_						=
Airborne Geophysics (line KMs)	673	:	\$	78.18		\$	52,615.14	
Project manager day(s)	4		\$	600.00		\$	2,400.00	
Geophysicist day(s)	9		\$	600.00		\$	5,400.00	
Geophysical Technician day(s)	36			-			-	
Camp Costs (per man day)	49		\$	450.00			22,050.00	
Helicopter Hour(s)	8		\$ :	1,550.00		\$	12,400.00	
Helicopter Fuel (drums)	56		\$	700.00		\$	39,200.00	
						\$2	216,550.14	
			S	upervision:	12%	\$	25,986.02	
				Tatal				
				Total:	:	Şź	242,536.16	=
					274	<u>,</u>	004.07	
		Cl	aır	ns Worked:	271	\$	894.97	

Date(s) worked: June 24 - July 2, 2011

Work done by: Aeroquest Airborne for Silver Quest Resources Ltd.

Appendix 1

Airborne Geophysical Survey Report and Accompanying Maps

Report on a Helicopter-Borne Magnetic and Radiometric Survey



Aeroquest Job # 11-039

For

# Silver Quest Resources Ltd.

by



7687 Bath Road, Mississauga, ON, L4T 3T1 Tel: (905) 672-9129 Fax: (905) 672-7083 www.aeroquestairborne.com

Report date: August 2011

# Report on a Helicopter-Borne Magnetic and Radiometric Survey

Aeroquest Job # 11-039

For

# Silver Quest Resources Ltd.

Suite 1410, 650 West Georgia Street

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V6B 4N8

by



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Report date: August 2011



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# LIST OF MAPS (1:25,000)

- TMI Coloured Total Magnetic Intensity (TMI) with contours.
- 1VD Calculated First Vertical Derivative of TMI colour grid with contours.
- TC Gamma Ray Spectrometer Total Counts colour grid with contours.
- Th\_K\_Ratio Gamma Ray Spectrometer Thorium-Potassium Ratio colour grid with contours.



# **1. INTRODUCTION**

This report describes a helicopter-borne geophysical survey carried out on behalf of Silver Quest Resources Ltd. on their Property in Yukon, Canada. The principal geophysical sensor was a helicopter stinger mounted caesium vapor magnetometer. The secondary sensor was Aeroquest's Airborne Gamma Ray Spectrometer (AGRS) system, which is installed in the helicopter cabin. The AGRS system utilizes four (4) downward looking NaI crystals used as the main gamma-ray sensors and one upward looking crystal for monitoring non-geologic sources. Ancillary equipment included a GPS navigation system, radar altimeter, digital video acquisition system, and a base station magnetometer.

The total survey coverage is 673 km, of which 644 line-km fell within the defined Prospector Mountain project area (Appendix 1), flown in 61/241 degrees of heading line direction. Survey flying described in this report took place on June  $24^{th}$  to July  $2^{nd}$ , 2011. This report describes the survey logistics, the data processing, presentation, and provides the specifications of the survey.

# 2. SURVEY AREA

The project contains Prospector Mountain block located approximately 330km northwest of Whitehorse, Yukon (Figure 1). The detail description of Prospector Mountain block with line direction has been described in the table 1.

The survey block corner-coordinates are tabulated in Appendix 1. The base of survey operations was Prospector Mountain camp in Yukon.



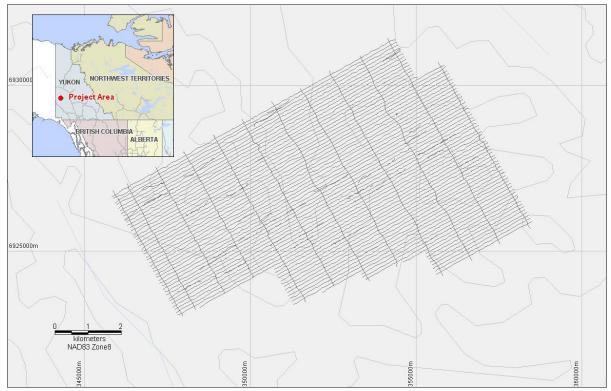


Figure 1. Prospector Mountain Survey block overview

# **3. SURVEY SPECIFICATIONS AND PROCEDURES**

The survey specifications are summarised in the following table:	The survey	specifications are	summarised in	the following table:
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Block name	Line Spacing (metres)	Line Direction	Tie Line Spacing (metres)	Tie Line Direction	Survey Coverag e (line- km)	Dates flown
Prospector Mountain	100	61°/241°	1000	151°/331°	673	June 24 <sup>th</sup> to July 02 <sup>nd</sup> , 2011

Table 1. Survey specifications summary

The survey coverage was calculated by adding up the survey and control (tie) line lengths as presented in the final Geosoft database.

The nominal helicopter stinger terrain clearance was 30 m but was periodically higher or lower over due to the rugged terrain and the capability of the aircraft. The scan rate of the helicopter stinger data acquisition was 0.10 seconds.

# 4. AIRCRAFT AND EQUIPMENT

This section provides a brief description of the geophysical and auxiliary instruments used to acquire the survey data:



#### 4.1. Aircraft

An A-star 350BA helicopter – registration C-FXED was used as survey platform. The helicopter was owned and operated by Abitibi Helicopters Ltd. of Calgary, Alberta, Canada. The helicopter flew at an average airspeed of 70 knots per hour.

### 4.2. Magnetometer

The following magnetometer was installed inside the stinger:

Model: Geometrics G823A

Type: Airborne caesium-vapor magnetometer

Sensitivity: 0.01 nT

Sample rate: 10Hz

#### Magnetic Compensator:

The compensator employed was a RMS Data Acquisition & Adaptive Aeromagnetic Real-Time Compensator (DAARC500). Compensation is achieved by combining the frequency measurement from any continuous reading sensor (Cs, K, He) with the measurements of analog outputs of a tri-axial fluxgate magnetometer. A proprietary algorithm combines these measurements and eliminates most of the influence caused by airframe movement through the magnetic field – pitch, roll yaw and aircraft heading.

# **4.3. Magnetic Base Station**

Model: Geometrics G823A

Type: portable Caesium magnetometer

Sensitivity: 0.01nT

Sample rate: 1Hz

A digital recorder is operated in conjunction with the base station magnetometer to record the diurnal variations of the earth's magnetic field. The clock of the base station is synchronized with that of the airborne system using GPS data to permit subsequent removal of diurnal drift.

# 4.4. Airborne Gamma Ray Spectrometer (AGRS) System

The Aeroquest AGRS system consists of an RSX-5 sensor pack, which is installed on the floor of the helicopter cabin and a DAARC500 acquisition system designed and manufactured by RMS Instruments Inc. (RMS).

The system has 4 downward looking NaI crystals (16.75 L) used as the main sensors and 1 upward looking crystal (4.18 L) for monitoring non-geologic sources. The system features automatic peak detection and real-time calibration to ensure spectrum stability and a high quality final product. The full spectrum is recorded (256 or 512 channels) to allow for subsequent noise reduction processing such as NASVD. The data are processed to produce the standard IAGA ROI channels – Total Count,



Potassium, Uranium and Thorium. The dose rate, potassium percentage, equivalent uranium and thorium concentrations are also derived and ratios of these concentrations are computed to enhance the interpretation of the survey results.

### 4.5. Altimeters

#### **Radar altimeter**

Manufacturer:	Terra
Type:	TRA 3000 Radar Altimeter and TRI 40 Indicator
Sensitivity:	5% @200ft

#### **Barometric altimeter**

Manufacturer: Honeywell

Type: PPT

High Accuracy: Achieves +/0.05 Full-Scale, Including Temperature Effects over -40 to  $+85^{\circ}\mathrm{C}$ 

### 4.6. Digital Data Acquisition System

Manufacturer:	RMS Instruments
Model:	DAARC 500 acquisition system (DAS & Adaptive Aeromagnetic
	Real-Time Compensator)

### 4.7. Video Tracking and Recording System

A wide angle Sanyo video camera was connected to Archos video recorder to provide the image. Using a video overlay board (Overland Technology Inc.) the GPS time is recorded continuously and is displayed on the margin of each image. This procedure ensures accurate correlation of digital data with respect to visible features on the ground.

#### 4.8. GPS Navigation System

Navigation is carried out using a GPS receiver, an AGNAV GUIA system for navigation control, and DAARC500 data acquisition system which records the GPS coordinates. The x-y-z position of the aircraft, as reported by the GPS, is recorded at 0.1 second intervals. The system has a published accuracy of less than 3 metres. A recent static ground test of the Mid-Tech WAAS GPS yielded a standard deviation in x and y of less than 0.6 metres and for z less than 1.5 metres over a two-hour period.

# **5. PERSONNEL**

The following Aeroquest personnel were involved in the project:

- Senior Project Manager: Troy Will
- Field Data Processor: Edward You



- Field Operator: Leonard Luke
- Office Data Processor: Asif Mirza / Chris Kahue
- Map Preparation and Reporting: Asif Mirza / Chris Kahue

The survey pilot, Joey Campbell was employed directly by the helicopter operator – Abitibi Helicopters Ltd.

# **6. DELIVERABLES**

#### 6.1. Hardcopy Deliverables

The report includes a set of 1:25,000 scale maps of Prospector Mountain. The survey area is covered by one map plate for Prospector Mountain block, and four geophysical data products are delivered as listed below:

- TMI Coloured Total Magnetic Intensity (TMI) with contours.
- 1VG Calculated First Vertical Derivative of TMI colour grid with contours.
- TC Gamma Ray Spectrometer Total Counts colour grid with contours.
- Th\_K\_Ratio Gamma Ray Spectrometer Thorium-Potassium Ratio colour grid with contours.

The coordinate/projection system for the Prospector Mountain block is NAD83 – UTM Zone 08N. For reference, the latitude and longitude in WGS84 are noted on the maps.

### **6.2. Digital Deliverables**

#### 6.2.1. Final Database of Survey Data (.GDB)

The geophysical profile data is archived digitally in Geosoft GDB binary database format. A description of the contents of the individual channels in the database can be found in Appendix 2.

### 6.2.2. Geosoft Grid files (.GRD)

Levelled Grid products used to generate the geophysical map images.

### 6.2.3. Digital Versions of Final Maps (.MAP, .PDF)

Map files in Geosoft .map and Adobe PDF format.

#### 6.2.4. Free Viewing Software

- Geosoft Oasis Montaj Viewing Software
- Adobe Acrobat Reader



# 6.2.5. Digital Copy of this Document (.PDF)

# 7. DATA PROCESSING AND PRESENTATION

## 7.1. Base Map

The geophysical maps accompanying this report are based on positioning in the NAD83 datum. The survey geodetic GPS positions have been projected using the Universal Transverse Mercator projection in Zone 08 North. A summary of the map datum and projection specifications is given following:

- Ellipse: Clarke 1866
- Ellipse major axis: 6378137
- Inverse Flattening: 298.25722
- Datum: NAD83
- Map Projection: Universal Transverse Mercator Zone 08 North
- Central Scale Factor: 0.9996
- False Easting, Northing: 500,000m, 0m

For reference, the latitude and longitude in WGS84 are noted on the maps.

### 7.2. Radiometric Data

#### 7.2.1. Equipment and General Adherence to IAEA Standards

Aeroquest Limited generally adopts the standards for airborne gamma-ray spectrometry (the radiometric method) as laid out in the IAEA Technical Report 323 – Airborne Gamma-Ray Spectrometry Surveying.

### 7.2.2. Spectral Calibration

When calibrated (with thorium source about once a year) linearity of the each detector is measured and linearity correction coefficients are calculated. When operating in real time (collecting data), the linearity of each detector is mathematically corrected for each measurement. Individual detector tracking (tuning) and linearity correction provide better fit of the individual spectra that are being summed and therefore a sharper (better resolution) spectrum is obtained.

Calibration of the 5 detectors was carried out on March 08<sup>th</sup>, 2011 as follows:

Crystal	S/N	Cs resolution (%)
1	5517UA	6.83
2	5517UB	7.06
3	5517UC	7.52
4	5517UD	6.99
5	5517DE	7.82



#### **Results from Calibration Pad Test**

Calibrations were performed by RSI at their Mississauga facility on March 08<sup>th</sup>, 2011.

	Spectrometer	
Stripping Ratios	Unit	Ideal Values
Th into U (alpha)	0.276	0.250
Th into K (beta)	0.392	0.400
U into K (gamma)	0.765	0.810
U into Th (a)	0.045	0.060

### 7.2.3. Data Quality Assurance and Control

The spectrometer data are referenced to the other ancillary data sets using the RSI data acquisition system. After each flight, preliminary ROI channels are generated and profiles are then plotted from the digital data to check for any missing data, spikes or data corrupted by other noise sources. Where necessary, the data are corrected or flagged for re-flight depending on the severity or duration of the noise.

# 7.2.4. Live-time Correction

Generally, the radiometric data is acquired in units measured in counts per second. The instrumentation may require some time each second to process the incoming data, during this time period no counts are made. This time referred as Dead-time. Alternatively, some systems record the time during which the crystal is actually 'on' in which case the resulting value referred to as the live-time. The data was corrected by using Live-Time channels from the RSI spec pack.

$$N = n*10^{-3}/lt$$

Where:

N = Corrected counts in each second

n = raw recorded counts in each second

lt = equipment live time

# 7.2.5. Filtering to Prepare for Background Corrections

The radar altimeter data are filtered (low pass 5 fiducial) in order to ensure that no noise sources from the altimeter data are introduced to the radiometric data processing. The upward looking data are also filtered to improve the count statistics. In order to establish radon background levels from the upward-looking detector data, temporary heavily filtered (31 points mean filter) downward looking uranium and downward looking thorium data are utilized. The original unfiltered data are, of course, retained.



### 7.2.6. Cosmic and Aircraft Background

Cosmic and aircraft background expressions are determined for each spectral window as described in chapter 4 of the IAEA Technical Report 323. The general form of these expressions is N = a + bC, where N is the combined cosmic and aircraft background for each window; a is the aircraft background in the window; C is the cosmic channel count; and b is the cosmic stripping factor for the window.

The expressions are evaluated for each ROI window for each sample and used as a subtractive correction for the data.

#### 7.2.7. Radon Background

Correction of the data for variations in background due to radon is a multi-step process. First, test flights at various elevations over water are carried out in the field to establish the contribution of atmospheric radon to the ROI windows. A least squares analysis of the data from these test flights yields the constants for equations 4.9 to 4.12 (IAEA Report 323). Second, the response of the upward looking detector to radiation from the ground is established. Here a departure from the IAEA Report has been recommended by Grasty and Hovgaard (1996). The expression for the radon component in the downward looking uranium window is given by Ur =(u - a1U - a2T + a2bT - bu)/(au - a1 - a2aT) (see Eq. 4.3 – IAEA 323) where, Ur is the radon background detected in the downward U window; u is the measured count in the upward uranium window; T is the measured count in the downward thorium window; a1, a2, au and aT are proportionality factors; and bu and bT are constants determined experimentally. Using a1 or a2 (see above) in this equation will result in a good estimate of Ur permitting correction of the other ROI windows.

Survey altitude test data will be collected and used to establish atmospheric background and calibrate the upward and downward looking detector systems. Variations in count rates due to soil moisture content and altimeter variations can largely be overcome by a normalization procedure using the thorium count. The procedure correlates the thorium count to the uranium count assuming the contribution to each ROI from the ground is proportional.

### 7.2.8. Computation of Effective Height above Ground Level

Radar altimeter data are used in adjusting the stripping ratios for altitude and to carry out the height attenuation corrections. They are then converted to effective height (he) at STP by the expression he = (h \* 273.15)/(T + 273.15)\* (P/1013), where h is the observed radar altitude; T is the temperature in degrees C; and P is the barometric pressure in mbars

#### 7.2.9. Compton Stripping Correction

The stripping ratios  $\alpha$ ,  $\beta$ ,  $\gamma$ , a, b and g are determined during tests over calibration pads. The principal ratios a,  $\beta$  and g should be adjusted for temperature, pressure and altitude (above ground) before stripping is carried out. These stripping ratios are used



to remove the contribution in each of the three ROI windows from higher energy sources, leaving only the contribution from potassium, uranium and thorium.

#### 7.2.10. Altitude Attenuation Correction

The altitude attenuation correction corrects the data in each of the ROI windows for the effects of altitude. The count rates decrease exponentially with altitude and therefore the counts are corrected to a constant altimeter datum at the nominal survey height of 30m.

#### 7.2.11. Apparent Radioelement Concentrations

The corrected count rate data can be converted to estimate the ground concentrations of each of the three radioelements, potassium, uranium and thorium. The procedure assumes an infinite horizontal slab source geometry with a uniform radioelement concentration. The calculation assumes radioactive equilibrium in the U and Th decay series. Therefore the U and Th concentrations are assigned as equivalent concentrations using the nomenclature eU and eTh.

An estimate of the air absorbed dose rate can be made from the apparent concentrations, K%, eU ppm and eTh ppm using the following formula:

E = 13.08 \* K + 5.43 \* eU + 2.69 \* eTh

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

A description of how most of the constants were determined can be found in: Exploranium, I.A.E.A. Report, Airborne Gamma-Ray Spectrometer Surveying, Technical Report No. 323, 1991.

#### 7.2.12. Computation of Radioelement Ratios

Standard ratioing of the three radioelements (eU/eTh, eU/K and eTh/K) can be carried out and presented in profile or plan map form. In order to ensure statistical confidence in generating these ratios, we generally take the following precautions:

• Reject all data point where the apparent potassium concentration is less than 0.25% as these measurements are likely taken over water.

• Carry out cumulative summing along the survey line of each radioelement, rejecting areas where the summation does not exceed a certain threshold value (usually 10 counts for both numerator and denominator).



• Compute the ratios using the cumulative sums.

### 7.3. Magnetic Compensation test

Test lines were flown to check the real time magnetic compensation, in four cardinal directions corresponding to the survey line direction. The compensation test was carried out near Prospector Mountain Camp, Yukon to ensure the sensor was completely removed of ground effect.

### 7.4. Total Field Magnetics

The total field aeromagnetic data are corrected for the diurnal variation, by subtracting the base station magnetic data (low pass filtered to remove spikes due to cultural interference). Then the line data was corrected for heading and any remaining small levelling errors. The geophysical data are interpolated onto a regular grid using bi-directional interpolation technique. The gridded data was micro-levelled to remove small amplitude, in between flight line, levelling errors. The resulting grid is suitable for generating contour maps of excellent quality.



# **APPENDIX 1: SURVEY BOUNDARIES**

The following table presents the project block boundaries. All geophysical data presented in this report have been windowed to 100m outside these outlines.

#### **Prospector Mountain Block**

X and Y positions are in NAD83 UTM Zone 08N.

Х	Y	Х	Y
345924.9	6926685.1	354413.3	6924644.1
354257.4	6931356.9	353535.3	6924157.4
354923.0	6930160.7	353341.2	6924502.4
355725.4	6930616.9	351394.3	6923414.9
358431.7	6925797.7	350701.2	6924641.0
354863.0	6923833.7	347900.9	6923094.5



# **APPENDIX 2: DESCRIPTION OF DATABASE FIELDS**

The GDB file is a Geosoft binary database. In the database, the Survey lines and Tie Lines are prefixed with an "L" for "Line" and "T" for "Tie".

Column	Units	Description
Х	m	UTM Easting (NAD83, Zone 08N)
Y	m	UTM Northing (NAD83, Zone 08N)
Ralt	m	Radar Altitude
Galt	m a.s.l.	GPS Elevation
DTM	m a.s.l.	Digital Terrain Model using radar altimeter data
Lalt	m	Laser Altitude
UTCTime	HH:MM:SS.ss	UTC Time
BASEMAG	nT	Basemag value
Mag_raw	nT	Uncompensated raw magnetic data
Mag	nT	Diurnal Corrected compensated Magnetic data
Mag_heading	nT	Diurnal & Heading Corrected compensated Magnetic data
ТМІ	nT	Levelled Magnetic data

#### Magnetic databases:

## **Radiometrics databases**:

Column	Units	Description
Utc_time	hh:mm:ss.s	utc time
K_raw	Cps	Radiometrics – potassium
Th_raw	Cps	Radiometrics – Thorium
U_raw	Cps	Radiometrics – Uranium
TC_raw	Cps	Radiometrics – Total Counts
UpU_raw	Cps	Radiometrics - Uranium upward looking counts
Live Time	S	System Live Time
Radar_stp	m	radar altitude at standard temperature and pressure
K_CPS	Cps	Radiometrics – corrected potassium
Th_CPS	Cps	Radiometrics – corrected Thorium
U_CPS	Cps	Radiometrics – corrected Uranium
TC_CPS	Cps	Radiometrics – corrected Total Counts
Cosmic_upUranium	Cps	Radiometrics - Cosmic Corrected Uranium upward looking counts
K_Percentage	%	Radiometrics – potassium (%K)
Th_ppm	ppm	Radiometrics – equivalent Thorium
U_ppm	ppm	Radiometrics – equivalent Uranium
Dose_Rate	uR/hr	Radiometrics – exposure rate
Th_K_Ratio		Thorium – Potassium Ratio
U_K_Ratio		Uranium – Potassium Ratio
U_Th_Ratio		Uranium – Thorium Ratio

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Column	Units	Description
Down	counts per second	512 channel spectral data (Downward looking)
Up	counts per second	512 channel spectral data (Upward looking)
Х	m	UTM Easting (NAD83, Zone 08N)
Y	m	UTM Northing (NAD83, Zone 08N)
Temperature	°C	temperature
Pressure	mbar	Barometric Pressure
Cosmic	Cps	Radiometric s- Cosmic



# **APPENDIX 3: RADIOMETRICS PROCESSING PARAMETERS**

COEFFICIENTS				
	Cosmic Stripping Factor	Aircraft Background Value		
	(b)	(a)		
тс	1.0975	101.18		
Κ	0.0597	12.7		
U	0.0436	4.884		
Th	0.0696	0.089		
Uup	0.0153	0.6172		

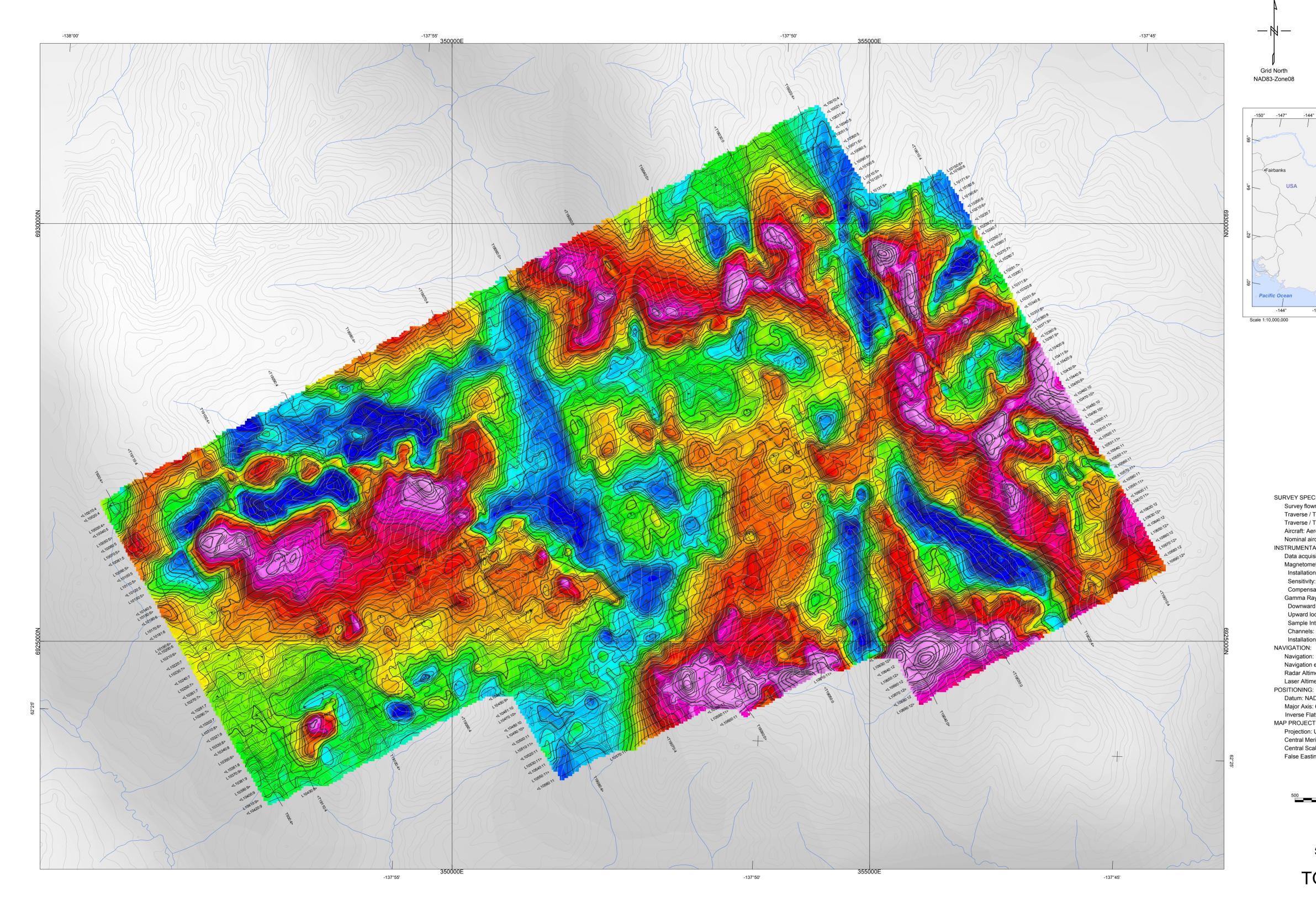
Aircraft Background and Cosmic Stripping Factors

#### Altitude Attenuation Coefficients

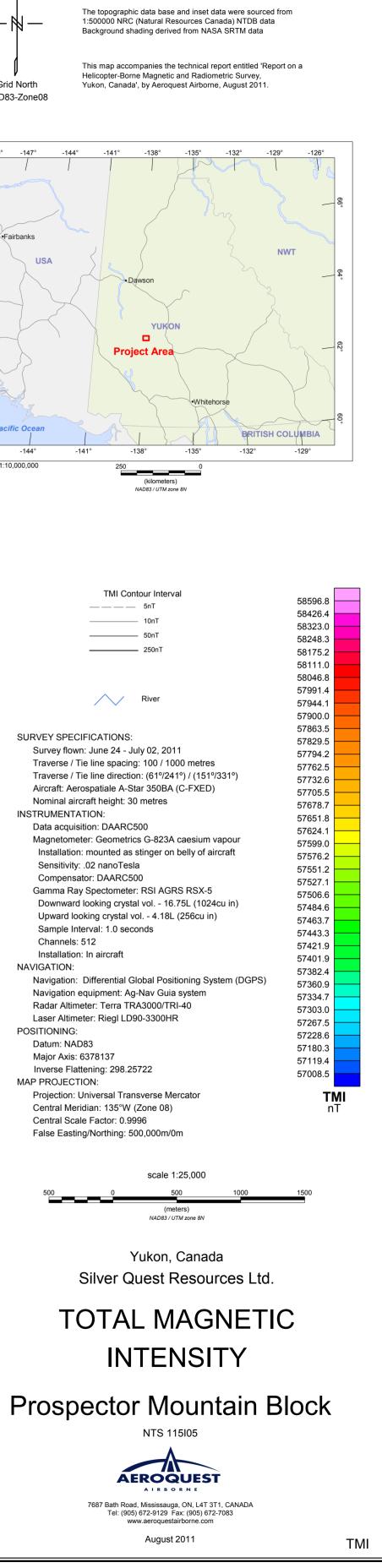
COEFFICIENTS		
Element	Attenuation Coeff.	
ТС	-0.00532	
К	-0.00618	
U	-0.00512	
Th	-0.00653	

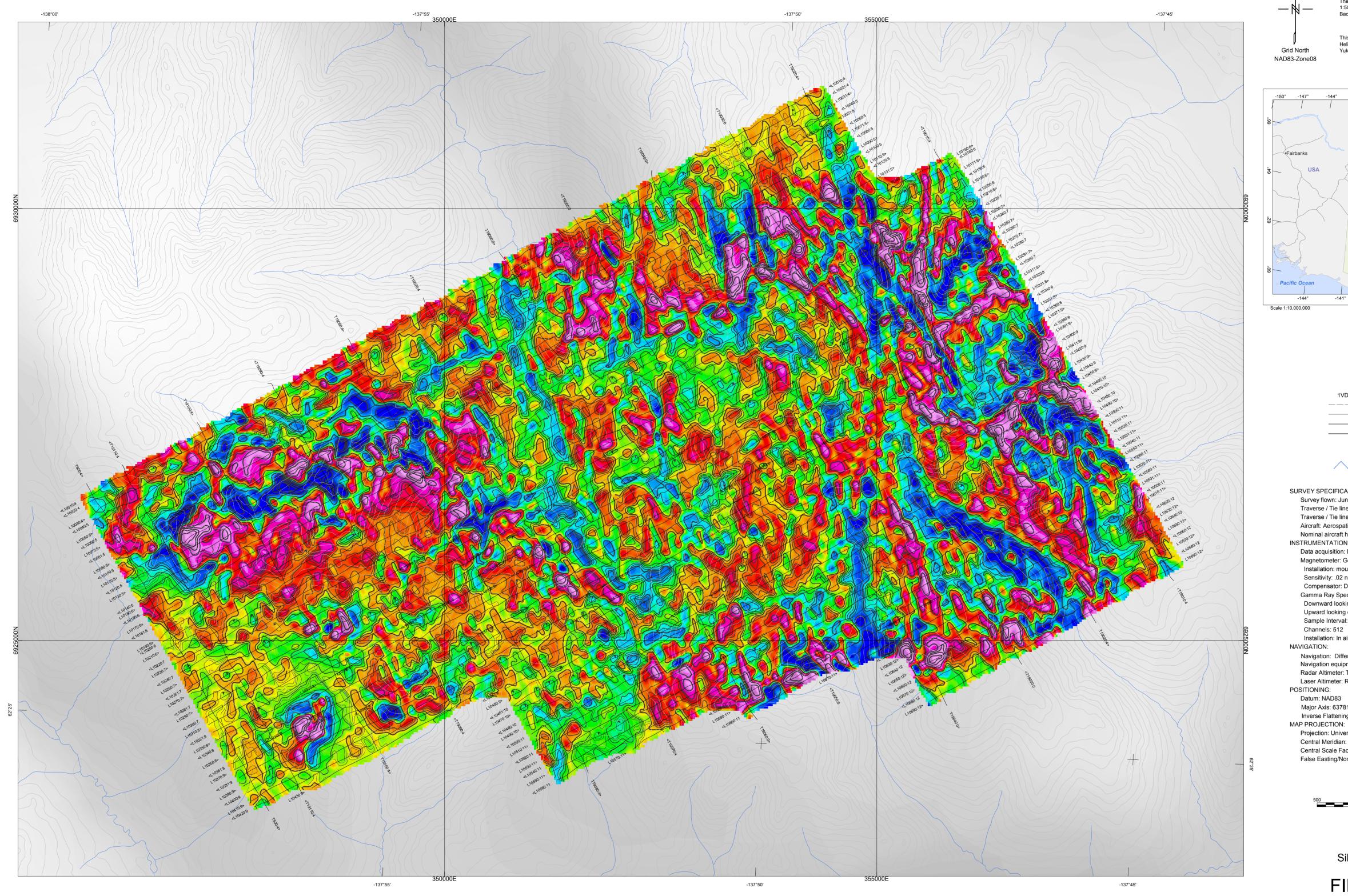
#### Sensitivity Factors

	Sensitivity Factors
Element	Sensitivity Factor at 30 m STP Height
К	64.59947 cps/%
U	7.29807 cps/ppm eU
Th	3.45573 cps/ppm eTh
Dose	
rate	20.81085 cps/nG/hr

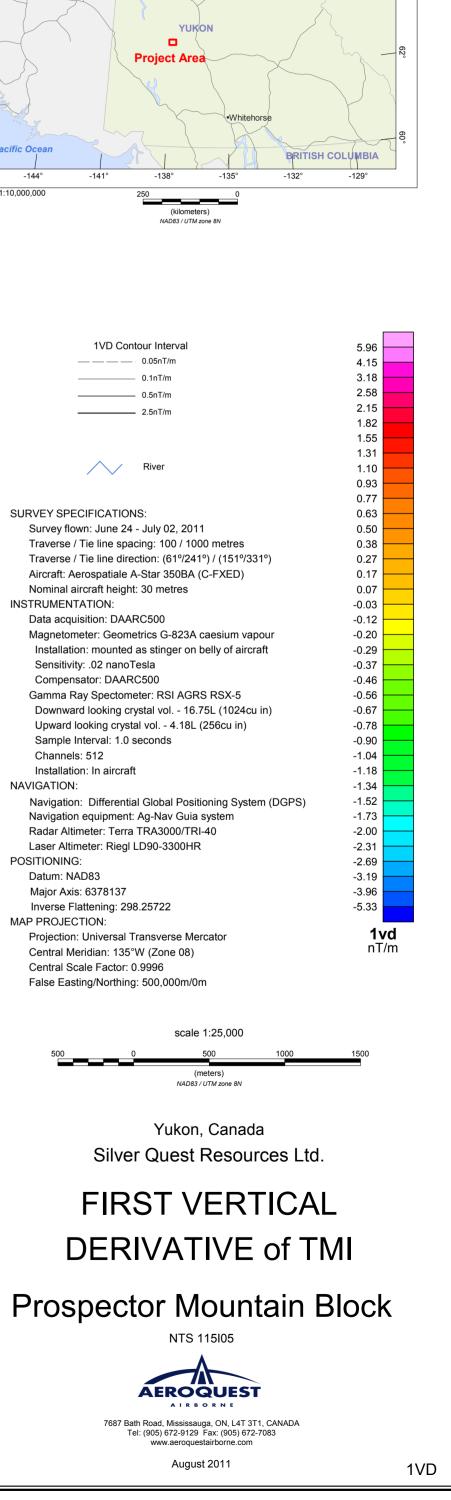


TMI\_25k\_Prospector Mountain Block.map, AA Job no. 11039



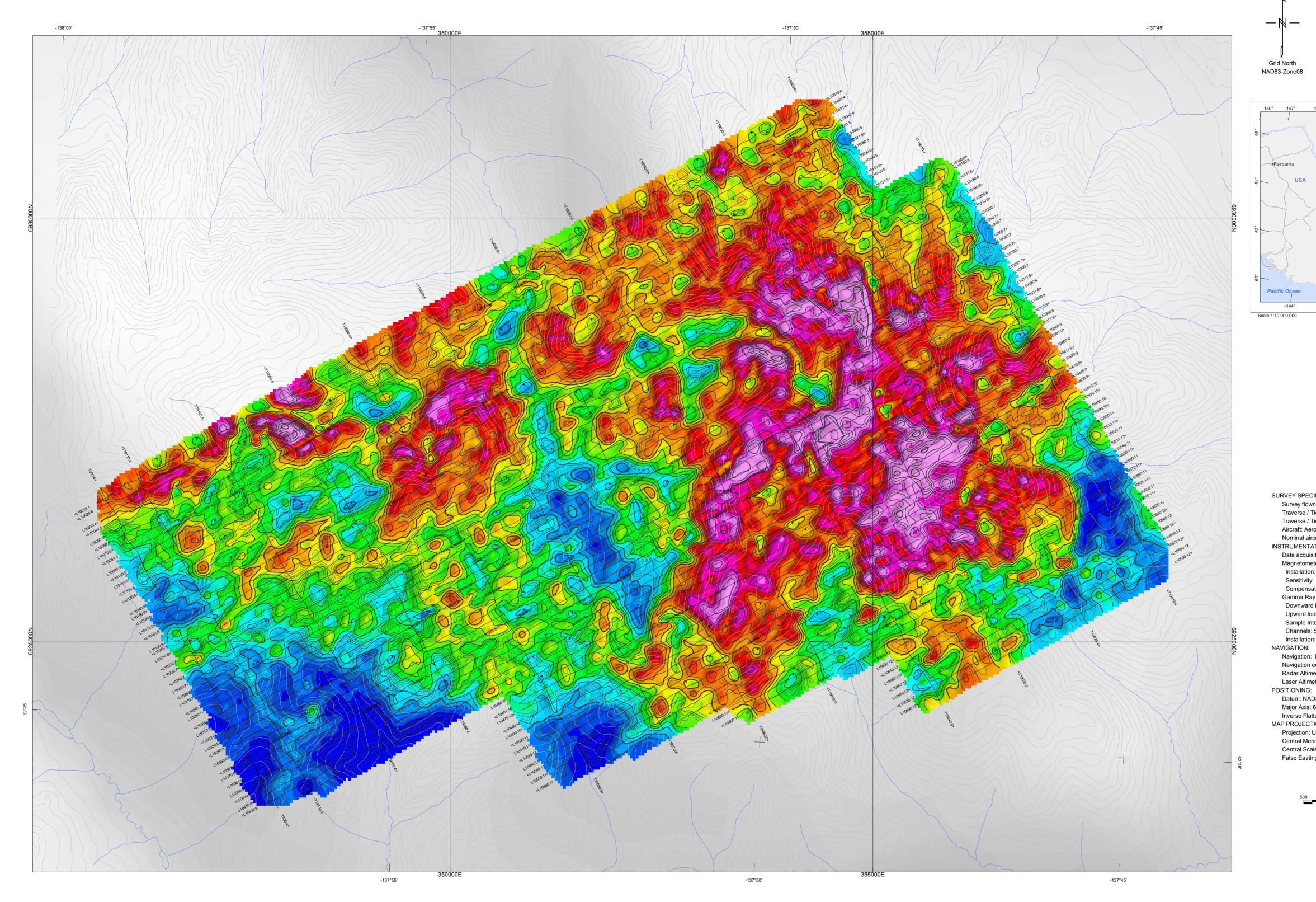


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Helicopter-Borne Magnetic and Radiometric Survey, Yukon, Canada', by Aeroquest Airborne, August 2011.



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/ Tie line direction: (61°/241°) / (151°/331°)
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s: 512
on: In aircraft
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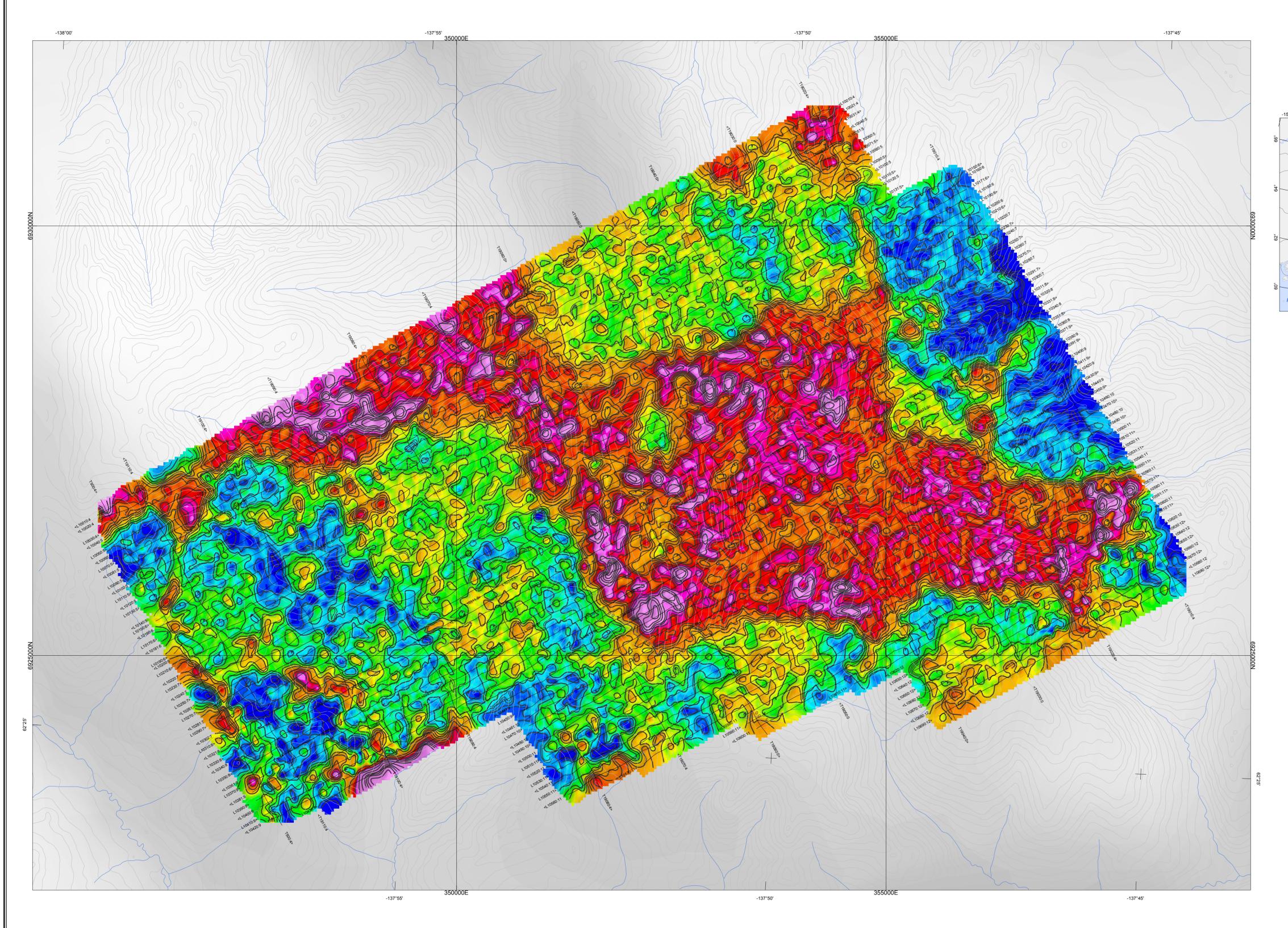
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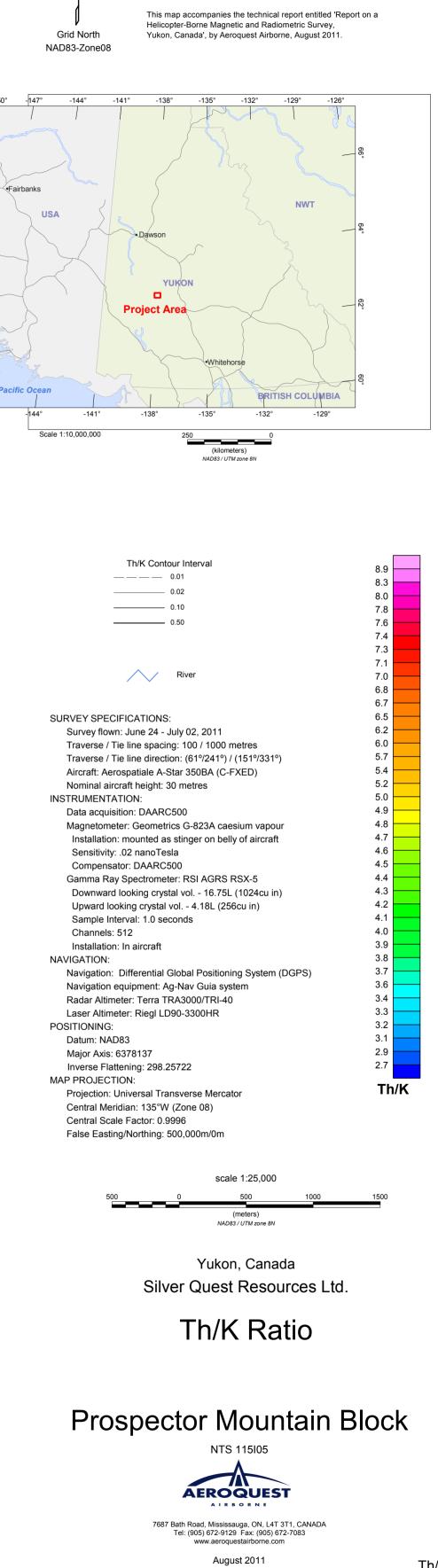
1740

1695

This map accompanies the technical report entitled 'Report on a Helicopter-Borne Magnetic and Radiometric Survey, Yukon, Canada', by Aeroquest Airborne, August 2011.



Th/K\_Ratio\_25k\_Prospector Mountain Block.map, AA Job no. 11039



The topographic data base and inset data were sourced from 1:500000 NRC (Natural Resources Canada) NTDB data Background shading derived from NASA SRTM data

Ы —

Th/K