Ministry of Energy & Mines
Energy & Minerals Division
Geological Survey Branch

ASSESSMENT REPORT
TITLE PAGE AND SUMMARY

TITLE OF REPORT [type of survey(s)]	TOTAL COST
Assessmnt Rpt - Murphy Lake Property Airborne Gamma-ray Spectrometric and Magnetic Surveys	$49,544.35

AUTHOR(S) Agnes Koffyberg, P.Geol. SIGNATURE(S)

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S) N/A YEAR OF WORK 2006

STATEMENT OF WORK - CASH PAYMENT EVENT NUMBER(S)/DATE(S) 4121499 (2007/01/12)

PROPERTY NAME Murphy Lake Property

CLAIM NAME(S) (on which work was done) 402246, 528127, 528129, 528130, 528437, 526768, 527403, 527404, 528081, 52808[illegible]
528083, 528084, 529448, 529449, 529531, 529532, 529534, 529535, 529645, 528077, 528085, 528089, 527391, 527396
527400, 527634, 527636, 528070, 528073, 528079, 528080, 528091, 528092, 528093, 528095, 528096, 528097, 528098
528100, 528101

COMMODITIES SOUGHT Copper, Gold

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN

MINING DIVISION Cariboo, Clinton NTS BCGS 092P.094, 093A.004, 005, 006, 014, 015

LATITUDE 52 o 03 ' 00 " LONGITUDE 121 o 21 ' 00 " (at centre of work)

OWNER(S)

1) Candorado Operating Company Ltd

2) Al Harvey / Ron McMillan

MAILING ADDRESS

#305 - 478 Bernard Avenue
Kelowna, BC V1Y 6N7

Lagoon Ct / 6606 Mark Lane
Clinton, BC V0K 1K0 / Victoria, BC V9E 2A1

OPERATOR(S) [who paid for the work]

1) Candorado Operating Company Ltd

2)

MAILING ADDRESS

#305 - 478 Bernard Avenue
Kelowna, BC V1Y 6N7

Lagoon Ct / 6606 Mark Lane
Clinton, BC V0K 1K0 / Victoria, BC V9E 2A1

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):
Nicola Group rocks, Upper Triassic, Lower Jurassic, monzonites, Quesnel Trough, alkaline intrusions,
copper, gold, porphyry

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS 949, 1,704, 2,074, 3,387, 4,697, 18,347
19,515, 22,504, 23,089, 23,382, 23,490, 23,920, 24,428, 26,221, 27,325, 27,712A

(OVER)

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne	688 line kilometres		49,544.35
GEOCHEMICAL (number of samples analysed for ...)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY/PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other			
		TOTAL COST	49,544.35

ASSESSMENT REPORT

on the

Airborne Gamma-ray Spectrometric
And Magnetic Surveys

MURPHY LAKE PROPERTY

CARIBOO and CLINTON MINING DIVISIONS, BC

BCGS 92P.094, 93A.004, 005, 006, 014, 015

NTS:	92P/14, P/15, 93A/2, A/3
LATITUDE:	52° 03' 00" N
LONGITUDE:	121° 21' 00" W
OWNERS:	Candorado Operating Company Ltd, Allen Harvey, Ron McMillan
OPERATOR:	Candorado Operating Company Ltd.
CONSULTANTS:	Discovery Consultants
AUTHOR:	A. Koffyberg, P.Geol.
DATE:	April 30, 2007

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1.0 SUMMARY

A high resolution aeromagnetic and airborne gamma-ray spectrometric geophysical survey was flown over the Murphy Lake Property ("Property"), comprising 40 mineral titles as shown in Table 1. The work was partnered by Geoscience BC, Natural Resources Canada's Targeted Geoscience Initiative (TG13) and Candorado Operating Company Ltd ("Candorado"). Candorado funded the survey.

In total, 820 line-kilometres were flown over the Murphy Lake Block; 688 line-kilometres of the total coverage are directly over the Property, including, in places, a 1 km zone around the Property.

Project management was undertaken by the Geological Survey of Canada (GSC). The fixed-wing airborne survey work was contracted out to Fugro Airborne Surveys, which performed the work from September 17 to October 8, 2006.

The Property is situated within the Cariboo Plateau, and is located approximately 50 km northeast of 100 Mile House. Access to the general area of the property and all of the target areas can be gained by logging roads from 100 Mile House, Lac la Hache and Forest Grove. Many of these logging roads are not regularly maintained and a 4-wheel drive vehicle is necessary to gain access to this area.

Geologically, the Property lies within the Quesnel Trough, which in this area consists of Nicola Group marine sediments and arc-derived volcanic rocks with associated high-level, coeval alkalic intrusions. Much is this area is mantled by younger plateau basalts of the Chilcotin Group. The Quesnel Trough hosts many alkalic porphyry copper-gold occurrences and producing mines (Copper Mountain, Mount Polley, Galore Creek, Mount Milligan) and is of regional metallogenic significance.

2.0 LOCATION AND ACCESS

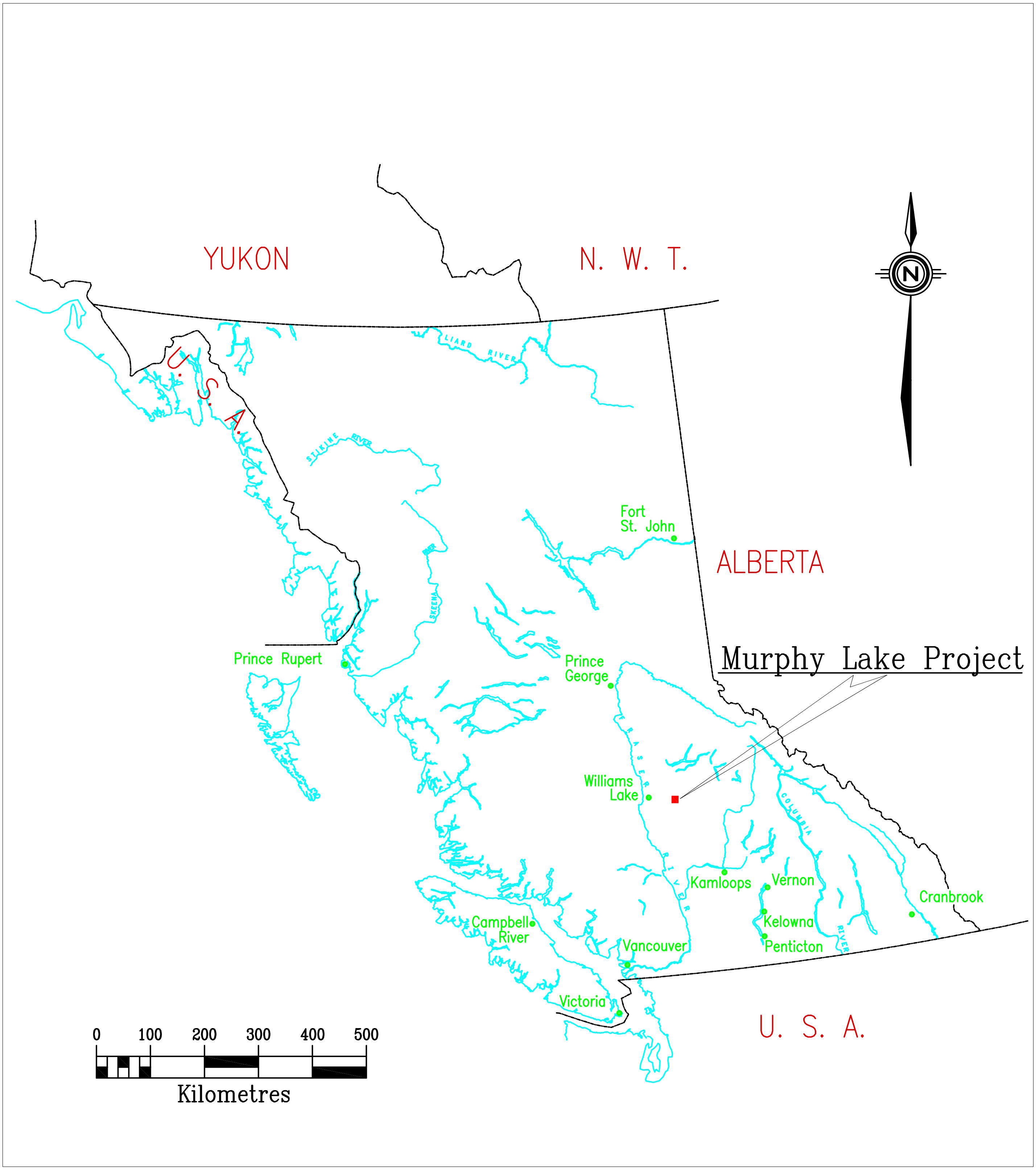
The Property is centred at latitude 52° 03' N and longitude 121° 21' W, which is physiographically located within the Cariboo Plateau. Figure 1 shows the regional location of the Property.

The Property is located 50 kilometres northeast of the town of 100 Mile House. The Property lies west of Murphy Lake, which is also referred to as Eagle Lake.

Access to the general area of the property and all of the target areas can be gained by Forestry Service roads from 100 Mile House, Lac la Hache and Forest Grove. Many of these logging roads are not regularly maintained and a 4-wheel drive vehicle is necessary to gain access to this area.

3.0 TOPOGRAPHY

The property covers a rolling upland of the Fraser Plateau located west of Murphy Lake. Relief within the property ranges from 864 m on Murphy Lake to 1,389 m on an un-named hill in the central part of the property north of Spout Lake. Glacial till and fluvial-glacial outwash cover much of this area, disrupting drainage patterns and creating many swampy areas. Large parts of the area are covered by a mature forest of spruce and pine.

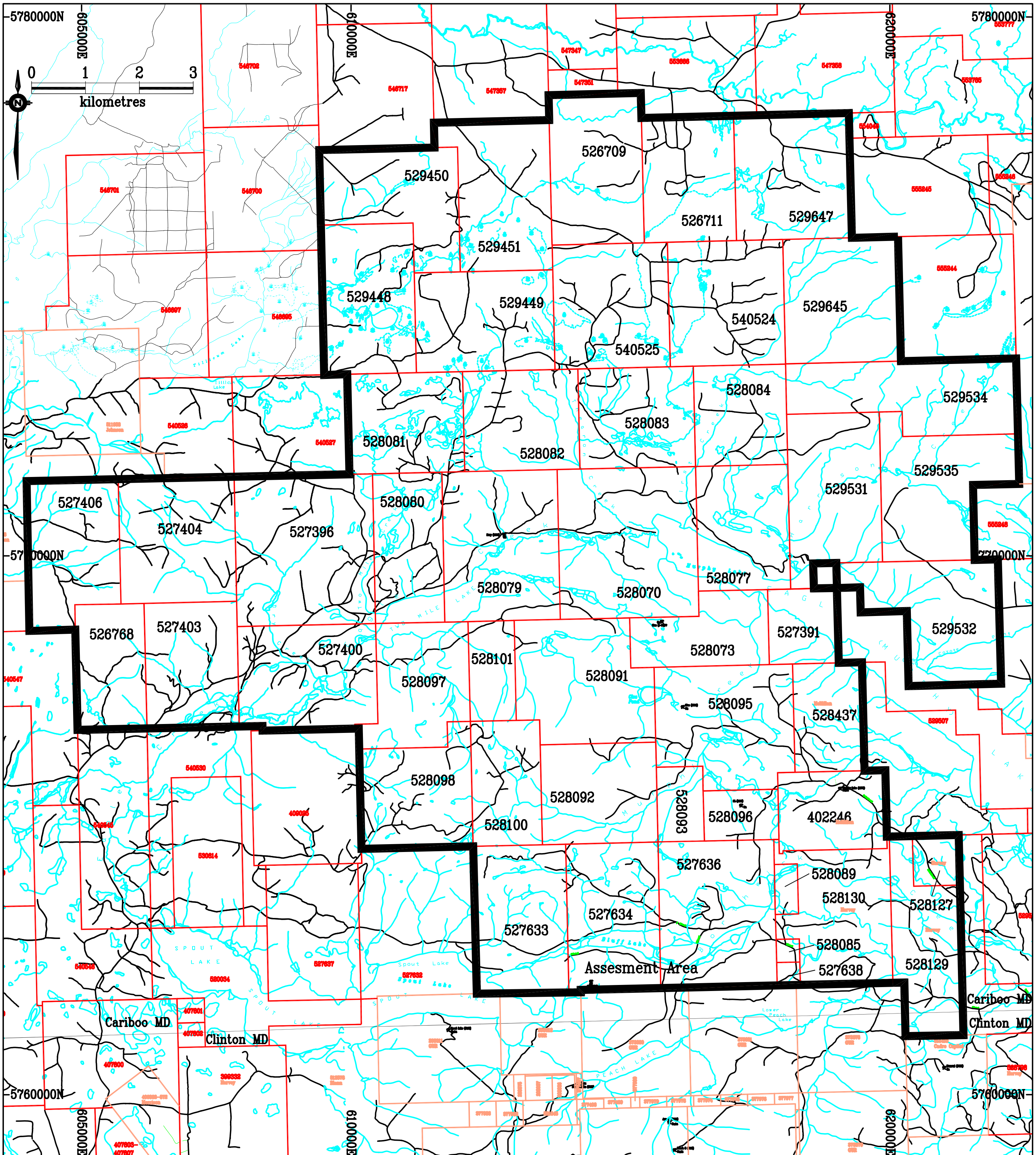


DISCOVERY Consultants	Candorado Operating Company Limited
Murphy Lake Project	Property Location Map

Date: April 9, 2007	Project: 696	Scale: as shown	N.T.S.: 093A/092P	Mining Div: Clinton	Figure: 1

4.0 PROPERTY

The Property consists of 46 Mineral Title Online titles, for a total of 18,461.95 hectares. Three of these mineral tenures are recorded in the name of Allen Daniel Harvey, two are recorded in the name of Ron McMillan, and 41 are recorded in the name of Candorado Operating Company Limited. Candorado has optioned the MTO claims from Allen Harvey and from Ron McMillan in two separate option agreements. Figure 2 shows the location of the claims. Table 1 lists the details of the claim tenures.



DISCOVERY Consultants	Candorado Operating Company Limited
Murphy Lake Project	Claim Location Map

Date:	April 9, 2007	Project:	696	Scale:	1:100000	N.T.S.:	093A/092P	Mining Div:	Cariboo, Clinton	Figure:	2

Table 1: Title Description * Expiry date is dependent on the acceptance of this report

Title Name	Tenure No.	Area (ha)	Registered Owner	Expiry*
MUR 1	402246	300	Ron McMillan	2009.05.09
	528127	79.57	Allen Daniel Harvey	2009.03.06
	528129	398	Allen Daniel Harvey	2009.03.06
	528130	517.32	Allen Daniel Harvey	2009.03.06
	528437	298.25	Ron McMillan	2009.05.10
MINER 1	526709	476.24	Candorado Operating Company Limited	2008.03.27
MINER 2	526711	396.88	Candorado Operating Company Limited	2008.03.27
	526768	298.17	Candorado Operating Company Limited	2008.03.27
	527403	397.56	Candorado Operating Company Limited	2008.03.27
	527404	496.72	Candorado Operating Company Limited	2008.03.27
	527406	437.13	Candorado Operating Company Limited	2008.03.27
	528081	397.23	Candorado Operating Company Limited	2008.03.27
	528082	397.23	Candorado Operating Company Limited	2008.03.27
	528083	397.23	Candorado Operating Company Limited	2008.03.27
	528084	317.78	Candorado Operating Company Limited	2008.03.27
R2R 1	529448	476.45	Candorado Operating Company Limited	2008.03.27
R2R 2	529449	476.5	Candorado Operating Company Limited	2008.03.27
R2R 3	529450	436.58	Candorado Operating Company Limited	2008.03.27
R2R 4	529451	496.12	Candorado Operating Company Limited	2008.03.27
RB 1	529531	496.66	Candorado Operating Company Limited	2008.03.27
RB 2	529532	496.89	Candorado Operating Company Limited	2008.03.27
RB 4	529534	496.5	Candorado Operating Company Limited	2008.03.27
RB 5	529535	496.66	Candorado Operating Company Limited	2008.03.27
RB 93	529645	496.33	Candorado Operating Company Limited	2008.03.27
RB 95	529647	496.1	Candorado Operating Company Limited	2008.03.27
	528077	397.38	Candorado Operating Company Limited	2008.03.27

Title Name	Tenure No.	Area (ha)	Registered Owner	Expiry*
	528085	19.9	Candorado Operating Company Limited	2008.03.27
	528089	39.79	Candorado Operating Company Limited	2008.03.27
	527391	178.89	Candorado Operating Company Limited	2008.02.28
	527396	715.31	Candorado Operating Company Limited	2008.03.20
	527400	556.63	Candorado Operating Company Limited	2008.03.20
	527634	477.53	Candorado Operating Company Limited	2008.03.09
	527636	596.92	Candorado Operating Company Limited	2008.03.07
	528070	715.31	Candorado Operating Company Limited	2008.03.15
	528073	298.15	Candorado Operating Company Limited	2008.02.28
	528079	596.09	Candorado Operating Company Limited	2008.03.15
	528080	357.66	Candorado Operating Company Limited	2008.03.13
	528091	536.76	Candorado Operating Company Limited	2008.02.27
	528092	397.76	Candorado Operating Company Limited	2008.03.17
	528093	119.33	Candorado Operating Company Limited	2008.03.16
	528095	556.73	Candorado Operating Company Limited	2008.02.26
	528096	159.12	Candorado Operating Company Limited	2008.02.26
	528097	397.6	Candorado Operating Company Limited	2008.02.26
	528098	417.65	Candorado Operating Company Limited	2008.02.26
	5280100	298.31	Candorado Operating Company Limited	2008.02.26
	528101	159.03	Candorado Operating Company Limited	2008.02.26

5.0 HISTORY

The exploration history of the area west of Murphy Lake has involved many different companies working on various properties in the area. The following table, summarizing the exploration history in the area of the Property, has been compiled by Page (2007).

Table 2 Compilation of Exploration in area of the Property

Author	Year	Reference	Company	Area	Exploration work
Janes, R. H.	1966	AR 949	Coranex	North of Spout and Bluff Lakes	386 soil & silt samples
Allen, A. R.	1968	AR 1,704	Monte Christo Mines Ltd. NPL	Area surrounding Bluff Lake and extending to the east end of Spout Lake.	> 2,000 soil samples
Mitchell, J. A.	1969	AR 2,074	Monte Christo Mines Ltd. NPL	Area surrounding Bluff Lake and extending to the east end of Spout Lake.	69 soil samples, magnetometer survey - 51 line-km
Kirwan, G. L.	1971	AR 3,387	Nitro Development Inc.	North of Cleo Lake, east of Two Mile Lake, Southwest of NW tip of Murphy Lake	1404 soil samples, magnetometer survey
Vollo, N. B.	1973	AR 4,697	Craigmont Mines Limited	North and east of Bluff Lake up to Two Mile Lake	2,437 soil samples, magnetometer and VLF-EM survey
BCGS	1974	BC GEM 1974	Craigmont Mines Limited	Southwest of Bluff Lake	one drill hole - 94 m
Woods, D. V.	1989	AR 18,347	Tide Resources Ltd.	Area surrounding and north of Bluff Lake extending past the north end of Murphy Lake.	airborne magnetometer and VLF-EM survey - 580 line-km, 200 m spacing
Seywerd, M. B.	1989	AR 19,515	Armstrong Mountain Gold Corp.	Area north of Spout Lake	reprocessing of 1400 line-km of airborne survey
Aulis, R. J.	1992	AR 22,504	Cominco	Area north of Spout Lake and west of Murphy Lake	IP - 65 line-km
Aulis, R. J.	1993	AR 23,089	GWR Resources Inc.; Regional Resources Ltd.	Area north of Spout Lake and west of Murphy Lake	85 silt, 275 soil and 40 rock samples
Klit, D. A.	1994	AR 23,382	GWR Resources Inc.; Regional Resources Ltd.	Three recc. Lines west of Murphy Lake and a small grid NW of Two Miles Lake.	IP - 15 line-km
Klit, D. A.	1994	AR 23,490	GWR Resources Inc.; Regional Resources Ltd.	Line extensions west of Murphy Lake, and 7.0 line km in 8 lines south of Bluff Lake.	IP - 18 line-km
Cornock, S. J. A., Lloyd, J.	1995	AR 23, 920	Regional Resources Ltd. GWR Resources Inc.	Southwest of Murphy Lake	IP and magnetometer survey - 27 line-km
von Guttenberg, R.	1996	AR 24,428	Regional Resources Ltd. GWR Resources Inc.	West of Murphy Lake	drilling
Caron L.	1999	AR 26,221	Chelsea Mercantile Bank Corporation	Nemrud Skarn + Murphy Lake showing	
McMillan, R. H.	2003	AR 27,325		West of Murphy Lake	magnetometer and VLF-EM survey - 22 line-km
Ostler, J.	2004		Candorado Operating Company Ltd.	West of Murphy Lake	drilling
Walcott, P.	2004		Candorado Operating Company Ltd.	North of Bluff Lake	IP and magnetometer survey - 18 line-km
Ostler, J.	2005	AR27,712A	Regional Resources Ltd.	West of Murphy Lake	Nine drill holes, 1,603 m

6.0 GEOLOGY

6.1 Regional Geology

The property is located in the Quesnel Terrane (commonly referred to as the Quesnel Trough) of the Intermontane Belt, a northwest-trending belt of marine sediments and volcanics measuring about 40 - 50 km wide and traceable for over 1000 km through central BC. The Quesnel Trough is a marine basin that formed at the Triassic continental margin and it provides a long-term record of deposition and tectonism through the Triassic and Early Jurassic. Arc-related volcanism and related coeval intrusives appeared in the Triassic and became a dominant feature of the Quesnel Trough in the Jurassic. To the west of the Quesnel Trough is the Cache Creek Terrane, whose boundary is marked by the major Pinchi Fault system. The Omineca Crystalline Belt to the east, formed in Early to Middle Jurassic time as a result of the accretion of the Intermontane Superterrane onto the continental margin of North America and the closing of the intervening arc-basin, marked the end of this phase of the Quesnel Trough.

These sediments and volcanics occupying the Quesnel Trough are assigned to the Triassic to Early Jurassic Nicola Group. The composition of the Nicola Group varies widely throughout its length, but in general, the basal marine sequence consists of shale, siltstone, greywacke, argillite and limestone. This basal sequence is more commonly exposed in the eastern part of Quesnellia (Eastern Belt of the Nicola Group). The basal sequence is succeeded by a considerable thickness of submarine alkalic volcanics, mainly augite and plagioclase phyric basaltic flows and associated breccias, which in turn are succeeded by an easterly facing succession of calc-alkaline, mainly plagioclase-phyric andesite flows and breccias, with lenses/beds of limestone and volcaniclastic rocks. Late Triassic to Early Jurassic volcanic centres with high-level alkalic cores of syenite to monzonite composition host the porphyry copper-gold deposits in the Quesnel Trough, along with several gold-rich skarn deposits.

The accretion onto the North American craton of the Intermontane Superterrane

(Columbian Orogeny) and the resulting calc-alkaline plutonism created a large number of Middle Jurassic to Cretaceous intrusions of intermediate composition. This includes the Takomkane Batholith (193 ma) east of Murphy Lake and a younger quartz monzonite intrusion which hosts the Boss Mountain molybdenum deposit about 50 km northeast of Murphy Lake.

A cap of Miocene to Pliocene basaltic flows and related sediments of the Chilcotin Group unconformably overlies older rocks in this area.

6.2 Property Geology

The following is taken from the report by Ostler (2005) who conducted extensive geological mapping within the Property:

"The oldest rocks in the property area are metavolcanics of the Late Triassic age Nicola Group. They are similar to those of the Central Belt mapped in the southern Quesnel Terrane. These rocks are variably exposed in a horseshoe shaped area extending from the central part of Murphy Lake around the southern and western parts of the property to north of Two Mile Lake and the northern end of Murphy Lake. The inner boundary of the "horseshoe" of Nicola Group metavolcanic rocks coincides with the inner boundary of the regional aeromagnetic anomaly.

The open end of the horseshoe is occupied by Takomkane batholith granodiorite, a lobe of which occupies the area between Murphy Lake and Cleo Pond.

The Murphy Lake stock, a monzonitic body, intruded Nicola Group rocks at the margin of the Takomkane batholith. The two intrusions are in contact with each other east of Cleo Pond. The Murphy Lake stock is exposed in a 5x6 km (3x3.7 mi) area in the southeastern part of Candorado's core property area…

The most recent event related to the emplacement of the Murphy Lake stock was the development of a plume of silicification and oxidation in a 1.0 x 0.7 km oval shaped area at Mineral Ridge southeast of Cleo Pond…

By the Eocene age, regional scale east north-easterly trending faults had broken the Murphy Lake stock into a series of panels, exposing progressively deeper sections of the stock from south to north. Erosion had produced a land surface similar to the present one.

Flood basalt filled the major valleys and spilled out over the adjacent slopes. After Pleistocene glacial scouring, all the remained of the Eocene age Endako Group flood basalts were two caps in the southern and western parts of the property area."

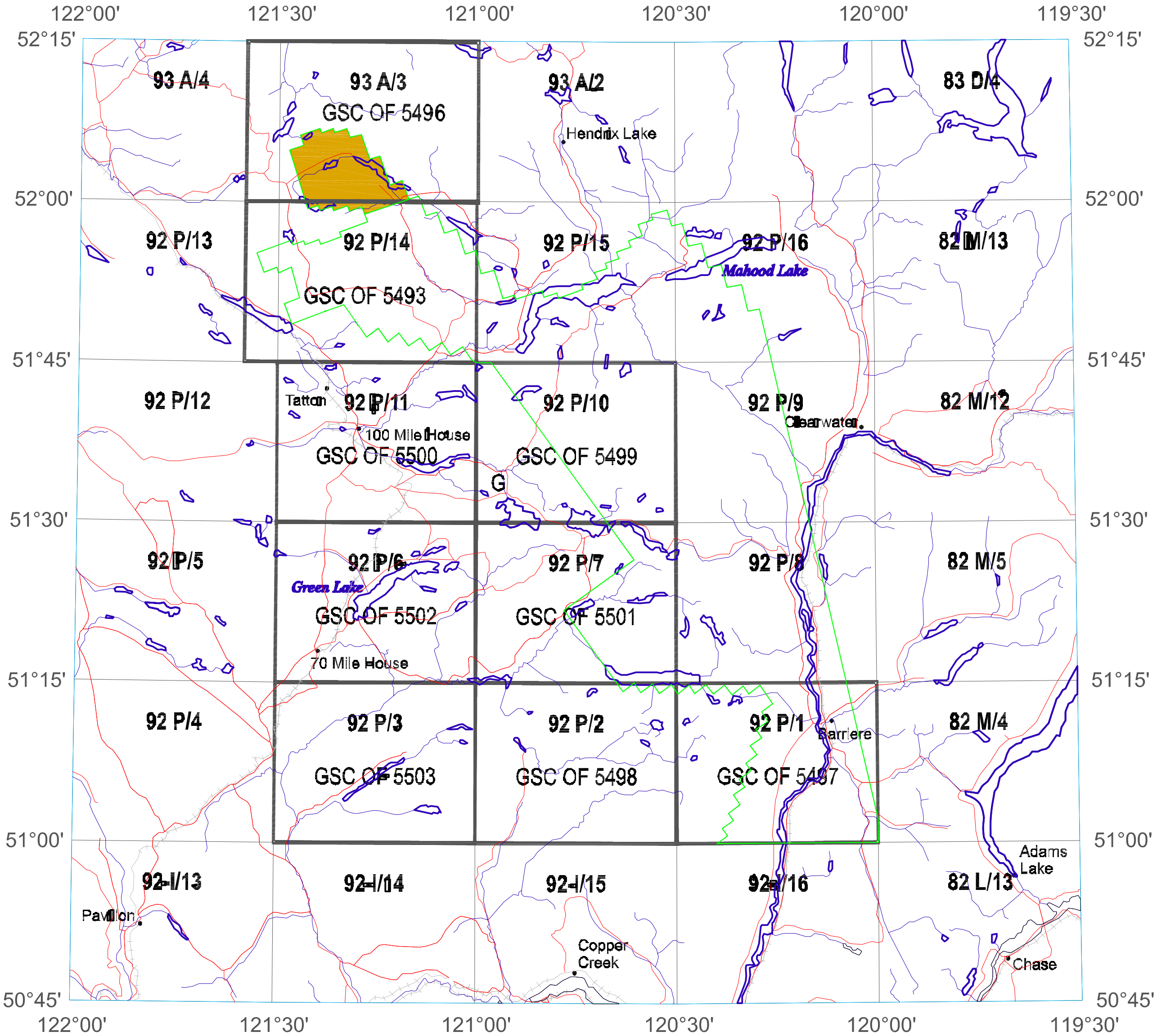
7.0 WORK COMPLETED

The helicopter airborne geophysical survey was carried out by Fugro Airborne Surveys (Fugro) during the period of September 17 to October 8, 2006. The survey, consisting of a gamma-ray spectrometric and magnetic survey, was conducted as a partnership with Geoscience BC, National Resources Canada and Candorado Operating Company Ltd. Candorado funded the survey. Project management was undertaken by the Geological Survey of Canada (GSC), which included the work as part of a larger airborne survey over the Bonaparte Lake area (Miles et al., 2007).

Figure 3 shows the extent of the complete airborne survey and the location of the Murphy Block survey which covered the Property. This area is included in the GSC Open Files 5496 and 5493 (2007). Flight lines were flown at 250 m spacing lines and were oriented at N70˚ E. The tie lines, oriented at N15˚W were flown at 2.4 km spacing.

In total, 820 line-kilometres were flown on the Murphy Lake Block. However, parts of the survey on the Murphy Lake Block occur beyond the Property boundary, in particular on the southeast and southwest parts of the survey. A 1 km buffer zone outside of the boundary is included in this report. This zone is needed for interpretation of data on the Property. In total, 132 line kilometres lie outside the 1 km buffer zone, resulting in 688 line kilometres flown over the property for assessment cost purposes. Figure 4 shows the extent of the geophysical survey of the Murphy Lake Block in relation to the Property.

All lines were flown at a nominal attitude of 125 m above the terrain surface, which was designed to take into account the digital terrain model and the performance of the aircraft at that attitude. The helicopter used in the survey was an Aerospatiale AS350B2 turbine helicopter (registration C-FDNF), provided by Questral Helicopters.



NATIONAL TOPOGRAPHICAL SYSTEM REFERENCE AND GEOPHYSICAL MAP INDEX

2006 Airborne Geophysical Survey Area

Murphy Airborne Geophysical Survey Area

DISCOVERY Consultants	Candorado Operating Company Limited
Murphy LakeProperty	Airborne Geophysical Survey

Date: April 1, 2007	Project: 696	Scale: none	N.T.S.: 92P,93A	Mining Div: Cariboo, Clinton	Figure: 3

Survey Equipment

Fugro provided the equipment for the airborne survey. The following descriptions are taken from Fugro Airborne Survey Report #06068. This report in its entirety is given in the Appendix.

Geophysical Flight Control System

HeliDAS

The HeliDAS controls, monitors and records the operation of all the geophysical and ancillary sensors. Input from the various sensors is monitored every 0.01 seconds for precise coordination of geophysical and positional measurements. GPS positional coordinates and terrain clearance is presented to the pilot by means of a LCD touch screen display and optional pilot indicator. The magnetometer response, 4th difference, altimeter profile and profiles of the radiometric windows are also shown on the LCD touch screen display for real-time monitoring of equipment performance.

Magnetometer

Scintrex CS-3

Type: Optically pumped cesium vapour
Sensitivity: 0.01 nT
Sample rate: 10 per second

The magnetometer was mounted in a forward facing stinger configuration on the helicopter. The Larmor frequency output was processed by the magnetometer counter board that provides a resolution, without filtering, of 10 (ten) times per second (in a magnetic field of 50,000 nT this resolution is equivalent to 0.005 nT).

Magnetic Base Station

Scintrex CS-2

Type: Digital recording cesium vapour
Sensitivity: 0.01 nT
Sample rate: 1 per second

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 to permit subsequent removal of diurnal drift.

Magnetic Compensation

HeliDAS

Sensitivity: 0.01

The proximity of the helicopter to the magnetic sensors creates a measurable anomalous response as a result of the helicopter movement. The orientation of the aircraft with respect to the sensors and the motion of the aircraft through the earth's magnetic field are contributing factors to the strength of this response. A special calibration flight is flown to record the information necessary to remove these effects. The maneuvers consist of flying a series of calibration lines at high altitude to gain information in each of the required line directions. During this procedure, the pitch, roll and yaw of the aircraft are varied. Each variation is conducted in succession (first vary pitch, then roll, then yaw). This provides a complete picture of the effects of the aircraft at designated headings in all orientations. A three-axis fluxgate magnetometer measures the orientation and rates of change of the magnetic field as measured at the aircraft, away from localized terrestrial magnetic anomalies. The digital compensation algorithm is applied to generate a correction factor to compensate for permanent, induced and eddy current magnetic responses generated by the aircraft movement. The HeliDAS compensation system allows the geophysicist to derive a set of coefficients for all line directions and for each magnetometer sensor. Once determined, the coefficients are applied real-time.

Spectrometer

Exploranium Model GR-820

Type: 256 multi-channel, Thorium stabilized
Accuracy: 1 count/sec.
Update: 1 integrated sample/sec.

The GR-820 Airborne Spectrometer is connected to eight downward looking crystals (33.6 litres) and one upward looking crystal (4.2 litres). The downward crystals record the radiometric spectrum from 410 KeV to 3 MeV over 256 discrete energy windows, as well as a cosmic ray channel that detects photons with energy levels above 3.0 MeV. From these 256 channels, the standard Total Count, Potassium, Uranium and Thorium channels are extracted. The upward crystal is used to measure and correct for Radon. The shock-protected Sodium Iodide (Thallium) crystal package is unheated and is automatically stabilized with respect to the Thorium peak. The GR-820 provides raw or Compton stripped data that has been automatically corrected for gain, base level, ADC offset and dead time. The system is calibrated before and after each flight using three accurately positioned hand-held sources. Additionally, tests are carried out to determine if there are any differences in background. This procedure allows corrections to be applied to each survey flight to eliminate any differences that might result from changes in temperature or humidity. For the GSC flying, the spectrometer crystal packs and console were installed and calibrated in C-FDNF, where one crystal pack was installed on the floor of the passenger compartment. The other was installed in a basket on the left skid.

Radar Altimeter

Sperry RT220/RT330

Indicator: TRI 30
Type: Single antenna, FMCW
Range: 40 to 2500 feet
Accuracy: 40 to 100 feet: ±5 feet; 100 to 500 feet: ±5%; 500 to 2500 feet: ±7%

Laser Altimeter

Optech G150

Type: Fixed pulse repetition rate of 2 kHz
Sensitivity: ±5 cm from 10ºC to 30ºC; ±10 cm from -20ºC to +50ºC
Sample rate: 2 per second

The laser altimeter is mounted underneath the helicopter, and measures the distance from the helicopter to ground, except in areas of very dense tree cover.

Barometric Pressure

Rosemount 1241M B2

Output: VDC
Accuracy: ±5.1 feet @ sea level; ±6.9 feet @ 10,000 feet

Digital Data Acquisition System

Fugro Airborne Surveys HeliDAS

The output data is recorded digitally on a flashcard and internal hard drive ten times per second and then downloaded to the field workstation PC at the survey base for verification, backup and preparation of in-field products.

Video Flight Path Recording System

Sony DXC-101 Camera

Type: Analog to Digital conversion
Model: Axis 2420

Information overlain on the video image includes flight number, line number, DOS time, GPS week second, and latitude and longitude. The digital images were archived on DVD, labelled with the flight number and date for external identification.

Navigation (Global Positioning System)

Airborne Receiver

NovAtel OEM4

Type: twelve-channel L1, L2 PC GPScard
Accuracy: ±2 metres post-processed

Base Station: located at 108 Mile Airport: 51˚ 44' 39.1474" N, 121˚ 20' 11.6825" W 935.91 m altitude

NovAtel Millenium

Type: twelve-channel L1, L2 GPScard
Accuracy: 0.75 metres real-time differential ; ±2 metres post-processed

The GPS records data in WGS84 coordinates, which are relative to the GRS80 ellipsoid, which is the basis of the revised North American Datum (NAD83).

Barometric Pressure and Temperature Sensors – Base Station

DIGHEM D 1300

Type: Motorola MPX4115AP analog pressure sensor
AD592AN high-impedance remote temperature sensors
Sensitivity: Pressure: 150 mV/kPa; Temperature: 100 mV/°C or 10 mV/°C (selectable) Sample rate: 10 per second

The D1300 circuit included one barometric sensor (1 KPA) and one temperature sensor (3 TDC). The two sensors were used to monitor pressure and external operating temperatures. The pressure data are used to correct the radar altimeter data to effective altitude in the radiometric data processing. The barometric altimeter data can also be used to confirm the GPSZ elevations and to produce approximate terrain maps by subtraction of the radar altimeter data. The barometric base station data can be used to estimate changes in air pressure throughout the survey flight.

Field Data Verification System

Fugro Pentium IV Laptop

PC Software: Geosoft Oasis Montaj + Atlas proprietary software

A portable PC-based field workstation was used at the survey base to process the data, to verify data quality and completeness, and to confirm that all data were within the stated specifications. Data checks were carried out at the end of every survey day. Flight data were transferred to the PC hard drive to permit the creation of a database. This process allowed the field operators to display both the positional (flight path) and geophysical data on a screen or printer.

Data compilation including editing and filtering, quality control, and final data processing was performed by Fugro. The final levelling of magnetic data was also performed by Fugro. The plan maps with GPS corrected UTM coordinates are shown on Figures 5 to 13 at a scale of 1:20,000, and include the various types of radiometric data as well as the magnetic data.

8.0 DISCUSSION and CONCLUSIONS

A series of 1:20,000 maps (Figures 5 – 12) show the airborne data.

The GSC has yet to issue an interpretive report on the airborne geophysical survey for the Murphy Lake area. Once the anomalies derived from the survey have been assessed, a program of follow up work can commence.

In general, it is recommended that all areas having anomalies showing high potassium levels, combined with low thorium/potassium ratios, will be further investigated on the ground by prospecting. These types of anomalies suggest that a zone of potassic alteration may be present. This type of alteration is favourable for evidence of a porphyry copper system. The corresponding magnetic signatures of these anomalies will also be taken into account.

9.0 RECOMMENDATIONS

The geophysical targets generated by the airborne survey should be ground evaluated by a field examination. Examination should include rock sampling if outcrop is present. The targets should also be evaluated with a soil sampling program to test the copper and gold geochemistry of the underlying rock. If the results of surface sampling are encouraging, then these areas should be explored by diamond drilling.

Respectfully submitted,

Original Signed by Author

Agnes Koffyberg, P. Geol.
Discovery Consultants
Vernon, BC
April 30, 2007

10.0 REFERENCES

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11.0 STATEMENT OF COSTS

1.	Professional Services		
	W.R. Gilmour, P.Geo (April 2007) Report writing, data compilation 1.0 days @ $600/day	$600.00	
	A. Koffyberg, P.Geol (March - April, 2007) Report writing 28.0 hours @ $67.50/hr	1,890.00	
			2,490.00
2.	Personnel - Office		
	Drafting	750.00	
	Data Compilation	200.00	
	Secretarial	250.00	
			1,200.00
3.	Expenses		
	Office	500.00	
	Communications	50.00	
	Maps	800.00	
			1,350.00
4.	Contracting - Geoscience BC 688 line-kilometres at $ 58.14 line-km		40,000.32
5.	Candorado Management Fee (10%)		4,504.03
	TOTAL EXPORATION EXPENDITURES:		**$49,544.35**

12.0 STATEMENT OF QUALIFICATIONS

I, Agnes Koffyberg, P.Geol. of 639 Welke Road, Kelowna, BC V1W 2M9

DO HEREBY CERTIFY that:

1. I am a geologist in mineral exploration and am employed by Discovery Consultants, Vernon, BC.

2 I graduated with a B.Sc. degree in combined Geological Sciences/Chemistry from the Brock University in 1987. In addition, I have obtained a M.Sc. in Geology from the University of Alberta in 1994.

3. I am a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta, registration number M60148.

4. I have worked as a geologist for a total of 10 years since graduation from university.

5. This report is based upon knowledge of the Property gained from a review of existing industry and government reports.

Dated this thirtieth day of April, 2007 in Vernon, BC.

Signature of

Original Signed by Author

Agnes Koffyberg, P.Geol.

APPENDIX

Report #06068

A HELICOPTER-BORNE GEOPHYSICAL SURVEY
FOR
GEOLOGICAL SURVEY OF CANADA

BRITISH COLUMBIA, 2006

PARTS OF NTS 92P and 93A

February, 2007

Fugro Airborne Surveys

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LIST OF APPENDICES

1. INTRODUCTION

A high sensitivity helicopter-borne Magnetic and Gamma-ray Spectrometric airborne geophysical survey was carried out for the Geological Survey of Canada over a single block in the central region of British Columbia. The survey was flown by Fugro Airborne Surveys under the terms of an agreement with the Geological Survey of Canada, dated August 24, 2006. Appendix A lists the personnel involved in the acquisition, processing and presentation of the survey data.

Geophysical equipment comprised a high-sensitivity cesium magnetometer mounted in a stinger configuration and a 256-channel spectrometer with 33.6 litre downward looking crystal. Ancillary equipment included analog and digital recorders, radar, laser and barometric altimeters, a video flight path camera, and a global positioning system (GPS), which provided accurate real-time navigation and subsequent flight path recovery. Surface equipment included magnetic and GPS base stations, and a PC-based field workstation, which was used to check the data quality and completeness on a daily basis.

This report describes the acquisition, processing and presentation of data for the British Columbia 2006 survey blocks.

2. SURVEY AREA

The survey project consisted of a three contiguous blocks (Figure 2-A) which covered portions of NTS sheets 92P and 93A in the central region of British Columbia. Table 2-1 lists the corner points of the survey areas in coordinates for the Universal Transverse Mercator (UTM) (Zone 10N) projection using North American Datum 1983 (GRS80). The final maps and data products for this survey are presented in UTM Zone 10N coordinates, NAD83.

The airborne geophysical survey was funded by Geoscience BC, NRCan's Targeted Geoscience Initiative 3, Candorado Operating Company, GWR Resources Ltd. and Amarc Resources Ltd.. The Geological Survey of Canada provided survey supervision and quality control. Total coverage of the British Columbia survey block consisted of 14780 line-kilometres as per the flight planning. The survey was carried from September 18 to October 23, 2006.

Line spacing and direction for survey and control lines were selected to ensure the best intersection of local geological features. These parameters are summarized for each of the three blocks in table 2-1.

Survey blocks were flown at a sensor survey altitude of either 125 m and the terrain clearance was monitored by radar altimeter. Laser altimeter data was also available for the survey blocks The average speed of the helicopter was 90 km/hr.

Figure 2-A
Location/Index Map of Block A, Bonaparte River East

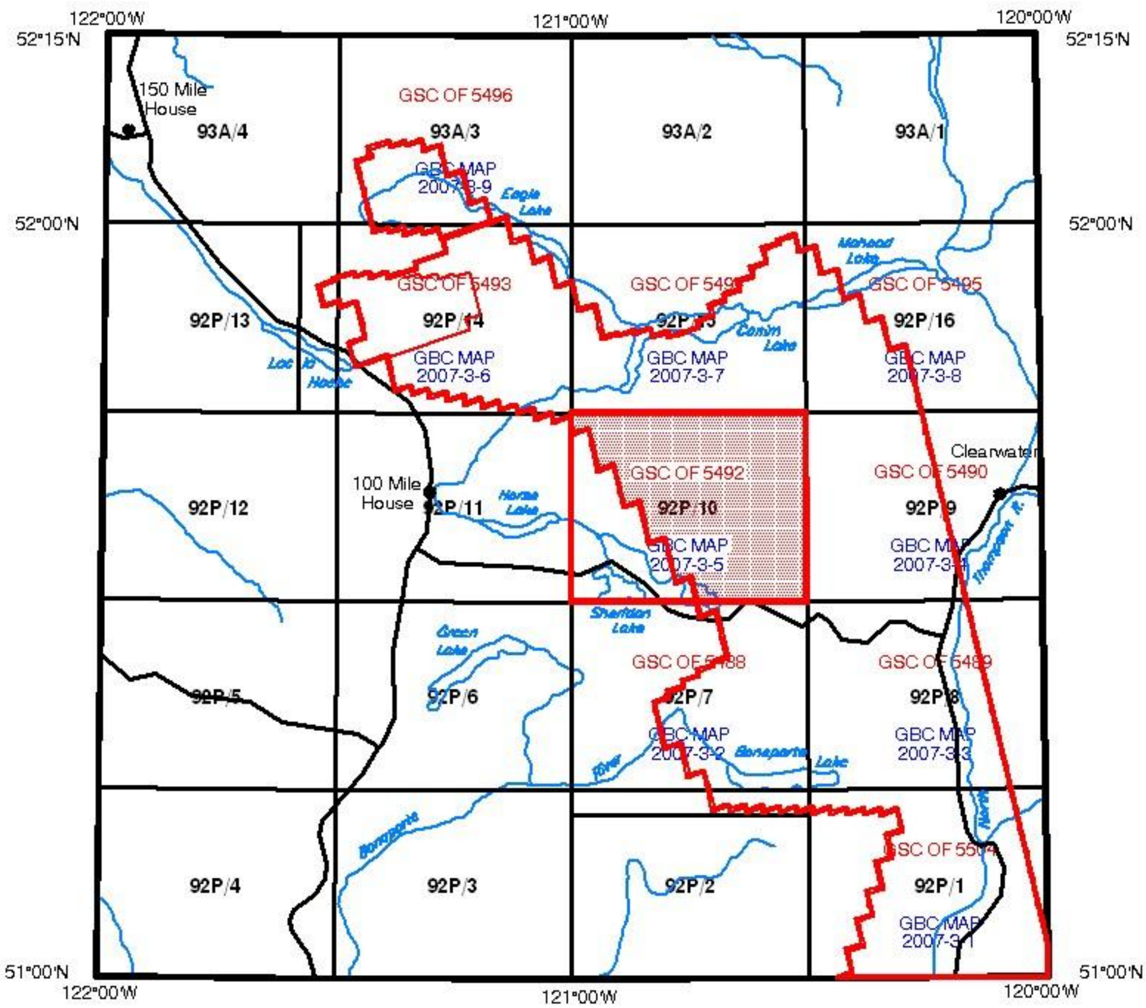

Table 2-1
British Columbia Survey Block Specifications
(Nad83 Utm Zone 10)

Block A Bonaparte River East

The survey specifications were as follows:

Parameter	Specifications
Traverse line direction	70° azimuth
Traverse line spacing	420 m
Tie line direction	345° azimuth
Tie line spacing	2400 m
Sample interval	10 Hz, 3.0 m @ 90 km/hr
Aircraft mean terrain clearance	125 m
Mag sensor mean terrain clearance	125 m

Nad83 Utm Zone 10

06068-1	600225	5752920
Block A	602577	5753756
	602467	5753976
	605501	5755053
	605655	5754415
	607700	5755141
	607942	5754372
	610228	5755185
	610382	5754415
	614603	5755911
	614361	5756680
	618912	5758373
	618319	5760418
	627685	5763803
	628564	5760132
	630938	5760923
	631862	5757274
	634192	5758131
	635314	5753690
	637644	5754481
	638677	5750392
	641030	5751206
	642261	5746347
	644591	5747160
	644657	5746765

646878	5747578
647010	5747138
649318	5747996
649604	5746787
651869	5747600
652088	5746743
656398	5748325
656156	5749227
658442	5750018
657981	5751623
660245	5752459
659981	5753228
662334	5754020
661916	5755273
664225	5756086
663895	5757296
666181	5758109
665588	5760176
667918	5761011
667742	5761429
670336	5762352
670952	5759912
673261	5760725
674250	5756702
676580	5757449
677724	5753052
680010	5753800
681109	5749733
683396	5750568
684693	5745753
686980	5746501
694902	5716837
660701	5704386
660113	5706553
657783	5705718
656332	5711434
654023	5710598
652330	5717128
650000	5716271
648439	5722361
646152	5721569
644503	5727703
642217	5726846
640634	5732958
638326	5732166

637710	5734607
635401	5733749
635072	5735024
632807	5734101
632389	5735772
630125	5734936
629839	5736167
627509	5735398
627223	5736607
624892	5735728
624651	5736959
622342	5736102
622078	5737311
619748	5736541
619462	5737772
617109	5736937
616780	5738168
614559	5737355
614273	5738564
611965	5737772
610646	5742873
605941	5741136
604951	5744566
607348	5745423
605897	5750722
603654	5749930
603434	5750722
601104	5749908

Rail Block

The survey specifications were as follows:

Parameter	Specifications
Traverse line direction	70° azimuth
Traverse line spacing	210 m
Tie line direction	345° azimuth
Tie line spacing	2400 m
Sample interval	10 Hz, 3.0 m @ 90 km/hr
Aircraft mean terrain clearance	125 m
Mag sensor mean terrain clearance	125 m

Nad83 Utm Zone 10		
06068-2	600225	5752920
Rail Block	602577	5753756
	602467	5753976
	605501	5755053
	605655	5754415
	607700	5755141
	607942	5754372
	610228	5755185
	610382	5754415
	612702	5755237
	612998	5754417
	615121	5755171
	615394	5754383
	617654	5755205
	617894	5754417
	620120	5755273
	620257	5754828
	622517	5755650
	624263	5749315
	622037	5748528
	622585	5746987
	610716	5742600
	610646	5742873
	605941	5741136
	604951	5744566
	607348	5745423
	605897	5750722
	603654	5749930
	603434	5750722
	601104	5749908

Murphy Block

The survey specifications were as follows:

Parameter	Specifications
Traverse line direction	70° azimuth
Traverse line spacing	250 m
Tie line direction	345° azimuth
Tie line spacing	2400 m
Sample interval	10 Hz, 3.0 m @ 90 km/hr
Aircraft mean terrain clearance	125 m
Mag sensor mean terrain clearance	125 m

Nad83 Utm Zone 10		
06068-3	605327	5771416
Murphy	607637	5772254
Block	607561	5772508
	607256	5772609
	607079	5773422
	610100	5774513
	610377	5773740
	612516	5774483
	612661	5773994
	614855	5774791
	615253	5773287
	617574	5774157
	618732	5769664
	620967	5770476
	622236	5765576
	624470	5766490
	625384	5763037
	618123	5760397
	617641	5761844
	615432	5761032
	615254	5761768
	612817	5760854
	612639	5761895
	610455	5761082
	610303	5761768
	608196	5761057

Summary of Total Kilometres Flown per Survey Block:

BLOCK	Traverse Lines (km)	Control Lines (km)	Total Kilometres (km)	Industry Sponsor
Block A	11357	2106	**13463**	
Rail Infills	480		**480**	
Murphy	746	91	**837**	

3. SURVEY EQUIPMENT

The instrumentation was installed in an Aerospatiale AS350B2 turbine helicopter (Registration C-FDNF), provided by Questral Helicopters. The helicopter was equipped with an emergency locator transmitter (ELT), a satellite phone, a VHF communications system, and all necessary emergency survival equipment. All field personnel were briefed on safety measures and SAR and emergency procedures.

Figure 3-A: Airborne Survey System

A brief description of the geophysical instruments used to acquire the survey data follows:

Geophysical Flight Control System

Type: HeliDAS

The HeliDAS controls, monitors and records the operation of all the geophysical and ancillary sensors. Input from the various sensors is monitored every 0.01 seconds for precise coordination of geophysical and positional measurements. GPS positional coordinates and terrain clearance is presented to the pilot by means of a LCD touch screen display and optional pilot indicator. The magnetometer response, 4th difference, altimeter profile and profiles of the radiometric windows are also shown on the LCD touch screen display for real-time monitoring of equipment performance.

Magnetometer

Model:	Scintrex CS-3
Type:	Optically pumped cesium vapour
Sensitivity:	0.01 nT
Sample rate:	10 per second

The magnetometer was mounted in a forward facing stinger configuration on the helicopter. The Larmor frequency output was processed by the magnetometer counter board that provides a resolution, without filtering, of 10 (ten) times per second (in a magnetic field of 50,000 nT this resolution is equivalent to 0.005 nT).

Magnetic Base Station

PRIMARY (CF1)

Model:	Scintrex CS-2
Type:	Digital recording cesium vapour
Sensitivity:	0.01 nT
Sample rate:	1 per second

SECONDARY

Model:	Scintrex CS-2
Type:	Digital recording cesium vapour
Sensitivity:	0.01 nT
Sample rate:	1 per second

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 to permit subsequent removal of diurnal drift.

Magnetic Compensation

Type:	HeliDAS
Sensitivity:	.01

The proximity of the helicopter to the magnetic sensors creates a measurable anomalous response as a result of the helicopter movement. The orientation of the aircraft with respect to the sensors and the motion of the aircraft through the earth's magnetic field are contributing factors to the strength of this response. A special calibration flight is flown to record the information necessary to remove these effects.

The maneuvers consist of flying a series of calibration lines at high altitude to gain information in each of the required line directions. During this procedure, the pitch, roll and yaw of the aircraft are varied. Each variation is conducted in succession (first vary pitch, then roll, then yaw). This provides a complete picture of the effects of the aircraft at designated headings in all orientations. A three-axis fluxgate magnetometer measures the orientation and rates of change of the magnetic field as measured at the aircraft, away from localized terrestrial magnetic anomalies. The digital compensation algorithm is applied to generate a correction factor to compensate for permanent, induced and eddy current magnetic responses generated by the aircraft movement.

The HeliDAS compensation system allows the geophysicist to derive a set of coefficients for all line directions and for each magnetometer sensor. Once determined, the coefficients are applied real-time.

Spectrometer

Manufacturer:	Exploranium
Model:	GR-820
Type:	256 multi-channel, Thorium stabilized
Accuracy:	1 count/sec.
Update:	1 integrated sample/sec.

The GR-820 Airborne Spectrometer is connected to eight downward looking crystals (33.6 litres) and one upward looking crystal (4.2 litres). The downward crystals record the radiometric spectrum from 410 KeV to 3 MeV over 256 discrete energy windows, as well as a cosmic ray channel that detects photons with energy levels above 3.0 MeV. From these 256 channels, the standard Total Count, Potassium, Uranium and Thorium channels are extracted. The upward crystal is used to measure and correct for Radon.

The shock-protected Sodium Iodide (Thallium) crystal package is unheated and is automatically stabilized with respect to the Thorium peak. The GR-820 provides raw or Compton stripped data that has been automatically corrected for gain, base level, ADC offset and dead time.

The system is calibrated before and after each flight using three accurately positioned hand-held sources. Additionally, tests are carried out to determine if there are any differences in background. This procedure allows corrections to be applied to each survey flight to eliminate any differences that might result from changes in temperature or humidity.

Radar Altimeter

Manufacturer:	Sperry
Model:	RT220/RT330
Indicator:	TRI 30
Type:	Single antenna, FMCW
Range:	40 to 2500 feet
Accuracy:	40 to 100 feet, ±5 feet 100 to 500 feet, ±5% 500 to 2500 feet, ±7%

Laser Altimeter

Manufacturer:	Optech
Model:	G150
Type:	Fixed pulse repetition rate of 2 kHz
Sensitivity:	±5 cm from 10ºC to 30ºC ±10 cm from -20ºC to +50ºC
Sample rate:	2 per second

The laser altimeter is mounted underneath the helicopter, and measures the distance from the helicopter to ground, except in areas of very dense tree cover.

Barometric Pressure

Manufacturer:	Rosemount
Model:	1241M B2
Output:	VDC
Accuracy:	±5.1 feet @ sea level ±6.9 feet @ 10,000 feet

Digital Data Acquisition System

Manufacturer:	Fugro Airborne Surveys
Model:	HeliDAS
Recorder:	Compact Flash Card

The output data is recorded digitally on a flashcard and internal hard drive ten times per second and then downloaded to the field workstation PC at the survey base for verification, backup and preparation of in-field products.

Video Flight Path Recording System

Camera:	Sony DXC-101
Type:	Analog to Digital conversion
Model:	Axis 2420

Information overlain on the video image includes flight number, line number, DOS time, GPS week second, and latitude and longitude. The digital images were archived on DVD, labeled with the flight number and date for external identification.

Navigation (Global Positioning System)

Airborne Receiver:

Model:	NovAtel OEM4
Type:	twelve-channel L1,L2 PC GPScard
Accuracy:	±2 metres post-processed

Base Station:

Model:	NovAtel Millenium
Type:	twelve-channel L1,L2 GPScard
Accuracy:	0.75 metres real-time differential ±2 metres post-processed

For the central British Columbia survey, there were two bases of operation and therefore base station locations. They are summarized below:

September 17 – October 8, 2006 : 100 Mile House
108 Mile Airport 51° 44' 39.1474" N 121° 20' 11.6825" W 935.91m
October 9 – October 24, 2006 : Little Fort
Rivermount Motel 51° 27' 18.8489" N 120° 10' 52.7256" W 375.60m

The GPS records data in WGS84 coordinates, which are relative to the GRS80 ellipsoid, which is the basis of the revised North American Datum (NAD83).

Barometric Pressure and Temperature Sensors – Base Station

Model:	DIGHEM D 1300
Type:	Motorola MPX4115AP analog pressure sensor AD592AN high-impedance remote temperature sensors
Sensitivity:	Pressure: 150 mV/kPa Temperature: 100 mV/°C or 10 mV/°C (selectable)
Sample rate:	10 per second

The D1300 circuit included one barometric sensor (1 KPA) and one temperature sensor (3 TDC). The two sensors were used to monitor pressure and external operating temperatures.

The pressure data are used to correct the radar altimeter data to effective altitude in the radiometric data processing. The barometric altimeter data can also be used to confirm the GPSZ elevations and to produce approximate terrain maps by subtraction of the radar altimeter data. The barometric base station data can be used to estimate changes in air pressure throughout the survey flight.

Field Data Verification System

Manufacturer:	Fugro
Type:	Pentium IV Laptop PC
Software:	Geosoft Oasis Montaj + Atlas proprietary software

A portable PC-based field workstation was used at the survey base to process the data, to verify data quality and completeness, and to confirm that all data were within the stated specifications. Data checks were carried out at the end of every survey day. Flight data were transferred to the PC hard drive to permit the creation of a database. This process allowed the field operators to display both the positional (flight path) and geophysical data on a screen or printer.

4. SURVEY LOGISTICS, CALIBRATION AND FIELD PROCESSING

Survey Field Operations

The survey was from September 18 to October 24, 2006 using AS350B2, C-FDNF. Survey operations were flown out of a base established at 100 Mile House. Personnel are listed in Appendix A. Aircraft ground speed was maintained at approximately 90 km/hr for the survey. A mean terrain clearance of 125 metres, depending on the survey block and consistent with the safety of the aircraft and crew, was achieved although terrain clearance was highly variable throughout the survey block.

Survey results were compiled and inspected daily. Preliminary field plots were produced in order to monitor data production, completeness and quality. The daily checks enabled those responsible for quality control to determine which lines, if any, did not meet the technical specifications. Any lines or line segments that did not meet the stipulated criteria could be reflown the following day, while the survey crew was still in the immediate area.

For the surveys, the primary GPS station locations were summarized as follows:

September 17 – October 8, 2006

108 Mile Airport 51° 44' 39.1474" N 121° 20' 11.6825" W 935.91m

October 9 – October 24, 2006

Rivermount Motel 51° 27' 18.8489" N 120° 10' 52.7256" W 375.60m

At each setup, the base station magnetometers (CF1) were setup near the GPS base. The first production flight was on September 18, 2006 and survey operations were concluded on October 23, 2006. Test flights and system calibrations were carried out over the Meanook test site on September 12, 2006 and a test range established by the Geological Survey of Canada (GSC) near 100 Mile House, British Columbia on October 3, 2006. The results of these tests were accepted by the Geological Survey of Canada's technical authority as valid calibrations for the determination of coefficients for conversion of radiometric count rates to equivalent ground concentrations. These tests also determined the spectrometer system response and magnetic lag/heading corrections.

Field Inspections

Field inspection by the Geological Survey of Canada Technical Authorities was carried out in October, 2006 by John Carson, Radiometric Data Analysis Expert and Regis Dumont, Magnetic Data Analysis Expert. Data was reviewed routinely by the Technical Authorities throughout the period of data acquisition. The purpose of this review was to ensure that operational and processing procedures were being followed according to the survey specifications

Navigation

The HeliDAS acquisition unit was operated in conjunction with an Ashtech GG24 GPS system to provide navigational guidance to the programmed flight plan.

Pre-Survey Spectrometer Calibrations

Pre-survey calibrations and testing of the GR820 airborne gamma-ray spectrometry system were carried out. For these calibrations and tests, the Eurocopter AS 350 B2 helicopter, registration C-FDNF, owned by Questral Helicopters, was mobilized in survey configuration. The installed equipment and configurations were selected to conform to contract technical specifications.

Calibration of the spectrometer system is a vital process to airborne radiometrics or airborne gamma-ray spectrometry. The calibration of the spectrometer system involved three tests which enabled the conversion of airborne data to ground concentration of natural radioactive elements. These tests included:

- **Calibration Pad** measurements which were used to determine the "spectral overlap" (Compton scattering) coefficients.
- **Cosmic Flight Test**, which was used to determine the aircraft background values and cosmic coefficients,
- **Ground-Airborne Test,** including the ***dynamic calibration range (dcr)*** measurements, which determined the altitude attenuation coefficients and the radio-element sensitivity of the airborne spectrometer system.

Measurements were made in accordance with Fugro Airborne Surveys procedures for airborne gamma-ray spectrometry (AGS) data acquisition, which were designed in accordance with IAEA technical report series No. 323, "Airborne Gamma Ray Spectrometer

Surveying", and AGSO Record 1995/60, "A Guide to the Technical Specification for Airborne Gamma-Ray Surveys".

Spectrometer System

For the GSC flying, the spectrometer crystal packs and console were installed and calibrated in C-FDNF, where one crystal pack was installed on the floor of the passenger compartment. The other was installed in a basket on the left skid.

Gamma Ray Detectors	Downward: 33.6 litres NaI (Tl) Upward 4.2 litres NaI (Tl)	
Spectrometer Analyzer	Exploranium GR-820	

Gamma Peak Positions

Fugro Airborne Surveys configures the GR-820 spectrometer so that the energy versus channel number intercept equals zero. The spectrometer is kept stable in the energy range of interest (400 – 3000keV) in order to maintain constant gamma peak positions. The most important peaks and their corresponding channel numbers are as follows:

Source Name	**Peak Energy (keV)**	**Position (channel no.)**
Cs-137	662	55.5
K(potassium/K-40)	1460	121.7
U(uranium/Bi-214)	1764	147.0
Th(thorium/Tl-208)	2615	217.5

Energy Windows

The airborne radiometric technique requires measurement of count rates for specific energy regions or windows in the natural gamma-ray spectrum. The standard energy regions (in accordance with IAEA 323) and their corresponding channel limits are:

Downward Spectrometer Energy Windows				
Designation	**Energy Limit (keV)**		**Channel Limit (inclusive)**	
			Unit Values	
	Lower	**Upper**	**Lower**	**Upper**

Total Count	=TC	410	2810	32	234
Potassium	=K	1370	1570	114	131
Uranium	=U	1660	1860	138	155
Thorium	=Th	2410	2810	201	234
Upward U	=Uranup	1660	1860	138	155
Cosmic	=Cosmic	3200	infinity		

Calibration Pad Test

The GR-820 spectrometer consists of eight downward looking crystals and one upward looking crystal, each with a volume of 256 cubic inches, recording regions of interest (ROI's) once per second. These ROI's are written to five channels: Total Count (TC), Potassium (K), Uranium (U), Thorium (Th), and Uranup (upward facing U). In addition, Livetime and Cosmic channels are recorded. The total count window refers to the sum of all counts within the 0.4 to 2.8 keV energy window, while the K, U and Th windows refer to spectral peaks within the total count window. Some of the counts in the K, U, and Th windows originate from gamma rays from other isotopes. Removal or "stripping" of this spectral overlap in the survey data is achieved using the Compton stripping coefficients or ratios calculated from the calibration pad test data.

The calibration pad test was conducted in Ottawa, Ontario using aircraft C-FDNF. This test required a total of four transportable 1mx1m concrete slabs, which were provided by the Geological Survey of Canada and manufactured under the supervision of Dr. R.L. Grasty. Reference:

"Transportable Calibration Pads for Ground and Airborne Gamma-Ray Spectrometers" by R.L. Grasty, P.B. Holman and Y.B. Blanchard. Geological Survey of Canada paper 90-23.

Three of the concrete slabs contained higher concentrations of potassium, uranium and thorium respectively, while the fourth slab (the background slab) contained lower concentrations of the radioelements. The calibration pad concentrations, as provided by the Geological Survey of Canada, were as follows:

Test Pad Designation	**Radio-Element Concentration**		
	Potassium (%)	Uranium (ppm)	Thorium (ppm)
B	1.34 +/- 0.01	1.05 +/- 0.03	2.10 +/- 0.06
K	6.74 +/- 0.03	2.24 +/- 0.10	5.89 +/- 0.67
U	1.25 +/- 0.01	53.33 +/- 0.39	3.20 +/- 0.09
Th	1.34 +/- 0.02	2.52 +/- 0.07	122.9 +/- 0.71

Setup Procedure

Upon arriving at the test site, the helicopter was positioned away from any surrounding traffic where it remained undisturbed throughout the course of the test. All hand sources (thorium, uranium, cesium, etc.) and transportable concrete slabs were placed approximately 50m from the helicopter and spectrometer system. The initial positions of each of the concrete slabs and hand sources were marked, and therefore returned to their respective positions after each measurement was taken. As well, the exact position of the spectrometer unit was marked in the helicopter and matched to the position that would be used during survey flights.

Power was consistently applied to the spectrometer units for a minimum of 12 hours prior to the calibration pad measurements to ensure that the crystals were stable.

Measurement Procedure

1. The spectrometer unit was stabilized on cesium and thorium following standard stabilizing procedures with the hand sources. In order to maintain consistency, a jig was used. The jig consisted of a 2" x 4" piece of wood with cut-outs at each end of the board in the shape of the helicopter skid tubes, which allowed the jig to be placed against the helicopter skids to give a constant placement of the jig for all measurements. The hand sources were placed on an established marker on the jig under the spectrometer pack, for precise measurement location.
2. Once the spectrometer unit was stabilized, the jig was removed and the background block was placed under the helicopter, with the crystal pack over its centre.
3. Digital survey data were then recorded for 60 seconds.
4. Steps 2-3 were then repeated for the potassium, uranium, thorium and background block. By completing the series of block tests with the background block, it could be confirmed that the background had remained constant, thus improving the statistics for background determination.
5. Using standard procedures with the jig described in step 1, the thorium source test was undertaken again to ensure consistency of the results between the pre-test and post-test.

Results from Calibration Pad Test

The measured count rates (downward crystal) were corrected for spectrometer livetime and averaged.

John Carson, Radiometric Data Analysis Expert of the Geological Survey of Canada analyzed the collected data and calculated the stripping ratios using the program "ZPADWIN". The program ZPADWIN was developed at RISO National Laboratory, Denmark. It uses non-linear statistical techniques to extract the Compton stripping coefficients and estimated errors (standard deviations) from test pad data. Reference: "Pad Facility for the Calibration of Gamma-Ray Measurements on Rock", RISO-R-454 (1981) by L.Lovborg et al. The following is the result of the program.

Stripping Ratios	Spectrometer Unit	Ideal Values
Th into U(alpha = a23/a33)	0.223	0.250
Th into K(beta = a13/a33)	0.385	0.400
U into K (gamma = a12/a22)	0.686	0.810
U into Th(a = a32/a22)	0.053	0.060
K into Th(b = a31/a11)	0.000	0.000
K into U (g = a21/a11)	0.008	0.003

Comparison of the coefficients obtained and the "ideal" coefficients calculated by the manufacturer (Exploranium) shows that the values were well within an acceptable range.

Cosmic Flight Test

In each of the spectral windows, the radiation increases exponentially with height due to radiation of cosmic origin. As well, the aircraft itself contributes a constant background to the count rate. By completing a series of flights over a range of altitudes above sea level, these backgrounds can be determined.

Setup Procedure

Throughout the course of the cosmic flight test, the spectrometer was operated with very few counts to the stabilization peak. In order to ensure that the detectors were stable prior to take off, the crystals were stabilized on the ground for at least 2 hours. During the test, the stabilizer was turned off.

Prior to the cosmic flight test, the spectrometer unit remained powered for at least 12 hours. This ensured that the crystals were stable.

Measurement Procedure

1. A source check was completed at the helicopter base using the jig described previously (calibration pad test).
2. Once the aircraft reached the desired altitude of 8,000 feet, survey data were recorded for 20 minutes.
3. Step 2 was then repeated at altitudes of 9000, 10000, 11000, and 12,000 feet.

4. After the cosmic flight test was completed, the spectrometer unit was stabilized on thorium at the helicopter base. After this, a post-flight thorium source test was completed. The values obtained were found to be within 3% of the pre-flight source test.

Results from Cosmic Flight Test

At each altitude, the data for the five windows of interest (Th, K, U, TC and Uranup) were evaluated for quality and corrected for livetime. The mean values were then extracted and plotted against the cosmic window. The result is a linear trend where the slope and intercept represent the cosmic stripping ratio and the aircraft background respectively. The results from the five graphs are summarized below.

	Cosmic Flight Test Result	
	Cosmic stripping	Aircraft background
K	0.0381	8.412
U	0.0289	2.169
Th	0.0392	0.094
TC	0.6546	89.118
Uranup	0.0086	1.089

<u>Ground Calibration Test</u>

The ground calibration site was used to calibrate the height attenuation and sensitivity parameters of the spectrometer system by flying a series of passes over a line of known, uniform radioelement ground concentration. The ideal calibration ranges are located adjacent to bodies of water. This permits accurate background corrections for the acquired data.

This calibration was completed on October 3, 2006 with aircraft C-FDNF in AGS survey configuration, over a test strip established near 100 Mile House, B.C.. The test range was flown by acquiring data on a series of 7 passes over a fixed length, at constant ground clearances ranging from 100 to 600 feet. These passes alternated between the land and adjacent fresh water sections of the range.

Radiometric Ground Concentrations

The radiometric ground concentration was measured using a calibrated portable spectrometer (Exploranium GR-320) on the same day as the airborne measurements. Thirty-two 100-second measurements were taken over the length of the calibration range. The sensor was positioned one metre above the soil and away from the operators' body. Four 300-second measurements were taken over the adjacent water to serve as background for the portable spectrometer. The resulting mean radiometric equivalent ground concentrations for the calibration range on October 3, 2006 were as follows:

Radio Element	Ground Concentration
Potassium	1.177 %
Equivalent Uranium	0.9456 ppm
Equivalent Thorium	3.563 ppm
Total	29.914 nGy/h

Results from the Dynamic Calibration Range Test

The airborne data from the calibration range were checked for quality, edited and divided into lines for each pass. All AGS windows were corrected for livetime. Mean values were calculated for each pass over water. The radiometric windows were then corrected for background (aircraft, cosmic and radon) by subtracting the over water mean values from the corresponding over land data values. After averaging the data for each line, the natural logs of the four windows of interest (K, U, Th, and total count) were plotted against the altimeter in order to obtain the height attenuation and sensitivity parameters. The results were obtained using a linear regression where the slope represents the attenuation coefficient and the intercept represents the counts at 0 feet. Using the ground concentrations noted previously, and the intercept, the sensitivity coefficients were obtained.

	Spectrometer Unit – 2006 System	
	Height Attenuation cps/m	Sensitivity @ 120 m
K	-0.009231	56.8802 cps/%
U	-0.008557	6.1364 cps/ppm
Th	-0.007710	3.3203 cps/ppm
TC	-0.007888	19.6401 cps/nGy/h

The correction coefficients used in processing the radiometric data are given in Appendix B.

<u>Meanook Test Range</u>

Prior to commencement, the Meanook, Alberta test site was used to determine the heading error and calibrate the system for the C-FDNF. A cloverleaf pattern of lines was flown at 500 feet in the cardinal directions (North, South, East, and West) over the Meanook observatory with a centre point of 347759.2, 6054576.2. These tests were flown September 12, 2006. The tests used the Magnetic Observatory Monitor to allow for the correction of diurnal variations.

The electronic navigation system was also checked at Meanook. These tests complied with GSC contract specifications. The Meanook tests also included a determination of the heading error, by flying at the specified altitude in two (2) directions.

Radon Calibration

Throughout the survey, repeat test lines were flown twice daily to monitor the system operation and atmospheric radon variations. This information was used to monitor the upward looking crystal coefficients for this system.

Field Survey Monitor Tests

During the field survey, data quality and instrument tests were completed as follows:

Airborne Magnetometer

The airborne magnetic data were monitored in the aircraft by means of a fourth difference calculation which was displayed on the airborne acquisition system display. Where the fourth difference exceeded the allowable specification, that portion of the flight line was reflown.

The fourth difference is defined as:

$$FD_i = X_{i+2} - 4x_{i+1} + 6x_i - 4x_{i-1} + X_{i-2}$$

where X_i is the i^{th} total field sample. The fourth difference in this form has units of nT. High frequency noise should be such that the fourth differences divided by 16 are generally less than ± 0.1 nT.

A test of the measurement platform's compensation system was made before starting the survey. This measures the ability of the system to remove the effects of aircraft motion on the magnetic measurement. The results of the FOM test were measured as less than 2.0 nT with an average noise envelope of 0.1 nT.

Magnetic Base Station Data Verification

The ground stations were monitored to ensure that the diurnal variation was within the peak to peak envelope of 3.0 nT from a long chord distance equivalent to a period of one minute.

Where reflights were necessary, the reflown portions of lines began and ended at control lines.

Flight Path

The GPS mobile data were differentially corrected using the base station data, on a daily basis. The flight path video was used to confirm the fiducial locations with respect to visible features on the map. Preliminary flight path maps and magnetic maps were plotted and updated, to monitor coverage of the survey area.

5. DATA PROCESSING AND PRESENTATION

Base Maps

The topographic base data were supplied as digital files by Geomatics Canada, Natural Resources Canada and were used in the map production. The digital topography was supplied in NAD83.

Flight Path

The mobile GPS data were differentially corrected post-survey, using the GPS base station data. The results were inspected in the field and edited to remove any noise spikes, offsets, or gaps in coverage. The preliminary flight path maps displayed fiducial increments which are tied to the UTC time. Each tick mark on the 1:50000 scale maps represents 10 seconds, with numerical labels every 100 seconds. Each tick mark on the 1:20000 scale maps represents 5 seconds, with numerical labels every 50 seconds.

The WGS84 latitude/longitude coordinates were converted to NAD83 UTM coordinates for Zone 10N, with a central meridian of 123º West. All final maps display Lat/Long coordinates. The data archives also contain the xy coordinates in UTM NAD83. As the GRS80 ellipsoid forms the basis of the NAD83 datum no datum shifts were required.

After confirming the accuracy of the flight path, the ends of the survey lines were trimmed to the survey boundary, leaving an over fly of approximately 100 meters. Each line or line segment shown on the map sheets carries a unique line number.

Magnetic Data

Magnetic Levelling

The raw magnetic data were checked for spikes, using the 4^{th} difference calculation as a flag. Obvious spikes were checked and then manually removed. The compensated magnetics were lagged according to the lag determined from the lag test. The long wavelength diurnal component was then removed from the lagged traverse and control line data. Diurnal corrections were made after appropriate base level removals from the diurnal field for each block.

A survey line/control line network was created in order to determine differences in the diurnally corrected, IGRF removed, magnetic field at the line intercepts. The differences were calculated and tabulated, and were used to guide subsequent manual levelling on any lines or line segments which required adjustments. After the initial and subsequent network corrections interim grids and maps, were submitted to the Technical Inspector for approval, prior to generating the final 100 m grids and maps.

In order to check the quality of the levelling process, a first vertical derivative grid was calculated from the corrected total field data. This product helped to locate subtle differences between lines that were not evident on the total field data. There was no microlevelling applied.

The total field strength of the International Geomagnetic Reference Field (IGRF) was calculated for every data point, based on the spot values of Latitude, Longitude and an average GPS altitude, using appropriated Epochs for each block.

The final IGRF removed magnetic field data were gridded using a minimum curvature method with a grid cell size of 100 metres.

Calculated Vertical Gradient

The vertical gradient grids were calculated from the magnetic grid, using 2-D FFT algorithms.

Radiometric Data

All radiometric data reductions followed the procedures described in the IAEA Technical Report[1] and AGSO Record 1995/60[2].

All processing of radiometric data was undertaken at the natural sampling rate of the spectrometer, i.e., one second. The archived data were interpolated to match the fundamental 0.1 second interval of the database.

The following sections describe each step in the process.

Pre-filtering

The radar altimeter data were processed with a 15-point median filter to remove spikes.

Reduction to Standard Temperature and Pressure

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[1] Exploranium, I.A.E.A. Report, Airborne Gamma-Ray Spectrometer Surveying, Technical Report No. 323, 1991.

[2] AGSO Record 1995/60, “A Guide to the Technical Specifications for Airborne Gamma-Ray Surveys”.

The radar altimeter data were converted to effective height (h_e) in feet using the acquired temperature and pressure data, according to the following formula:

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

where: *h* is the observed radar altitude in metres
T is the measured air temperature in degrees Celsius
P is the barometric pressure in millibars

Live Time Correction

The spectrometer, an Exploranium GR-820, uses the notion of "live time" to express the relative period of time the instrument was able to register new pulses per sample interval. This is the opposite of the traditional "dead time", which is an expression of the relative period of time the system was unable to register new pulses per sample interval.

The GR-820 measures the live time electronically, and outputs the value in milliseconds. The live time correction is applied to the total count, potassium, uranium, thorium, upward uranium and cosmic channels. The formula used to apply the correction is as follows:

$$C_{lt} = C_{raw} * \frac{1000.0}{L}$$

where: C_{lt} is the live time corrected channel in counts per second
C_{raw} is the raw channel data in counts per second
L is the live time in milliseconds

Intermediate Filtering

Two parameters were filtered, but not returned to the database:

- Radar altimeter was smoothed with a 7-point Hanning filter (h_{ef}).
- The Cosmic window was smoothed with a 9-point Hanning filter (Cos_f).

Aircraft and Cosmic Background

Aircraft background and cosmic stripping corrections were applied to the total count, potassium, uranium, thorium and upward uranium channels using the following formula:

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

where: C_{ac} is the background and cosmic corrected channel

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

Radon Background

The determination of calibration constants that enable the stripping of the effects of atmospheric radon from the downward-looking detectors through the use of an upward-looking detector is divided into two parts:

1) Determine the relationship between the upward- and downward-looking detector count rates for radiation originating from the ground.

2) Determine the relationship between the upward- and downward-looking detector count rates for radiation due to atmospheric radon.

The procedures to determine these calibration factors are documented in IAEA Report #323 on airborne gamma-ray surveying. The calibrations for the first part were determined as outlined in the report.

The latter case normally requires many over-water measurements where there is no contribution from the ground. Where this is not possible, it is standard procedure to establish a test line over which a series of repeat measurements are acquired. From these repeat flights, any change in the downward uranium window due to variations in radon background would be directly related to variations in the upward window and the other downward windows.

The validity of this technique rests on the assumption that the radiation from the ground is essentially constant from flight to flight. Inhomogeneities in the ground, coupled with deviations in the flight path between test runs, add to the inaccuracy of the accumulated results. Variations in flying heights and other environmental factors also contribute to the uncertainty.

The use of test lines is a solution for a fixed-wing acquisition platform. The ability of rotary wing platforms to hover at a constant height over a fixed position would appear to eliminate a number of the variations which degrade the accuracy of the results required for this calibration.

One test line was established in the survey area. Test flights were carried out daily. Data were acquired over a four-minute period at the nominal survey altitude (120 m). The data were then corrected for livetime, aircraft background and cosmic activity.

Once the survey was completed, the relationships between the counts in the downward uranium window and in the other four windows due to atmospheric radon were determined using linear regression for the test site. The equations solved for were:

$$u_r = a_u Ur + b_u$$
$$K_r = a_K U_r + b_K$$
$$T_r = a_T U_r + b_T$$

$I_r \quad = a_I U_r + b_I$

where: u_r is the radon component in the upward uranium window
K_r, U_r, T_r and I_r are the radon components in the various windows of the downward detectors; the various "a" and "b" coefficients are the required calibration constants

In practice, only the "a" constants were used in the final processing. The "b" constants are normally near zero for over-water calibrations. The values of a_I, a_K, a_T and a_u are summarized in Appendix D1.

The thorium, uranium and upward uranium data for each line were copied into temporary arrays, then smoothed with 21, 21 and 51 point Hanning filters to product Th_f, U_f, and u_f respectively. The radon component in the downward uranium window was then determined using the following formula:

$$U_r = \frac{u_f - a_1 * U_f - a_2 * Th_f + a_2 * b_{Th} - b_u}{a_u - a_1 - a_2 * a_{Th}}$$

where: U_r is the radon component in the downward uranium window
u_f is the filtered upward uranium
U_f is the filtered uranium
Th_f is the filtered thorium
a_1, a_2, a_u and a_{Th} are proportionality factors and
b_u and b_{Th} are constants determined experimentally

The effects of radon in the downward uranium are removed by simply subtracting U_r from U_{ac}. The effects of radon in the total count, potassium, thorium and upward uranium are then removed based upon previously established relationships with U_r. The corrections are applied using the following formula:

$$C_{rc} = C_{ac} - (a_c * U_r + b_c)$$

where: C_{rc} is the radon corrected channel
C_{ac} is the background and cosmic corrected channel
U_r is the radon component in the downward uranium window
a_c is the proportionality factor and
b_c is the constant determined experimentally for this channel

Compton Stripping

Following the radon correction, the potassium, uranium and thorium are corrected for spectral overlap. First α, β, and γ the stripping ratios, are modified according to altitude.

Then an adjustment factor based on a, the reversed stripping ratio, uranium into thorium, is calculated. (Note: the stripping ratio altitude correction constants are expressed in change per metre. A constant of 0.3048 is required to conform to the internal usage of height in feet):

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

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

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

where: α, β, γ are the Compton stripping coefficients
α_h,β_h,γ_h are the height corrected Compton stripping coefficients
h_{ef} is the height above ground in metres

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

$$\alpha_r = \frac{1}{1 - a\alpha_h - g\gamma_h + ag\beta_h}$$

$$Th_c = ((1 - g\gamma_h)Th_{rc} - aU_{rc} + agk_{rc}) * \alpha_r$$

$$U_c = (Th_{rc}(g\beta_h - \alpha_h) + U_{rc} - K_{rc}{}^{g}) * \alpha_r$$

$$K_c = (Th_{rc}(a\alpha_h - \beta_h) + U_{rc}(a\beta_h - \gamma h) + K_{rc}(1 - a\alpha_h)) * \alpha_r$$

where: U_c, Th_c and K_c are corrected uranium, thorium and potassium
α_h,β_h,γ_h are the height corrected Compton stripping coefficients
U_{rc}, Th_{rc} and K_{rc} are radon-corrected uranium, thorium and potassium
α_r is the backscatter correction
a is the reverse stripping ratio U into Th
g is the reverse stripping ratio K into uranium

Attenuation Corrections

The total count, potassium, uranium and thorium data are then corrected to a nominal survey altitude, in this case 110 m (361 ft). This is done according to the equation:

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

where: C_a is the output altitude corrected channel
C is the input channel
μ is the attenuation correction for that channel

h_{ef} is the effective altitude, usually in m
h_0 is the nominal survey altitude used as datum

Conversion to Apparent Radioelement Concentrations

At this point the corrections are complete. The final step is to convert the corrected potassium, uranium and thorium to apparent radioelement concentrations using the following formula:

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

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

Finally, the natural air absorption dose rate is determined 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.

<u>Radiometric Ratios</u>

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

1. Any data points where the potassium concentration was less than 0.15 were neglected.
2. The element with the lowest corrected count rate was determined.

3. The element concentrations of adjacent points on either side of each data point were summed until they exceeded a certain threshold value. This threshold was set to be equivalent to 100 counts of the element with the lowest count rate. Additional minimum thresholds of 1.0% for Potassium, 5 ppm for thorium, and 5 ppm for uranium were set up to insure meaningful ratios in this low count survey area.
4. The ratios were calculated using the accumulated sums.

With this method, the errors associated with the calculated ratios will be similar for all data points.

Radioelement Ternary Maps

The radioelement ternary map was produced by creating separate grids for each of the three radioelements and assigning a specific colour to each radioelement. Cyan represents thorium, yellow represents uranium, and magenta represents potassium. The relative concentrations of the three radioelements are represented by the mixing of the three colours. For example, equal concentrations of potassium and uranium would yield a red, grading through orange, towards yellow as the relative concentration of uranium increases.

Each of the normalized radioelement concentrations and the exposure rate are then non-linearly quantized using histogram equalization. The radioelement concentrations are quantized into 49 levels, and the exposure rate into five levels. The three quantized radioelement concentrations were normalized once more by the sum of their components and assigned cyan (Th), magenta (K) and yellow (U) values according to their relative amounts. The final colour intensities were then modulated by the quantized exposure rate, with five representing high intensity and one being low intensity.

The triangular icon which appears on the ternary radioelement maps shows the colours associated with each radioelement and their combinations at full intensity exposure rate. This scale is not linear, and accounts for approximately 90% of the data in the survey area. This facilitates the recognition of colours that would otherwise fall within a very small range on a linear scale diagram.

6. DELIVERABLES

Map Products

Preliminary line/grid data archives were created during the data processing phase and supplied via FTP transfer to the Geological Survey of Canada and industry client offices, so that checks could be carried out. Final map proofs were also submitted for inspection and approval prior to printing the final copies

The map products were presented on a digital topographic base that showed NAD83 coordinates.

Final Products

<u>Maps</u>

Colour maps at 1:50,000 scale (in 5 copies):

- total magnetic field
- calculated vertical gradient
- natural air absorbed dose rate
- potassium concentration
- equivalent Uranium
- equivalent Thorium
- eU/eTH ratio
- eTH/K ratio
- eU/K
- radiometric ternary

COMPILATION SCALE :

Colour maps at 1:250,000 scale (in 5 copies):

- total magnetic field
- calculated vertical gradient
- natural air absorbed dose rate
- potassium concentration
- equivalent Uranium
- equivalent Thorium
- eU/eTH ratio
- eTH/K ratio
- eU/K

- radiometric ternary

Digital Data Archives

1) Digital archive of all gridded data in Geosoft format at 50 m grid cell size:
   - Residual magnetic field
   - Calculated vertical gradient (first vertical magnetic derivative)
   - Natural air absorbed dose rate
   - % Potassium
   - Equivalent uranium
   - Equivalent thorium
   - eTh/K ratio
   - eU/eTh ratio
   - eU/K ratio

2) Digital line data in GDB format of all gamma-ray magnetic and radiometric data presented at 10 times per second.

3) Maps: Digital map files of all final products in both Postscript and PDF format

The raw, and final processed digital data, including both the profile/line and the gridded data were presented on DVD

Operational Reports

Two (2) copies of the Operational Report.

7. SUMMARY

This report describes the logistics of the survey, equipment used, field procedures, data acquisition and presentation of results.

The various maps included with this report display the magnetic and radiometric properties of the survey area.

Respectfully submitted,
FUGRO AIRBORNE SURVEYS

APPENDIX A

LIST OF PERSONNEL

APPENDIX A

LIST OF PERSONNEL

The following personnel were involved in the acquisition, processing, interpretation and presentation of data, relating to an airborne geophysical survey carried out for Geological Survey of Canada and their Industry Partners, Fugro Airborne Surveys job #06068

David Miles	Manager, Helicopter Operations
Emily Farquhar	Project Manager/Geophysicist
Duane Griffith	Operations Manager
Will Marr	Geophysical Operator
Sunny Bhatia	Geophysical Operator
Brett Robinson	Supervisor, Field Geophysicists
Sheli Droszio	Geophysicist/Processor (Field)
Geo Rawlins	Pilot (Questral Helicopters)
Wally Zec	Pilot (Questral Helicopters)
Stephane Fortin	AME (Questral Helicopters)
Mark April	AME (Questral Helicopters)
Lyn Vanderstarren	Drafting Supervisor

With the exception of the pilots and mechanics, all personnel were employees of Fugro Airborne Surveys.

APPENDIX B

RADIOMETRIC COEFFICIENTS

APPENDIX B

RADIOMETRIC COEFFICIENTS

FOR AS350B2 Installation in C-FDNF

```
### Corrections to apply ###
   CorrectionType = Yes  Filtering
   CorrectionType = Yes  LiveTimeCorrection
   CorrectionType = Yes  CosmicAircraftBGRemove
   CorrectionType = No   CalcEffectiveHeight
   CorrectionType = Yes  RadonBGRemove
   CorrectionType = Yes  ComptonStripping
   CorrectionType = No   HeightCorrection
   CorrectionType = No   ConvertToConcentration


### Main I/O settings ###
   MainChannelIO|TC       = TC_DOWN    --> TC_DOWN_1
   MainChannelIO|K        = K_DOWN     --> K_DOWN_1
   MainChannelIO|U        = U_DOWN     --> U_DOWN_1
   MainChannelIO|Th       = TH_DOWN    --> TH_DOWN_1
   MainChannelIO|UpU      = U_UP       --> U_UP_1
   MainChannelIO|Cosmic   = COSMIC     --> COSMIC_1
   MainChannelIO|Spectrum =            -->

### Control Channel I/O settings ###
   ControlChannel|RadarAltimeter     = ALTRAD_M    [metres]
   ControlChannel|Pressure/Barometer = KPA         [kPa]
   ControlChannel|Temperature        = TEMP_EXT


### Input for correction ###
   InputForCorrection    = ROIs


### Pre-filtering settings ###
   Filtering|TC      = 0
   Filtering|K       = 0
   Filtering|U       = 0
   Filtering|Th      = 0
   Filtering|UpU     = 0
   Filtering|Cosmic  = 11
   Filtering|RadarAltimeter     = 9
   Filtering|Pressure/Barometer = 9
   Filtering|Temperature        = 9

### Live-time correction settings ###
   LiveTimeChannel           = LIVE_TIME
   LiveTimeUnits             = milli-seconds
   ApplyLiveTimeCorrToUpU    = Yes

### Cosmic correction settings ###
   CosmicCorrParam|TC      = 0.654582,  89.118200
   CosmicCorrParam|K       = 0.038159,  8.412950
```

```
   CosmicCorrParam|U       = 0.028998,  2.169100
   CosmicCorrParam|Th      = 0.039245,  0.094175
   CosmicCorrParam|UpU     = 0.008648,  1.089571
   CosmicCorrParam|SpectrumBackgroundFile    = YES

### Effective-Height settings ###
   EffectiveHeightOutputChannel = EffectiveHeight
   EffectiveHeightOutputUnits   = metres

### Radon correction settings ###
   RadonCorrMethod                        = UpU
   RadonCorrParam_FilterWidth             = 71
   RadonOutputChannel                     = Radon1
   RadonCorrParam_UgInUpU(A1) = 0.025000
   RadonCorrParam_ThInUpU(A2) = 0.015000
   RadonCorrParam|TC      = 12.433000,  0.000000
   RadonCorrParam|K       = 0.623000,  0.000000
   RadonCorrParam|Th      = 0.037000,  0.000000
   RadonCorrParam|UpU     = 0.220000,  0.000000

### Special Stripping (Compton Stripping) ###
   ComptonCorrParam_Stripping_Alpha     = 0.223000
   ComptonCorrParam_Stripping_Beta      = 0.385000
   ComptonCorrParam_Stripping_Gamma     = 0.686000
   ComptonCorrParam_AlphaPerMetre       = 0.000490
   ComptonCorrParam_BetaPerMetre        = 0.000650
   ComptonCorrParam_GammaPerMetre       = 0.000690
   ComptonCorrParam_GrastyBackscatter_a = 0.053000
   ComptonCorrParam_GrastyBackscatter_b = 0.000010
   ComptonCorrParam_GrastyBackscatter_g = 0.008000

### Height Correction settings ###
   SurveyHeightDatum     = 125.000000
   AttenuationCorrControl = 0
   HeightCorrParam|TC      = -0.007888, 300.000000
   HeightCorrParam|K       = -0.009231, 300.000000
   HeightCorrParam|U       = -0.008557, 300.000000
   HeightCorrParam|Th      = -0.007710, 300.000000

### Concentration settings ###
  ConcentrationParam|K       = Concentration_K,  56.880200
  ConcentrationParam|U       = Concentration_U,  6.136420
  ConcentrationParam|Th      = Concentration_Th,  3.320340
  AirAbsorbedDoseRateParam   = DoseRate,  19.640100
  NaturalAirAbsorbedDoseRateParam = NaturalDoseRate,  0.000000, 0.000000, 0.000000
```

COSMIC CORRECTION

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

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

TC	$a_{TC=}0.6545$ $b_{TC=}89.118$
K	$a_{K=}0.0381$ $b_{K=}$ 8.412
U	$a_{U=}0.0289$ $b_{U=}2.169$
Th	$a_{Th=}0.0392$ $b_{Th=}0.0941$
U_Up	$a_{Th=}0.00864$ $b_{Th=}1.0895$

RADON REMOVAL

$$U_r = \frac{u_f - a_1 * U_f - a_2 * Th_f + a_2 * b_{Th} - b_u}{a_u - a_1 - a_2 * a_{Th}}$$

where: U_r is the radon component in the downward uranium window
u_f is the filtered upward uranium
U_f is the filtered uranium
Th_f is the filtered thorium
a_1, a_2, a_u and a_{Th} are proportionality factors and
b_u and b_{Th} are constants determined experimentally

a1 = 0.025
a2 = 0.015

This correction is applied using the following formula:

$$C_{rc} = C_{ac} - (a_c * U_r + b_c)$$

where: C_{rc} is the radon corrected channel
C_{ac} is the background and cosmic corrected channel
U_r is the radon component in the downward uranium window
a_c is the proportionality factor and
b_c is the constant determined experimentally for this channel

TC	a_{Tc}, b_{Tc}	= 12.43, 0.000000
K	a_K, b_K	= 0.623, 0.000000
Th	a_{Th}, b_{Th}	= 0.037, 0.000000
UpU	a_{UpU}, b_{UpU}	= 0.220, 0.000000

COMPTON STRIPPING

where: $\alpha_h, \beta_h, \gamma_h$ are the height corrected Compton stripping coefficients
α_r is the backscatter correction
a is the reverse stripping ratio U into Th
g is the reverse stripping ratio K into uranium

α_h = 0.223
β_h = 0.385
γ_h = 0.686
α_r = 0.000
a = 0.053
g = 0.0008

ATTENUATION CORRECTION

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

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

TC	μ_{TC} = -0.007888
K	μ_K = -0.009231
U	μ_U = -0.008557
Th	μ_{Th} = -0.007710

CONVERSION TO APPARENT RADIOELEMENT CONCENTRATIONS

At this point the corrections are complete. The final step is to convert the corrected potassium, uranium and thorium to apparent radioelement concentrations using the following formula:

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

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

TC	s_{TC} = 19.6401 at 125 metres
K	s_{K} = 56.8802 at 125 metres
U	s_{U} = 6.1364 at 125 metres
Th	s_{Th} = 3.3203 at 125 metres

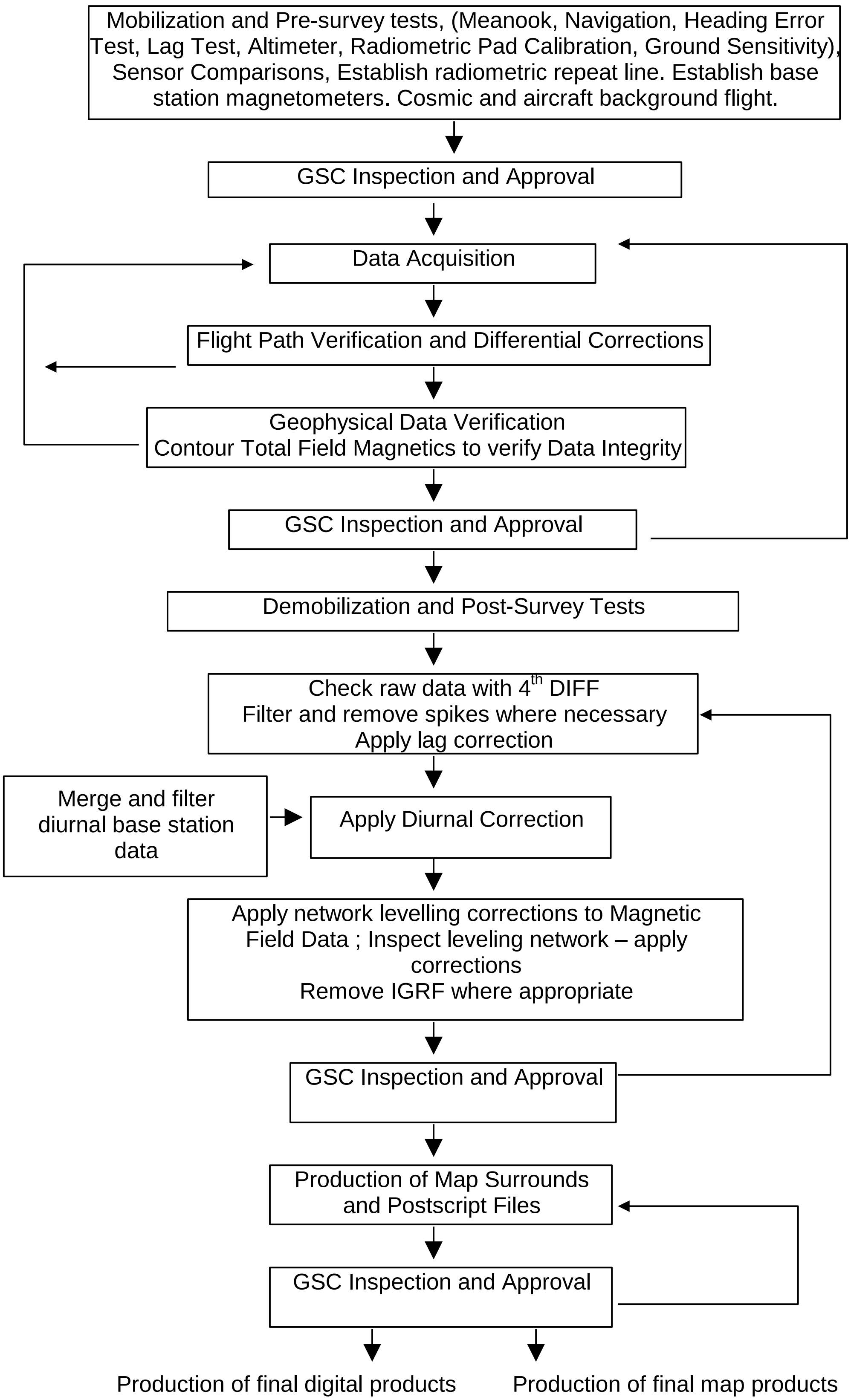
APPENDIX C

PROCESSING FLOW CHARTS

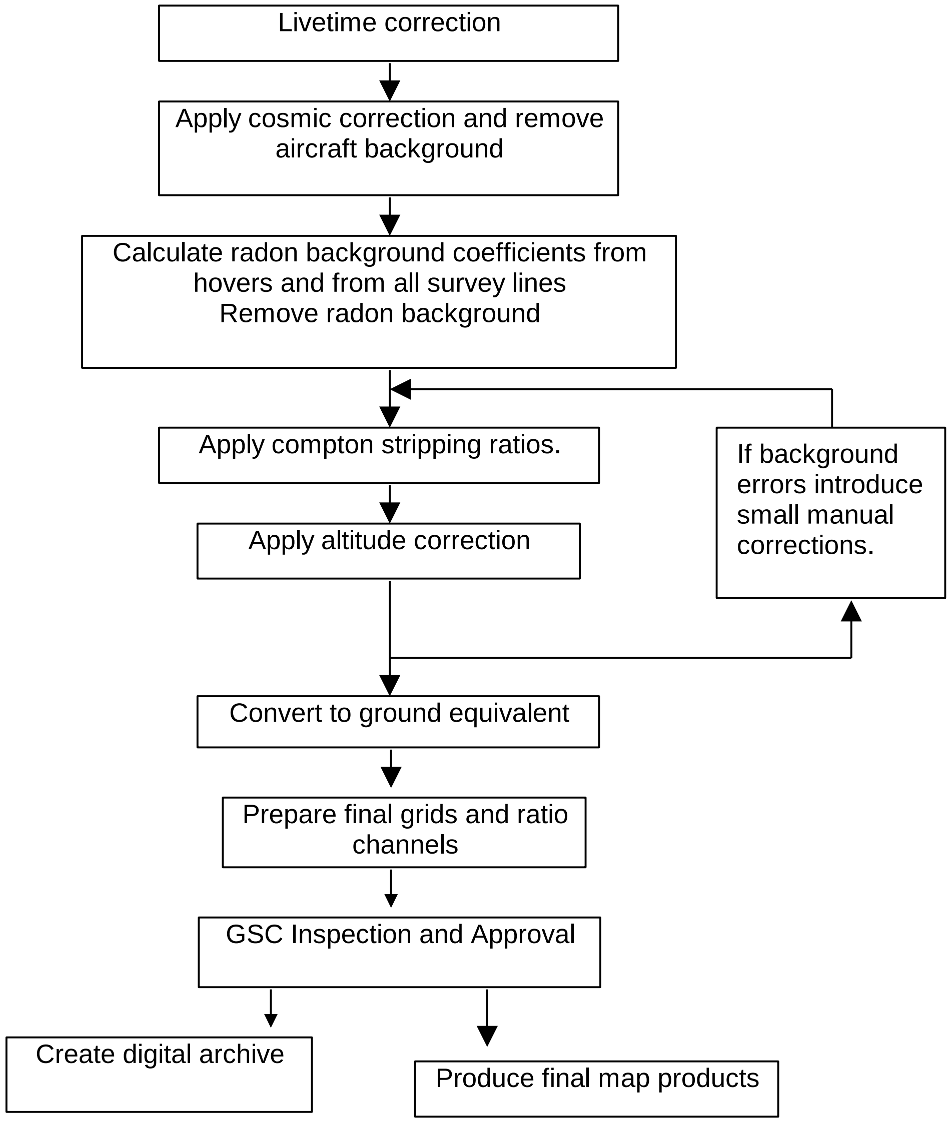
APPENDIX C

PROCESSING FLOW CHARTS

Survey Procedures and Magnetic Processing



Spectrometer Processing



LEGEND
Tenures included in this assessment report
Limits of Airborne Geophysics in this report
526709
529450
526711
529647
529451
529448
529449
540524
529645
540525
528084
529534
528083
528081
528082
529535
529531
527406
528080
527404
527396
528079
528070
528077
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527403
527400
528073
527391
529532
528101
528097
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528095
528437
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528092
528093
528096
402246
528100
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547357
547351
553785
546701
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555245
555246
555244
546697
546695
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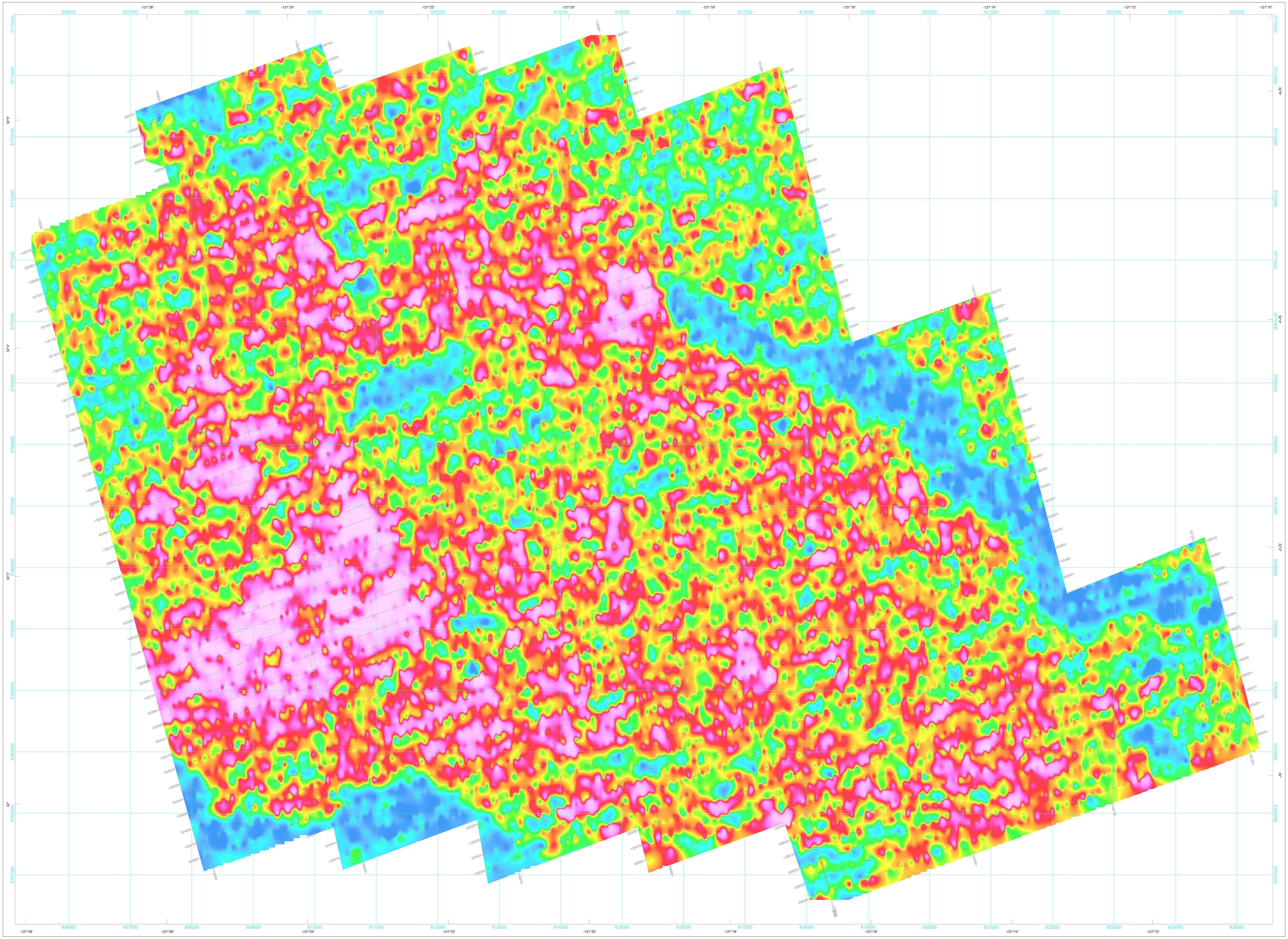
555248
548497
555249
555251
555254
529507
540530
409025
540614
529541
529506
540546
520034
527637
527632
407801
407802
529493
Cariboo MD
Clinton MD
Murphy Lake
0 500 1000 1500
metres
Topographic contour interval = 20 metres
DISCOVERY Consultants
Candorado Operating Company Limited
Murphy Lake Project
2006 Airborne Geophysics
Location: Spout Lake
Mining Jurisdiction: Cariboo/Clinton
Datum: NAD83
Map Ref.: 093A/092P
Scale: 1:20000
UTM: 10
Project: 696
Date: April 30, 2007
Drawn By: RM
Figure: 4

GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA



THORIUM

MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.

-0.7 0.4 0.9 1.3 1.6 1.8 2.1 2.2 2.4 2.6 2.7 2.9 3.0 3.1 3.3 3.4 3.6 3.8 4.0 4.2 4.4 4.7 5.0 5.6 6.9

ppm

Scale 1:20000

250 0 250 500 750 1000 1250 1500

(meters)

NAD83 / UTM zone 10N

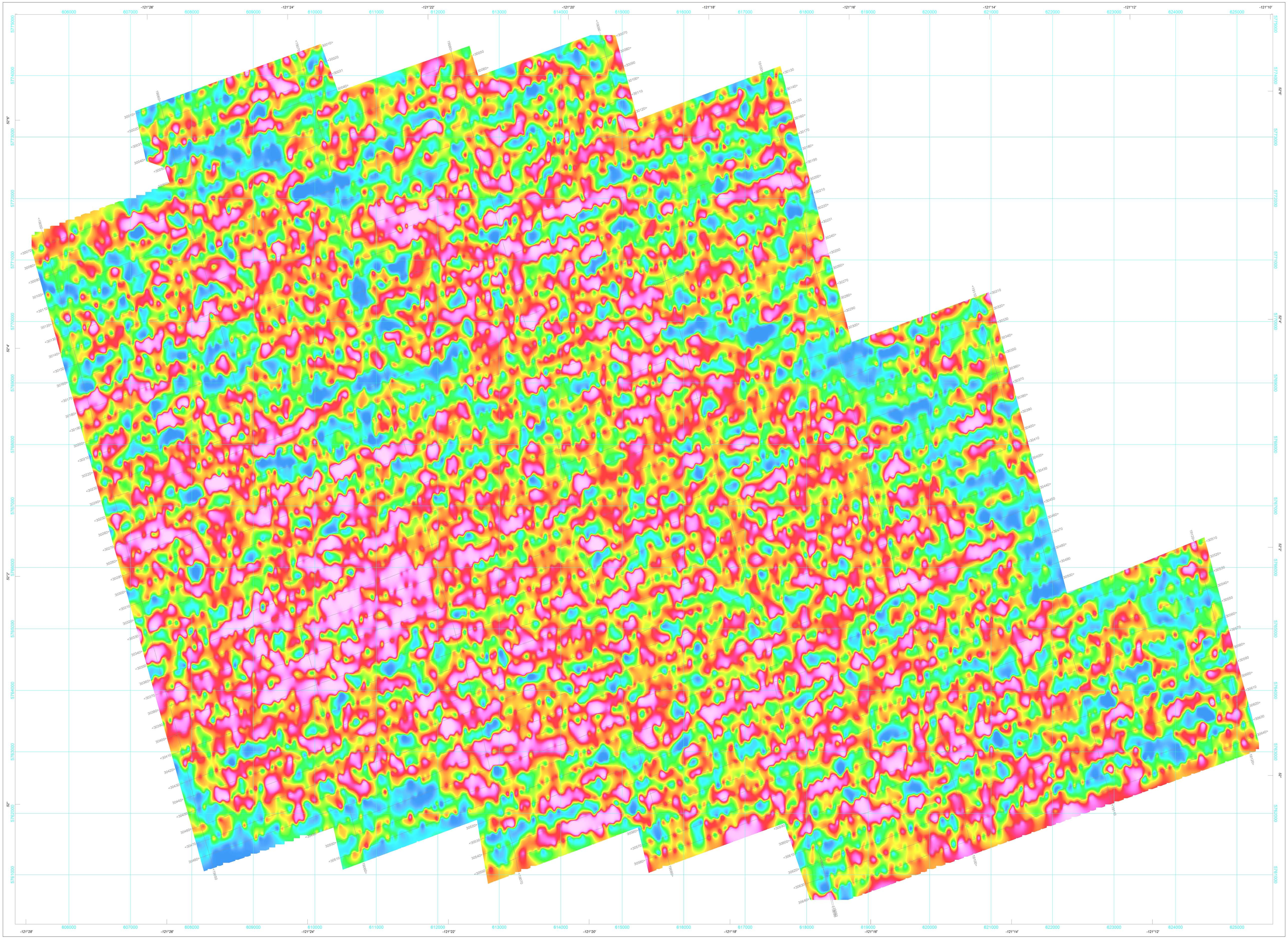
Natural Resources Canada Ressources naturelles Canada

Canada

Original Signed

Compiled by the Central Canada Division of the Geological Survey of Canada, Ottawa, Ontario.

GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA

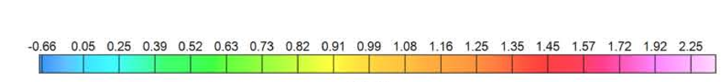


URANIUM

MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.



Scale 1:20000

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(meters)

NAD83 / UTM zone 10N

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Canada

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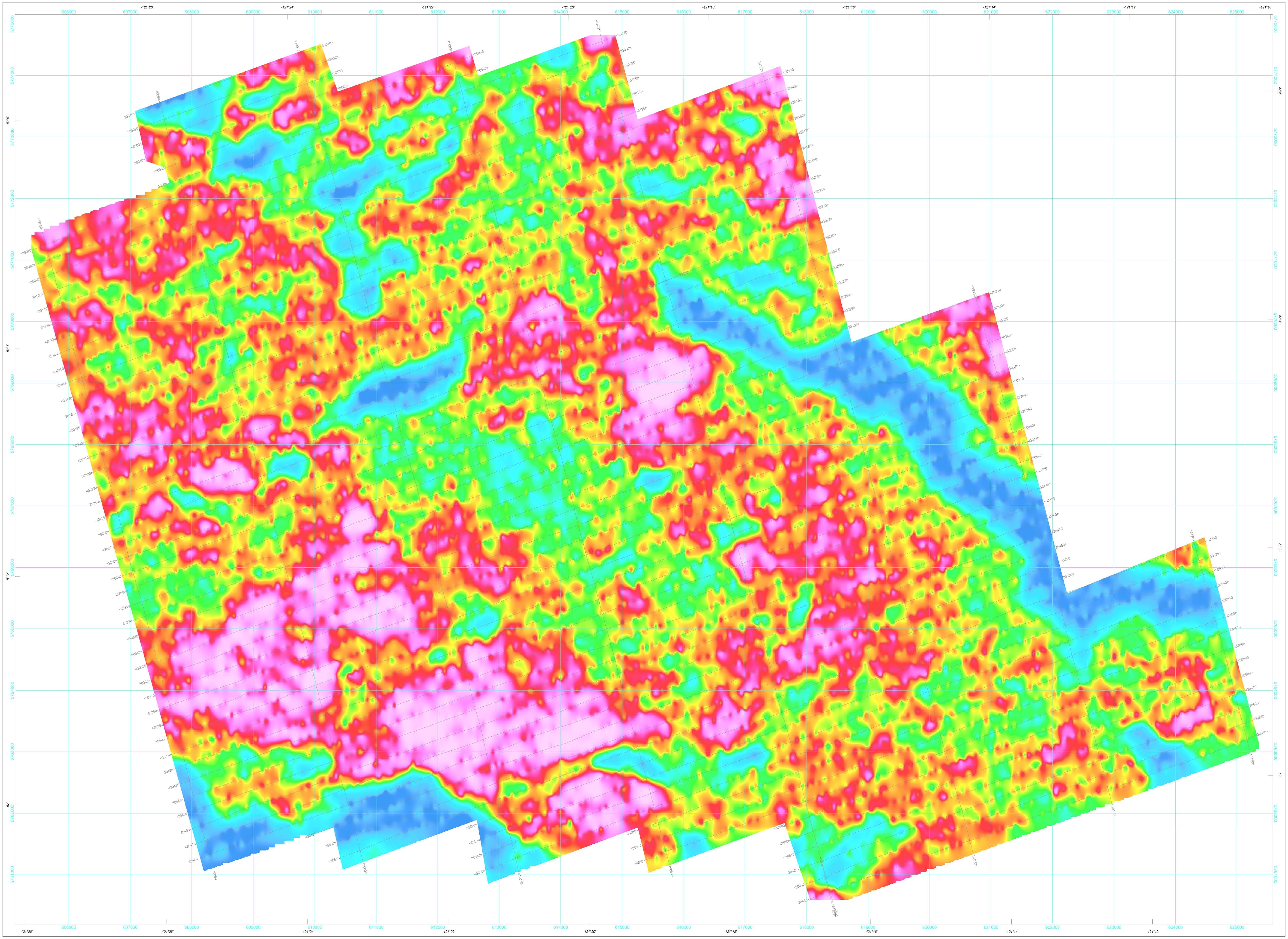
GEOLOGICAL SURVEY OF CANADA   COMMISSION GÉOLOGIQUE DU CANADA



POTASSIUM

MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.

-0.10 0.18 0.54 0.71 0.80 0.86 0.92 0.97 1.02 1.06 1.10 1.15 1.20 1.25 1.30 1.37 1.46 1.57 1.77

%

Scale 1:20000

250 0 250 500 750 1000 1250 1500

(meters)

NAD83 / UTM zone 10N

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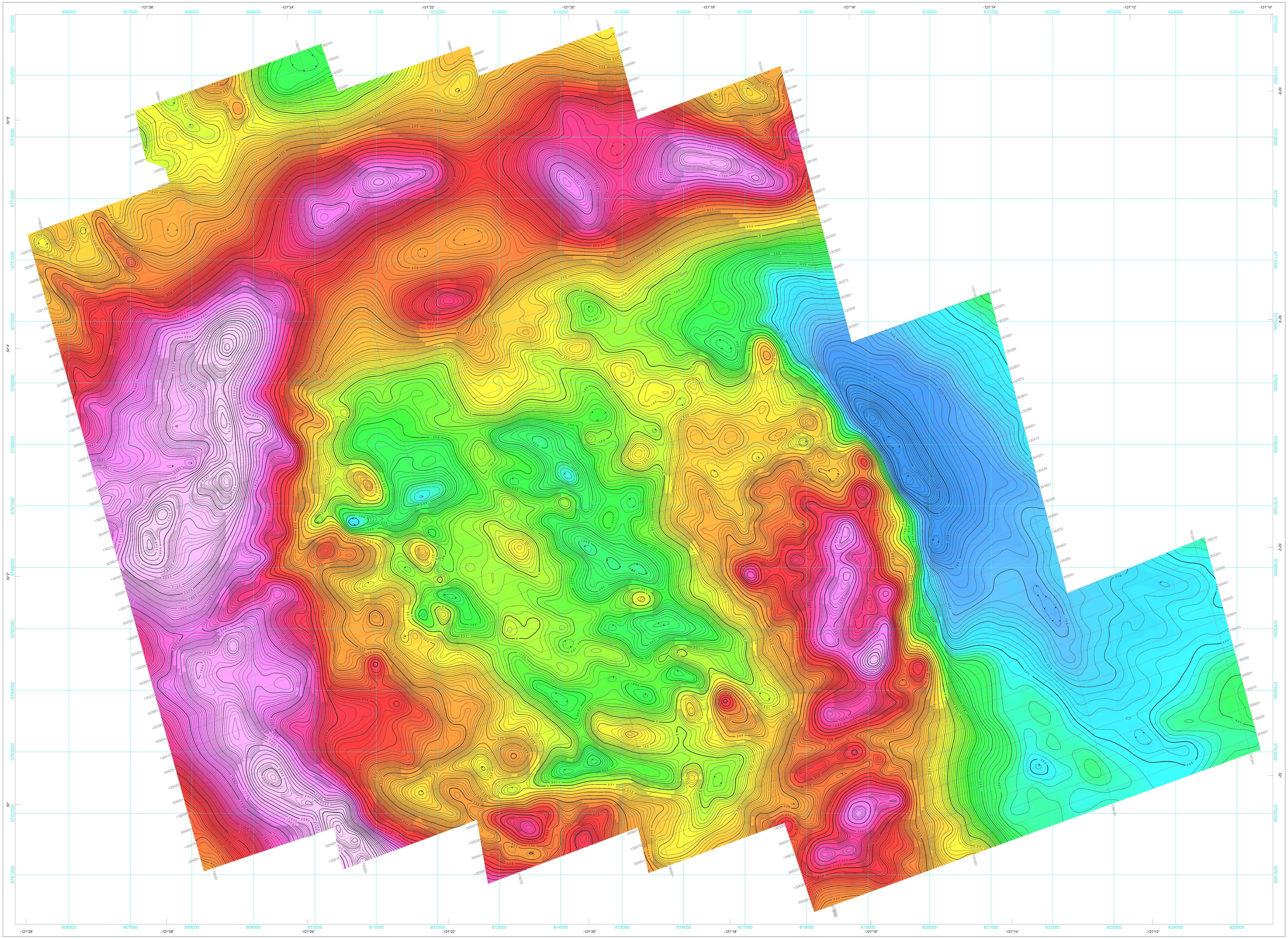
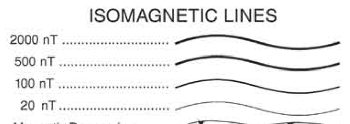


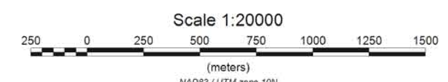
RESIDUAL TOTAL MAGNETIC FIELD

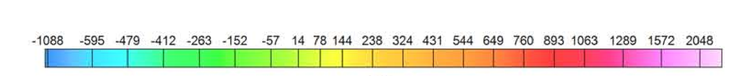
MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.







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Canada

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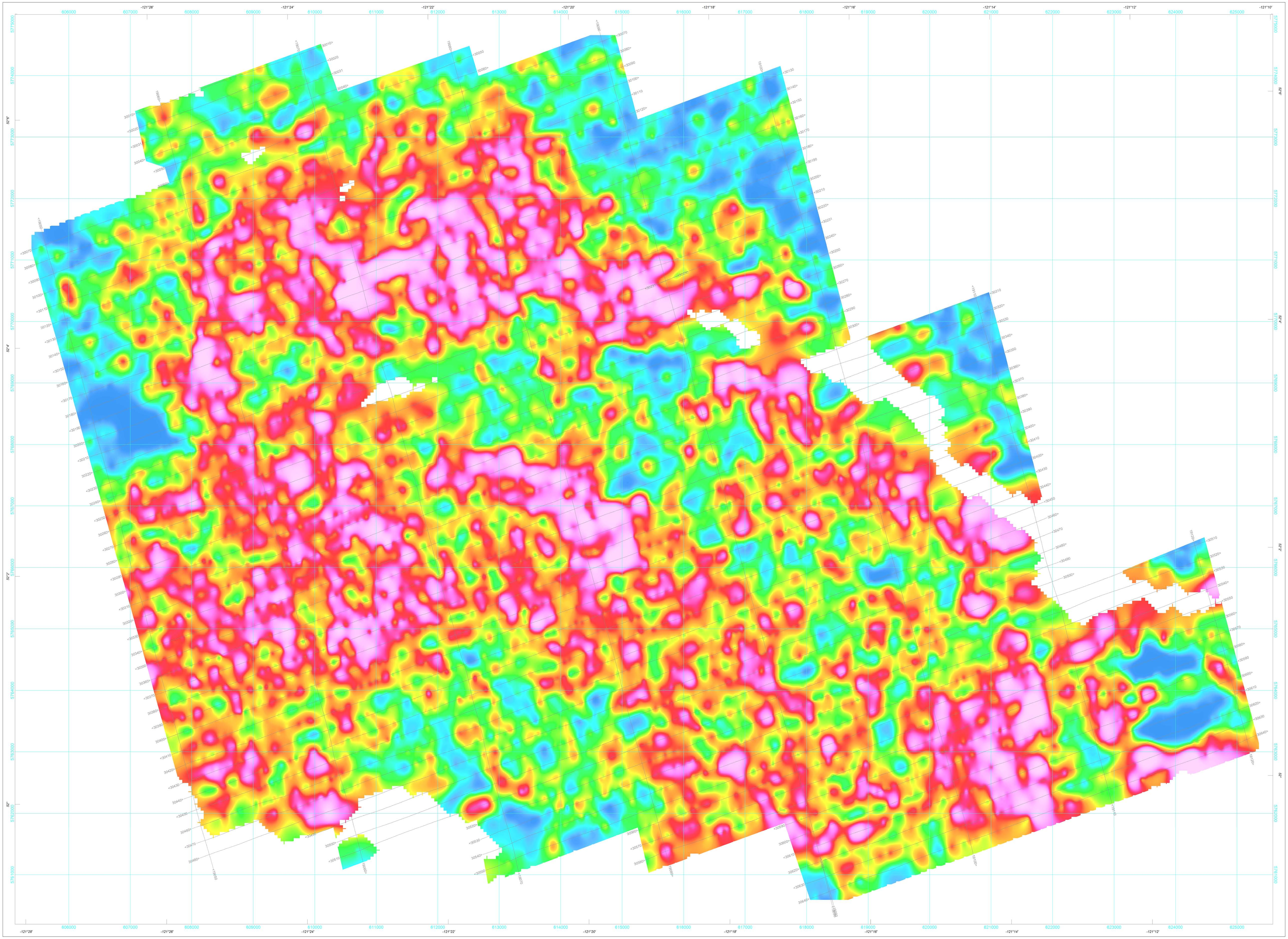
GEOLOGICAL SURVEY OF CANADA   COMMISSION GÉOLOGIQUE DU CANADA



THORIUM / POTASSIUM

MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.

Scale 1:20000

250 0 250 500 750 1000 1250 1500

(meters)

NAD83 / UTM zone 10N

1.19 1.81 2.03 2.20 2.35 2.48 2.60 2.71 2.83 2.95 3.06 3.19 3.32 3.45 3.60 3.77 3.97 4.24 4.70

Th/K

Natural Resources Canada   Ressources naturelles Canada

Canada

Original Signed b

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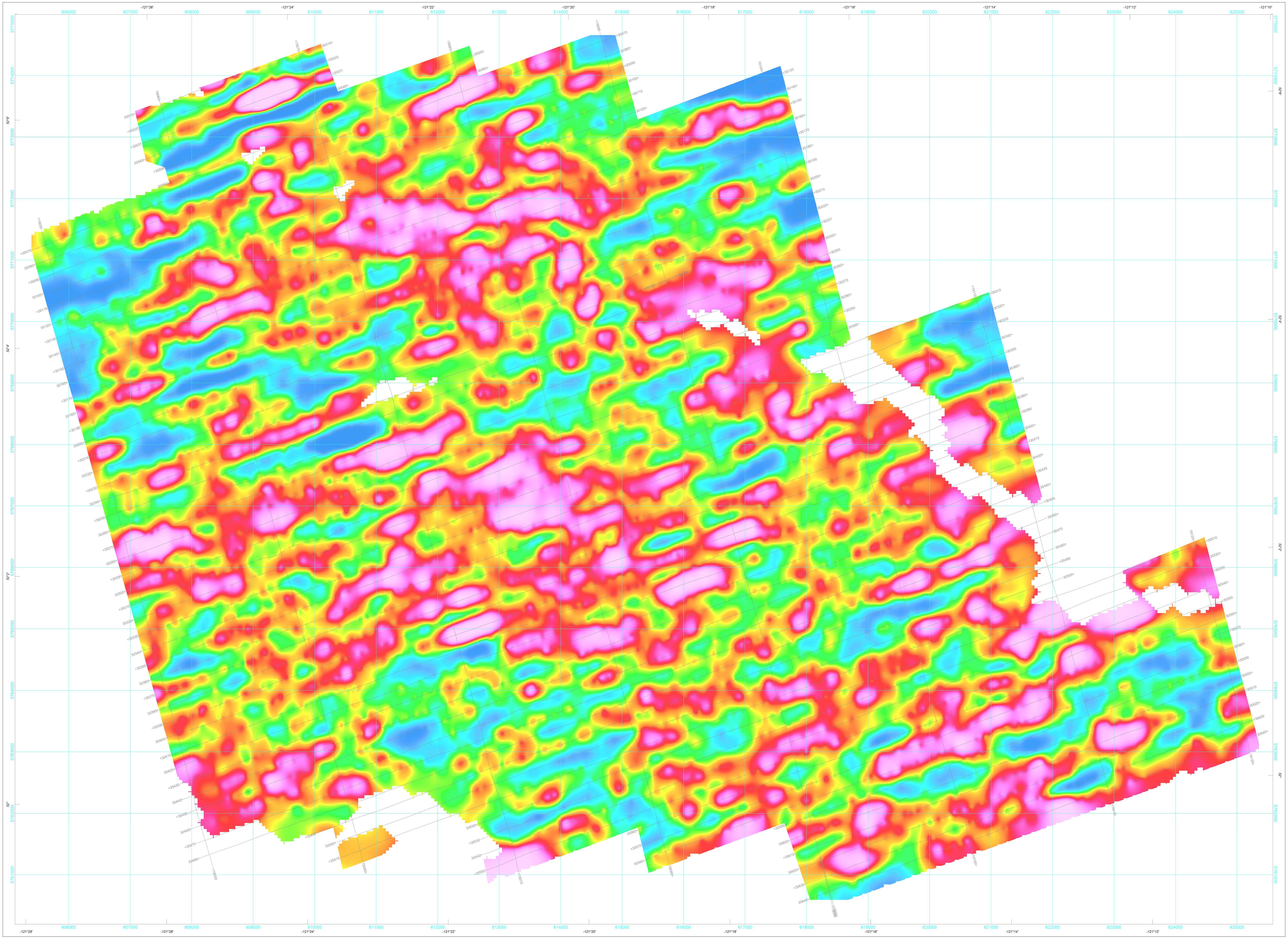
GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA



URANIUM / POTASSIUM

MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.

Scale 1:20000

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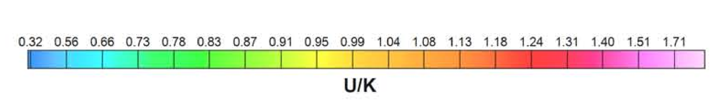
(meters)

NAD83 / UTM zone 10N



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Canada

Figure 10

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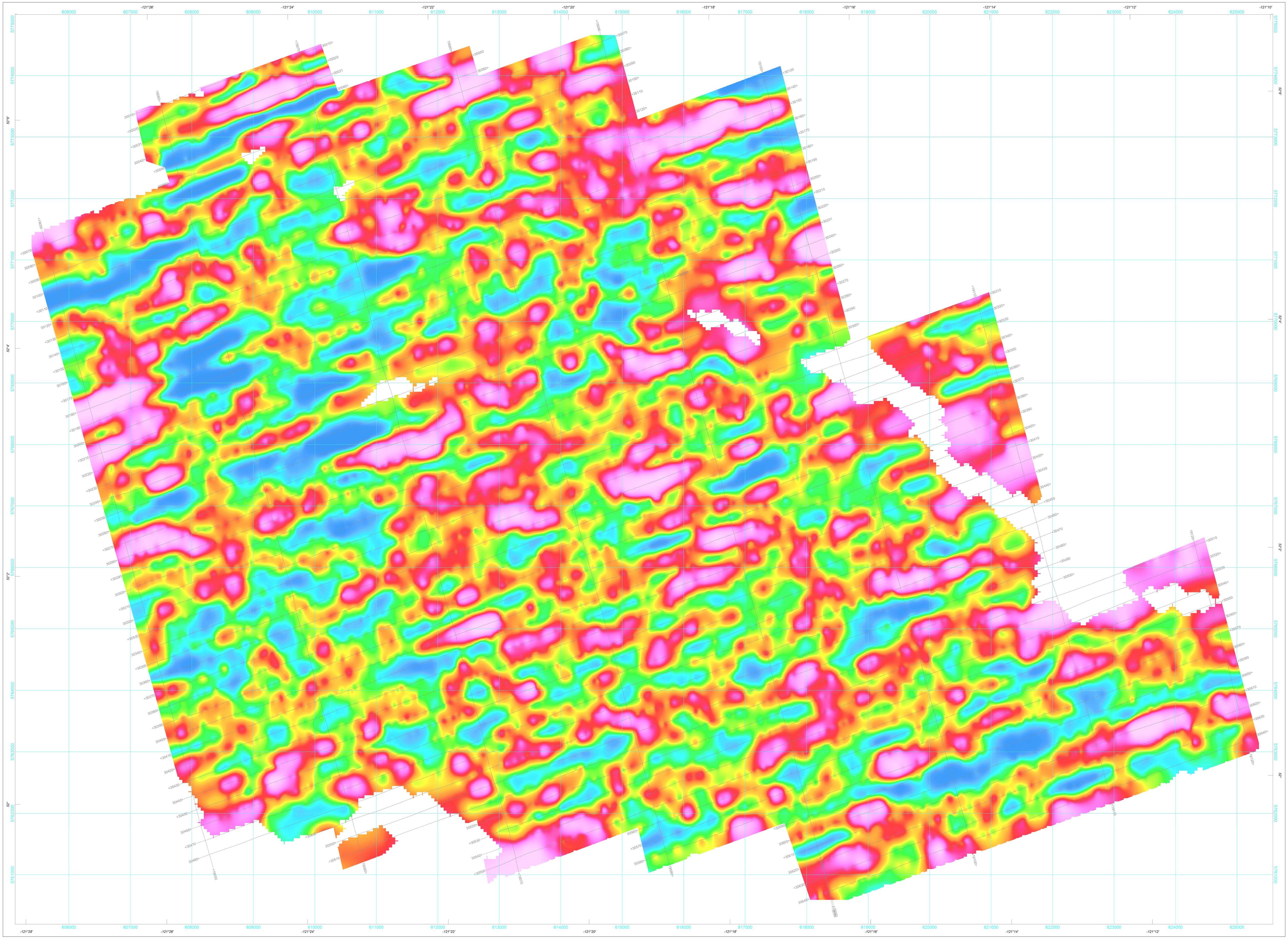
GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA



URANIUM / THORIUM

MURPHY BLOCK
SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.

Scale 1:20000

250 0 250 500 750 1000 1250 1500

(meters)

NAD83 / UTM zone 10N

0.12 0.20 0.23 0.25 0.27 0.29 0.30 0.31 0.33 0.34 0.36 0.37 0.39 0.41 0.43 0.46 0.49 0.54 0.64

U/Th

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Canada

Figure 11

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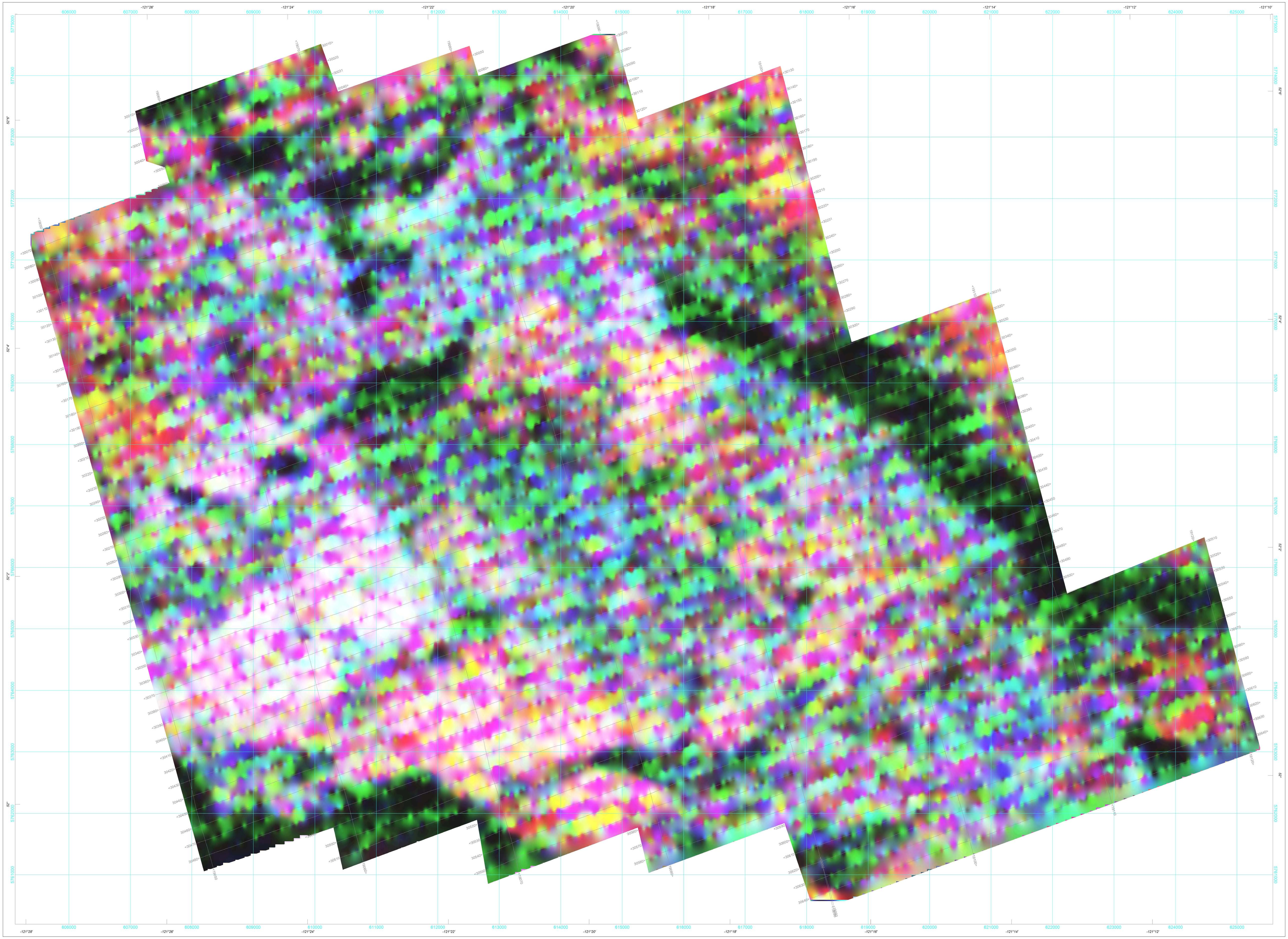
GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA



TERNARY

MURPHY BLOCK

SOUTH-CENTRAL BRITISH COLUMBIA

CANDORADO OPERATING COMPANY LTD.

Scale 1:20000

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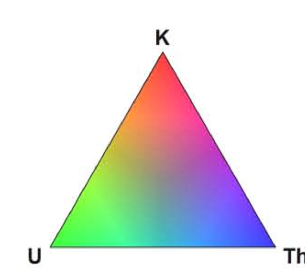
(meters)

NAD83 / UTM zone 10N



Natural Resources Canada Ressources naturelles Canada

Canada

Figure 12

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