

# GM 58437

HIGH RESOLUTION AEROMAG SURVEYS, TORNGAT

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**OPERATIONS REPORT**

**TORNGAT, QUEBEC  
HIGH RESOLUTION AEROMAG SURVEYS**

<b>AREA 1</b>	<b>Project 0003</b>
<b>AREA 2</b>	<b>Project 0004</b>
<b>AREA 3</b>	<b>Project 0005</b>

**SPECTRA AVIATION SERVICES CORP. Calgary, Alberta, Canada**

October 2000

MRN-GÉOINFORMATION 2001

GM 58437

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## 1.0 INTRODUCTION

This report describes the specifications and operations of an airborne geophysical survey carried out by Spectra Aviation Services Corp. during the period of March 2000 through October 2000. Spectra Aviation Services is a wholly owned subsidiary of Spectra Exploration Geoscience Corp., and is located at Suite 2610, 520 - 5th Avenue SW, Calgary, Alberta T2P 3R7. Telephone (403) 777-9280, fax (403) 777-9289, and email: spectra@nucleus.com.

The purpose of a survey of this type was to acquire high resolution, high sensitivity aeromagnetic data over three project areas over the Torngat Mountains in Quebec. The end result of the HRAM data processing was to provide detailed maps to assess the area for anomalies and magnetic features pertaining to their relevance in minerals exploration.

To achieve this purpose, the survey areas were systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines (traverses) spaced 150 meters apart. Tie-lines were flown normal to the traverses spaced at 750m. The nominal flying height was a best-fit draped 130 meters above the terrain surface. The traverse line orientation for the first (0003) and third (0005) blocks was 135°-315° with tie lines flown at 45°-215°. For the second block (0004) traverse lines were flown East/West and the tie lines were flown North/South.

In general, this survey was hampered by the proximity of the project areas to the Ungava Bay and the Torngat Mountains, which bounded the area to the north. High winds, snow flurries and fog were all instrumental in hampering data acquisition. Phases 1 and 2 were completed during the period from April 2000 through August 2000. Due to inclement weather, the crew was removed from Kuujjuaq until the weather conditions favor aircraft data acquisition in the third survey area (see section 4.4 for further details).

## 2.0 SURVEY AREA

The survey areas are located northwest of Kuujjuaq, Quebec, and are bounded by the following UTM coordinates:

### Block 1

<u>Corner No.</u>	<u>UTM X</u>	<u>UTM Y</u>
1	396502	6603171
2	409502	6586801
3	402752	6575001
4	380502	6569201
5	380502	6572501
6	376202	6572501
7	374502	6570701
8	370252	6575001
9	377302	6582001
10	373802	6585501
11	379502	6591201
12	380102	6590651
13	384002	6594751
14	386002	6592751
15	396502	6603171

### Block 2

<u>Corner No.</u>	<u>UTM X</u>	<u>UTM Y</u>
1	342500	6570000
2	343500	6572250
3	346000	6574750

4	356500	6572600
5	356500	6583500
6	361500	6583500
7	361500	6587500
8	365500	6587500
9	367800	6585000
10	364350	6581500
11	375500	6573500
12	381500	6573500
13	381500	6559500
14	370500	6559500
15	370500	6549500
16	360500	6549500
17	350500	6556500
18	344500	6564000
19	342500	6568000
20	342500	6570000

**Block 3**

<u>Corner No.</u>	<u>UTM X</u>	<u>UTM Y</u>
1	356800	6626500
2	360500	6626500
3	360500	6622500
4	369500	6622500
5	369500	6620500
6	375200	6620500
7	382000	6618500
8	400450	6618500
9	398450	6613400
10	396920	6602180
11	392500	6597800
12	384500	6605000
13	380000	6609293
14	370300	6599500
15	364020	6599500
16	360730	6610000
17	357300	6616890
18	356500	6621800
19	356800	6626500

A map of the project areas is attached in the Appendix to this report. Note that the project areas are extended by 500 m to eliminate any "edge effects" on the processed data within the project area.

**3.0 EQUIPMENT SPECIFICATIONS****3.1 AIRCRAFT**

The surveys were carried out using Spectra's Piper Navajo PA 31-310C aircraft, registration C-FZHG, configured with a specially designed rigid-mount tail boom for geophysical survey operations. The aircraft is equipped with a high sensitivity magnetometer and a full on-board real time compensation recording computer, and related equipment. It is a twin engine aircraft with full avionics, including real time GPS.

The aircraft has been extensively modified to conduct airborne geophysical surveys. Considerable effort has been made to remove all ferruginous materials near the sensor and to ensure that the aircraft electrical systems do not create any noise. With these modifications this aircraft represents one of the quietest

magnetic platforms in the industry with a figure of merit of 1.9 nT compensated at this survey location using G.S.C. standards.

The aircraft is operated by Spectra Aviation Services Corp. under full M.O.T approval and certification for specialty flying including airborne geophysical surveys. The aircraft is maintained at base operations by a regulatory AMO Facility, Baker Aviation Inc. and in Kuujuaq by a certified AME.

The following table lists the relevant aircraft flight parameters for conducting HRAM surveys. In addition, there is an aircraft specifications sheet in the Appendix.

TYPE	R/N	TSO-* HOURS	FUEL CAPACITY	CRUISE (kts)	SURVEY ENDURANCE
PIPER NAVAJO	C-FYTT	LE 1,662 RE 50	192 gallons, AVGAS 100/130	176 knots survey:160 stall: 71	5.5 hours
PIPER NAVAJO	C-FZHG	LE 328 RE 204	242 gallons** AVGAS 100/130	176 knots survey:160 stall: 71	6.5 hours
Normal Climb/Descent Gradient		1,445 FPM ***			
Survey Fuel Consumption		~ 30.5 gph			

\* TSO = Time Since Overhaul

\*\* This aircraft has Nayak wing-locker tanks for additional duration.

\*\*\* This is best rate of climb at SL at gross weight as indicated in the Piper pilots operating manual; short duration rate of climb is much higher, dependent on outside temperature.

### 3.2 AIRBORNE GEOPHYSICAL EQUIPMENT

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

#### Cesium Vapor Magnetometer:

Manufacturer	Scintrex
Model	CS-2
Resolution	0.001 nT counting @ 0.1 per second
Sensitivity	+/-0.005 nT
Dynamic Range	15,000 to 100,000 nT
Fourth Difference	0.02 nT

#### Tri-Axial Magnetic Field Sensor (for compensation, mounted in the forepart of the tail stinger):

Manufacturer	Bartington Instruments Ltd.
Model	MAG-03MC
Internal Noise	at 1 Hz - 1 kHz; 0.6 nT rms
Bandwidth	0 to 1 kHz maximally flat, -12 dB/octave roll off beyond 1 kHz
Frequency Response	1 Hz - 100 Hz: +/- 0.5% 100 Hz - 500 Hz: +/- 1.5% 500 Hz - 1 kHz: +/- 5.0%
Calibration Accuracy:	+/- 0.5%
Orthogonality	+/- 0.5% worst case
Package Alignment	+/- 0.5% over full temperature range

Scaling Error	absolute: +/- 0.5% between axes: +/- 0.5%
<b>Video Camera (camera mounted in belly of aircraft):</b>	
Manufacturer	Sanyo
Model	VDC-2982 (colour)
Specifications	1/2", 470 hr, 1.3LX, 12VDC, C/CS,EI/ES, backlite comp
Lens	Pentax, F1.8-360, auto iris
<b>Video Recorder (strapped to computer rack/floor plate):</b>	
Manufacturer	Orion
Model	TV / Video combination
<b>Radar Altimeter:</b>	
Manufacturer	King
Model	KRA-10A
Accuracy	5% up to 2,500 feet
Calibrate Accuracy	1%
Output	Analogue for pilot; Converted to digital for data acquisition
<b>Barometric Altimeter:</b>	
Manufacturer	Sensym
Model	LX18001AN
Source	Coupled to aircraft pitot static system
<b>Differential GPS Receiver (# 511 aircraft certified antenna mounted on top of the cabin roof):</b>	
Manufacturer	Novatel
Model	Novatel Card for magnetic system; King KLN-89B for pilot (interfaced)
Serial Number	GPS 511
Type	Continuous tracking, L1 frequency, C/A code (SPS), 12 channel (independent)
Position Sensitivity	once per second
Accuracy	position (SA implemented) 100 meters, position (no SA) 30 m, velocity 0.1 knot, time recovery 1 pps, 100 nsec pulse width
Data Recording	all GPS data and positional data logged by Picodas Unit
<b>Navigation Interface (with pilot and operator readouts):</b>	
Manufacturer	Picodas Group Inc.
Model	PNAV
Data Input	Real time processing of GPS output data
Pilot Readout	Left/Right indicator
Operator Readout	Screen modes: map, survey and line
Data Recording	All data recorded in real time by Helimag
<b>Data Acquisition System :</b>	
Manufacturer	Picodas Group Inc.
Model	PDAS 1000 - Helimag & PNAV / PDAS 2000
Operating System	MS-DOS
Microprocessor	80486dx - 66 CPU
Coprocessor	Intel 8048dx
Memory	On board up to 8 MB, page interleaving, shadow RAM for BIOS, support EMS 4.0

Clock	real time; hardware implementation of MC14618 in the integrated peripherals controller
I/O Slots	5 AT and 3 PC compatible slots
Display	Electro - luminescent 640x400 pixels
Graphic Display	Scrolling analog chart simulation with up to 5 windows operator selectable; freeze display capability to hold image for inspection
Recording Media	Standard 540 Mbyte hard disk with extra shock mounts; Standard 1.44 Mbyte floppy disk; Standard tape backup
Sampling	Selectable for each input type; 1, 0.5, 0.25, 0.2 or 0.1 seconds
Inputs	12 differential analog input with 16 bit resolution
Serial Ports	2 RS-232C (expandable)
Parallel Ports	Ten definable 8 bit I/O; Two definable 8 bit outputs

The Helimag also contains the magnetometer processor boards, one for each cesium vapor magnetometer installed

Manufacturer	Picodas Group Inc.
Model	PCB
Input Range	20,000 - 100,000 nT
Resolution	0.001 nT
Bandwidth	0.7, 1 or 2 Hz
Microprocessor	TMS 9995
Firmware	8 Kbit EPROM board resident
Internal Crystal	18,432 kHz
Absolute Crystal Accuracy	<0.01%
Host Interfacing	8 Kbyte dual port memory
Address Selection	Within 20 bit addressing in 8 Kbyte software selectable steps
Input Signal	TTL, CMOS, Open collector compatible or sine wave with decoupler
Input Impedance	TTL > 1K Ohm

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

Analog Processor      PCB - provides separate A/D converter for each analog input with no multiplexing; each channel is sampled at a rate of 1,000 samples per second with digital processing applied.

#### Power Supplies:

- 1) Power Distribution Unit manufactured by Picodas Group Inc. interfaces with the aircraft power and provides filtered and continuous power at 27.5 VDC to all components.
- 2) The Helimag contains a 32 volt DC cesium sensor switching power supply for the cesium vapor magnetometers in conjunction with real time magnetometer compensation; also enables interfacing the fluxgate magnetometer and the barometric altimeter; also provides clean power for radar altimeter and ancillary equipment (PC notebook, printer)

### 3.3 MAGNETOMETER BASE STATION

High sensitivity base station data are provided by a cesium vapor magnetometer, data logging onto a PC 486sx notebook and time synchronization with ground GPS receiver.

#### Magnetic Sensor:

Identical to magnetometer in aircraft



**Magnetic Processor:**

Manufacturer	Picodas Group Inc.
Model	PCB
Input range	20,000 - 100,000 nT
Resolution	0.001 nT
Resolution (fdd)	1 pt
Bandwidth	0.7, 1 or 2 Hz
Microprocessor	TMS 9995
Firmware	8 Kbit EPROM board resident
Internal Crystal	18,432 kHz
Absolute Crystal Accuracy	<0.01%
Host Interfacing	8 Kbyte dual port memory
Address Selection	Within 20 bit addressing in 8 Kbyte software selectable steps
Input Signal	TTL, CMOS, Open collector compatible or sine wave with decoupler
Input Impedance	TTL > 1kohm
Clock Stability	2 ppm per year
Absolute accuracy correction	+/- 999x10e-6

**Logging Software:**

Logging software by Picodas Group Inc. version 5.02 to IBM compatible PC with RS 232 input; supports real time graphics, automatic startup, compressed data storage, selectable start/stop times, automatic disk swapping, plotting of data to screen or printer at user selected scales, and fourth digital difference and diurnal quality flags set by user.

**3.4 GPS BASE STATION**

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

Manufacturer	Novatel
Model	Novatel Card
Type	Continuous tracking, L1 frequency, C/A code (SPS), 10 channel (independent)
Position Update	once per second
Accuracy	with SA implemented 100 meters, no SA 30 meters, velocity 0.1 knot, time recovery 1 pps, 100 nsec pulse width
Data Recording	all GPS raw and positional data logged by PDAS 1000

**4.0 SURVEY SPECIFICATIONS****4.1 LINES AND DATA**

Survey area coverage	Block 1 – 5,950 line km; Block 2 – 6,285 line km; Block 3 – 5,620 line km
Line Direction	135-315 degrees azimuth (Blocks 1&3); 090-180 degrees (Block 2)
Line Interval	150 meters
Tie Line Interval	750 meters - flown orthogonal to survey lines
Terrain Clearance	130 meters, +/- 10 m, optimum drape mode
Average ground speed	70-80 meters/second
Data point interval:	Magnetic: 7-8 meters relative ground spacing per sample point

## 4.2 TOLERANCES

**Line spacing:** At no point did the traverse or control lines deviate more than 15% of the nominal spacing from the pre-plot line locations.

**Terrain clearance:** the nominal survey elevation was 130 meters drape mode. The exceptionally narrow and deep fjords, common in all three areas, made a perfect drape with fixed wing physically impossible, thus the drape mode is classified as modified best-fit drape mode.

**Diurnal magnetic variation:** A maximum deviation of +/- 3.0 nT from a curvilinear mean within the time span required to acquire 10 line kilometers of data at the specified minimum sampling interval.

**Missing data:** Lines with channels missing from the database or video that was not viewable was reflown.

## 4.3 NAVIGATION AND RECOVERY

The satellite navigation system is used to ferry to the survey site and to survey along each line using latitude/longitude coordinates. The survey coordinates of the survey outline for navigation purposes and flight path recovery were calculated from the project areas coordinates listed above, and optimized for most efficient data acquisition.

The navigation accuracy is variable depending on the number and condition of the satellites, however it is generally less than twenty five meters and typically in the ten to fifteen meter range. Post flight differential correction of the flight path, which corrects for satellite range errors, improves the accuracy of the flight path recovery to approximately within one to three meters.

The navigational and flight path recovery positioning is based on 1:50,000 NTS maps, in addition to coordinates forwarded to Spectra by the participants, all of which are referenced to the NAD 83 ellipsoid.

A video camera recorded the ground image along the flight path. A video screen in the aircraft cabin enabled the operator to monitor the accuracy of the flight path during the survey. This system also provided a backup system and verification for flight path recovery.

## 4.4 OPERATIONAL LOGISTICS

The main base of operations for the Torngat HRAM surveys was Kuujjuaq, Quebec. The base station magnetometer and GPS equipment were located near the ATCO Trailer where the crew was housed. The coordinates for the base station were: 58°06'21.4"N, 68°24'43.5"W; 28.79 m ASL.

The field crew consisted of:

- John Schonstrom – Chief Survey Pilot
- Sam El Tawil – Survey Pilot
- Jeremy Weber – Equipment Operator/Field Data Processor
- Adam Barrett – Equipment Operator/Field Data Processor

Management/processing:

- Jim Genereux – Project Manager
- Paul Klein – Senior Processor, Quality Control

The survey crew arrived in Kuujjuaq on April 3, 2000, to set up the base station and establish local support facilities. Data acquisition was immediately delayed due to high winds, low clouds and snowy conditions. The first data acquisition flight for the first block was made on April 9, and the final flight completed on July 20. There were a total of 20 flights, including ferry and survey flights, compensation, scrubbed missions, and reflights.

Data acquisition for the second block, adjacent to the south west of the first block, began July 21 with the final flight being completed August 7. There were a total of 20 flights, including ferry and survey flights,

compensation, scrubbed missions, and reflights. Weather was not a significant factor during this acquisition phase.

Acquisition for block 3, north of blocks 1 and 2, was started on August 9. Due to the inevitable changing weather with the onset of winter in the Ungava Bay area, the number of days when it was acceptable to fly became fewer and fewer in number. The crew was demobilized on September 13, 2000 and will be re-mobilized when the Ungava Bay has frozen over and the incidence of fog and low cloud will be at a minimum.

The figure of merit (FOM) was measured at 1.9 nT for C-FZHG, and the results of the project FOM are in the Appendix.

After each mission the field crew processed the data and did a quality control check on the data. Following, they forwarded the digital data files via FTP to the Calgary office for quality assessment of each flight line. Each line of data was viewed on computer screen displaying rawmag, compensated mag, groundmag, noise, radar altimeter, and flight path. This was the basis for the data QC. Any flight lines that exceeded the survey specifications due to aircraft positioning or diurnal variations were noted for reflight, and forwarded to the flight crew.

In addition to Spectra's internal QC, all channels of each recorded and field accepted line data for certain portions of the first block was further checked and processed by a third party independent consultant.

## 5.0 DATA PROCESSING

Initially, preliminary processing and QC were performed by our field crew, checking on all recorded parameters and procedures. The data were then sent to Spectra's Calgary office via a secure FTP site. The preliminary processing during the survey consisted of the following:

- 1) Software program C3NAV (by Picodas) was applied to the base and aircraft GPS data in order to provide post-flight compensated GPS location of the flight path.
- 2) Program C3NAV2TBL (by Geosoft) to produce a table file (UTM-X -Y -Z, and LAT/LON)
- 3) Use READMAG (by Picodas) on raw binary base (diurnal) magnetic data to create BASEMAG table.
- 4) Import all flight and base data into Geosoft Oasis Montaj.
- 5) Edit BASEMAG channel to remove any occasional spikes and linearly interpolate across the gaps.
- 6) When required, establish table of mean terrain clearances at intersection locations from tie line data to provide elevation guidance for survey line navigation. Differences in elevations at intersections of tie and survey lines to provide quality check on elevation control and tag any for reflight.
- 7) Edit flight path channels to remove any erroneous spikes and linearly interpolate gaps.
- 8) Edit RAWMAG channel to remove any erroneous spikes and linearly interpolate gaps.
- 9) Create new channel as  $MAGDC = (MAG1 - BASEMAG) + \text{base constant}$  (Base constant is determined by averaging the magnetic values over a 24 hour period).
- 10) Perform lag correction and heading correction to MAGDC channel: lag is 0.85 seconds
- 11) Perform tie line leveling using all the line data to level the tie lines
- 12) Perform survey line leveling using the leveled tie lines; final leveled channel is labeled LEVMAGDC
- 13) All data were viewed on the screen on a line by line basis using the interactive Montaj database to inspect for quality, required tolerances and data integrity.
- 14) Produce preliminary flight path map and gridded magnetic intensity map including shadowing.
- 15) Plot analog charts of MAG1 and MAGDC in output format, for data quality.
- 16) Plot survey line and tie line flight paths and profiles for quality control inspection.
- 17) Produce final map suite deliverables.

## 5.1 DATA PRODUCTS

The following 1:50,000 scale maps were produced:

- Total Magnetic Intensity map, reduced to pole, with Flight Path overlay
- 1<sup>st</sup> Vertical Derivative of TMI
- Total, Vertical and Horizontal Gradient maps of TMI
- Band-pass maps
- Shallow Target Enhancement maps of TMI

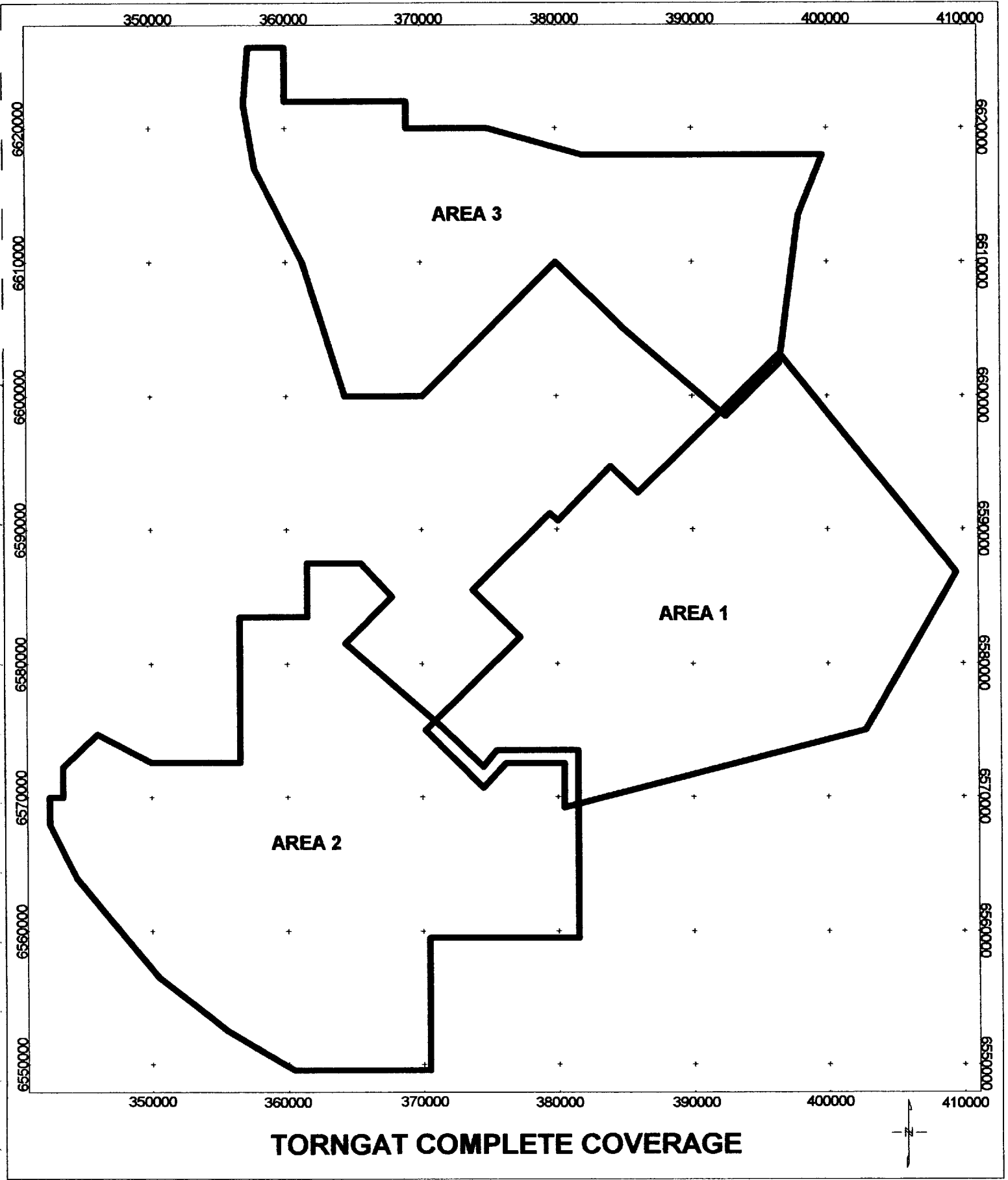
In addition, a CD-ROM of all digital files has been delivered for any client-specific data processing of the HRAM data.

## 6.0 SUMMARY

An airborne high sensitivity, high resolution magnetic survey has been carried out at approximately 130 meter drupe mode elevation, 150 meter line intervals and with data sample stations at 7-8 meters along the lines. Tie lines were spaced at 750 meters. A high sensitivity base magnetic station recorded the diurnal activity throughout the survey and a base GPS station was used to correct range errors in the GPS flight path recovery. Airborne recorded data included one fully compensated magnetometer located in rear stinger, radar altimeter, barometric altimeter and all attendant GPS data. The magnetic data have been processed, gridded and provided on CD-ROM, and hard-copy plotted at 50,000 scale.

SPECTRA AVIATION SERVICES CORP.

Jim Genereux, P. Geo.  
President



**TORNGAT COMPLETE COVERAGE**

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT APRIL 3, 2000 – APRIL 9, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday April 3</b>	N/A	N/A	N/A	Arrive in Kuujjuaq set up equipment
<b>Tuesday April 4</b>	OK	Poor	N/A	No flights due to active diurnal.
<b>Wednesday April 5</b>	Poor	OK	Flt 3001	Flt 1 aborted due to high winds and snowy conditions.
<b>Thursday April 6</b>	Poor	OK	N/A	No flights due to bad weather.
<b>Friday April 7</b>	Poor	OK	N/A	Low ceiling and low visibility over survey area.
<b>Saturday April 8</b>	Poor	OK	N/A	Low ceiling and low visibility over survey area.
<b>Sunday April 9</b>	Good	Good	Flt 3002	Compensation and test flight. 93.85 line km production

**TOTAL FLOWN TO DATE:**

acquired to date : 93.85 Line kms  
total program size: 5950 +/- Line miles  
% complete: 1.2 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT APRIL 10, 2000 – APRIL 16, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday April 10</b>	Poor	OK	None	White out conditions.
<b>Tuesday April 11</b>	Poor	OK	None	White out conditions over survey area.
<b>Wednesday April 12</b>	Poor	OK	Flt 3	Flt 3 aborted due to high winds and cloud cover.
<b>Thursday April 13</b>	Poor in am	OK	Flt 4	585.9 line km
<b>Friday April 14</b>	Poor	OK	None	High winds and white out conditions.
<b>Saturday April 15</b>	Poor	OK	None	High winds and white out conditions.
<b>Sunday April 16</b>	Poor	OK	None	High winds and white out conditions.

**TOTAL FLOWN TO DATE:**

acquired to date : 679.75 Line kms  
total program size: 5950 +/- Line miles  
% complete: 13.7 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett



**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT APRIL 17, 2000 – APRIL 23, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday April 17</b>	Poor	OK	None	High winds and low ceiling in survey area
<b>Tuesday April 18</b>	OK	OK	Flt 5	544.21 line km
<b>Wednesday April 19</b>	Poor	OK	None	Snow, wind, low ceiling
<b>Thursday April 20</b>	Poor	OK	None	Snow, wind, low ceiling
<b>Friday April 21</b>	Poor	OK	None	Snow, wind, low ceiling
<b>Saturday April 22</b>	Poor	OK	None	Snow, wind, low ceiling
<b>Sunday April 23</b>	Poor	OK	None	Low ceiling and blowing snow in survey area

**TOTAL FLOWN TO DATE:**

acquired to date : 1223.96 Line kms  
total program size: 5950 +/- Line kms  
% complete: 20.5 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT APRIL 24, 2000 – APRIL 30, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday April 24</b>	Poor	OK	None	Low ceilings and blowing snow
<b>Tuesday April 25</b>	Poor	OK	Flt 6	202.5 line km. Low ceiling obscured Mountain tops
<b>Wednesday April 26</b>	N/A	N/A	None	Aircraft in for 100 hour inspection
<b>Thursday April 27</b>	N/A	N/A	None	Awaiting completion of 100 hour inspection
<b>Friday April 28</b>	N/A	N/A	None	Awaiting completion of 100 hour inspection
<b>Saturday April 29</b>	N/A	N/A	None	Awaiting completion of 100 hour inspection
<b>Sunday April 30</b>	N/A	N/A	None	Awaiting completion of 100 hour inspection

**TOTAL FLOWN TO DATE:**

acquired to date : 1426.46 Line kms  
total program size: 5950 +/- Line kms  
% complete: 23.9 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT MAY 1, 2000 – MAY 8, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday May 1</b>	N/A	N/A	None	Await completion of 100hr inspection.
<b>Tuesday May 2</b>	N/A	N/A	None	Await completion of 100hr inspection.
<b>Wednesday May 3</b>	Poor	OK	None	Await completion of 100 hour inspection in am. Low ceiling and snow in survey area.
<b>Thursday May 4</b>	Some snow and low ceiling.	OK	Flt 7	384 line km.
<b>Friday May 5</b>	Poor	OK	None	Low ceiling over survey area.
<b>Saturday May 6</b>	Poor	OK	Flt 8	Flt 8 aborted due to bad weather over survey area.
<b>Sunday May 7</b>	Poor	OK	None	Snow flurries and low ceiling.

**TOTAL FLOWN TO DATE:**

acquired to date : 1810.46 Line kms  
total program size: 5950 +/- Line kms  
% complete: 30.4 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT MAY 8, 2000 – MAY 14, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday May 8</b>	Bad	OK	None	Bad weather over survey area.
<b>Tuesday May 9</b>	Bad	OK	None	Bad weather over survey area.
<b>Wednesday May 10</b>	Bad	OK	None	Bad weather in area.
<b>Thursday May 11</b>	OK	OK	Flt 9	Aircraft battery dead in am. 441.83 line km
<b>Friday May 12</b>	Poor	OK	None	Bad weather in area.
<b>Saturday May 13</b>	Poor	OK	None	Rain and snow with low ceiling.
<b>Sunday May 14</b>	Poor	OK	None	Rain and snow with low ceiling

**TOTAL FLOWN TO DATE:**

acquired to date : 2252.29 Line kms  
total program size: 5950 +/- Line kms  
% complete: 37.84 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT MAY 15, 2000 – MAY 21, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday May 15</b>	Bad	OK	None	Wet snow/rain, low ceiling over survey area.
<b>Tuesday May 16</b>	Bad	OK	None	Wet snow/rain, low ceiling over survey area.
<b>Wednesday May 17</b>	Bad	OK	Flt 10	Flt 10 aborted due to bad weather.
<b>Thursday May 18</b>	Bad	OK	None	Freezing rain and low ceiling.
<b>Friday May 19</b>	Bad	OK	None	Freezing rain and low ceiling.
<b>Saturday May 20</b>	Bad	OK	None	Snow and low ceiling.
<b>Sunday May 21</b>	Bad	OK	None	Snow and low ceiling.

**TOTAL FLOWN TO DATE:**

acquired to date : 2252.29 Line kms  
total program size: 5950 +/- Line kms  
% complete: 37.84 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT MAY 22, 2000 – MAY 28, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday May 22</b>	Bad	OK	None	Low ceiling over survey area.
<b>Tuesday May 23</b>	OK	OK in am	Flt 11	494.10 line km
<b>Wednesday May 24</b>	Bad	OK	None	Low ceiling over survey area.
<b>Thursday May 25</b>	OK	Bad	None	Diurnal out of spec.
<b>Friday May 26</b>	Bad	OK	None	High winds in survey area.
<b>Saturday May 27</b>	OK	OK in pm	Flt 12	327.55 line km
<b>Sunday May 28</b>	OK	OK	Flt 13	675.99 line km

**TOTAL FLOWN TO DATE:**

acquired to date : 3749.93 Line kms  
total program size: 5950 +/- Line kms  
% complete: 63 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT MAY 29, 2000 – JUNE 4, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday May 29</b>	Bad	Bad	None	No flights due to bad weather and diurnal
<b>Tuesday May 30</b>	OK	Bad	Flt 11	No flights – diurnal out of spec. Crew pulled out for crew change.
<b>Wednesday May 31</b>	N/A	N/A	None	Crew change.
<b>Thursday June 1</b>	N/A	N/A	None	Crew change.
<b>Friday June 2</b>	N/A	N/A	None	Crew change.
<b>Saturday June 3</b>	N/A	N/A	None	Crew change.
<b>Sunday June 4</b>	N/A	N/A	None	Crew change.

**TOTAL FLOWN TO DATE:**

acquired to date : 3749.93 Line kms  
total program size: 5950 +/- Line kms  
% complete: 63 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Equipment Operator/Data Processor – Adam Barrett

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #10 (JUNE 5<sup>th</sup>, 2000 – JUNE 11<sup>TH</sup>, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday June 5<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover
<b>Tuesday June 6<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover
<b>Wednesday June 7<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover
<b>Thursday June 8<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover
<b>Friday June 9<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover
<b>Saturday June 10<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover
<b>Sunday June 11<sup>th</sup></b>	Poor	BAD	None	No flights due to crew changeover

**TOTAL FLOWN TO DATE:**

acquired to date : 3749.93 Line kms  
total program size: 5950 +/- Line kms  
% complete: 63 %

**C-FZHG – Piper Navajo**

OTHER: Please be advised that we are expecting to have completed the crew changeover as of today, Monday. We plan to be back in Kuujjuaq and ready to fly by tomorrow, Tuesday. We have been informed that the weather appears to finally be cooperating and warmer temperatures are being experienced in the area. We also believe the Diurnal has settled down after the severe solar storm of last week.

Pilot – John Schonstrom / Sam Eltawil

Equipment Operator – Adam Barrett / Jeremy Weber

Data Processor – Mark Watts / Paul Klein



**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #11 (JUNE 12, 2000 – JUNE 18, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday June 12</b>	N/A	N/A	None	No flights due to crew changeover
<b>Tuesday June 13</b>	Poor	N/A	None	Aircraft in Ontario awaiting weather.
<b>Wednesday June 14</b>	Poor	N/A	None	Aircraft in Ontario awaiting weather.
<b>Thursday June 15</b>	Poor	N/A	None	Aircraft in Ontario awaiting weather.
<b>Friday June 16</b>	Poor	N/A	None	Aircraft in Ontario awaiting weather.
<b>Saturday June 17</b>	Poor	N/A	None	Crew arrives in Kuujjuaq.
<b>Sunday June 18</b>	Poor	OK	None	No flights due to low cloud, rain and gusting winds.

**TOTAL FLOWN TO DATE:**

acquired to date : 3749.93 Line kms  
total program size: 5950 +/- Line kms  
% complete: 63 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – John Schonstrom / Sam Eltawil

Equipment Operator – Adam Barrett / Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT JUNE 19, 2000 – JUNE 25, 2000**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday June 19</b>	Bad	OK	None	No flights due to low clouds, showers and windy conditions.
<b>Tuesday June 20</b>	Bad	OK	None	No flights due to low clouds, shower and windy conditions.
<b>Wednesday June 21</b>	Bad	OK	None	No flights due to low clouds, shower and windy conditions
<b>Thursday June 22</b>	Bad	OK	None	No flights due to low clouds, shower and windy conditions.
<b>Friday June 23</b>	Bad	OK	None	No flights due to low clouds, shower and windy conditions
<b>Saturday June 24</b>	Poor in am OK in pm	OK	Flt 12	256.1 line km
<b>Sunday June 25</b>	OK in am Poor in pm	OK	Flt 13	95.84 line km. Flight ended early due to increased winds.

**TOTAL FLOWN TO DATE:**

acquired to date : 4101.87 Line kms  
total program size: 5950 +/- Line kms  
% complete: 68.9 %

**C-FZHG – Piper Navajo**

Pilot – John Schonstrom

Pilot – Sam El Tawil

Equipment Operator/Data Processor – Jeremy Weber

**SPECTRA AVIATION SERVICES  
"KUUJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #13 (JUNE 26, 2000 – JULY 2, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday June 26</b>	Poor	Bad	None	No flights due to severe mag. storm and gusting winds.
<b>Tuesday June 27</b>	Poor	Bad	None	No flights due to severe mag. storm and gusting winds.
<b>Wednesday June 28</b>	Poor	Bad in am OK in pm	None	No flights due to low clouds, showers and gusting winds. Mag active in am.
<b>Thursday June 29</b>	Poor	Bad in am OK in pm	None	No flights due to low clouds, showers and gusting winds. Mag active in am.
<b>Friday June 30</b>	OK in am Poor in pm	OK	Flt 16 Flt 17	422.2 line km 319.1 line km
<b>Saturday July 1</b>	OK in am Poor in pm	OK	Flt 18	398.3 line km
<b>Sunday July 2</b>	Poor	OK	None	No flights due to low ceiling and gusting winds.

**TOTAL FLOWN TO DATE:**

acquired to date : 5241.2 Line kms  
total program size: 5950 +/- Line kms  
% complete: 88.1 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #14 (JULY 3, 2000 – JULY 9, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday July 3</b>	Poor	OK	None	Low cloud, rain showers.
<b>Tuesday July 4</b>	Poor	OK	None	Low cloud, rain showers.
<b>Wednesday July 5</b>	Poor	OK	None	Low cloud, rain showers.
<b>Thursday July 6</b>	Poor	OK	None	Low cloud, rain showers, gusting winds.
<b>Friday July 7</b>	Poor	OK	None	Low cloud, rain showers, gusting winds.
<b>Saturday July 8</b>	Poor	OK	None	Dense fog over survey area. Survey crew left Kuujjuaq under sunny blue skies, flew over Georges River under sunny blue skies, only to encounter ground fog obscuring the Torngets and the entire grid.
<b>Sunday July 9</b>	Poor	OK	None	Dense fog over survey area.

**TOTAL FLOWN TO DATE:**

acquired to date : 5241.2 Line kms  
total program size: 5950 +/- Line kms  
% complete: 88.1 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #15 (JULY 10, 2000 – JULY 16, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday July 10</b>	Poor	OK	None	Low cloud in area.
<b>Tuesday July 11</b>	OK	Bad	None	Mag storm.
<b>Wednesday July 12</b>	Poor in am OK in pm	OK	Flt 19	Low cloud, fog in am. 510.2 line km.
<b>Thursday July 13</b>	OK	Bad	None	Major solar activity.
<b>Friday July 14</b>	OK	Bad	None	Major solar activity.
<b>Saturday July 15</b>	OK	Bad	None	Major solar activity
<b>Sunday July 16</b>	Poor	Bad	None	Magnetic storm subsiding. Strong winds gusting to 45 knts.

**TOTAL FLOWN TO DATE:**

acquired to date : 5751.4 Line kms  
total program size: 5950 +/- Line kms  
% complete: 96.6 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJUAQ HRAM SURVEY"**

**BLOCK 1**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #16 (JULY 17, 2000 – JULY 23, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday July 17</b>	Poor	Bad	None	Active magnetics with thunderstorm in survey area.
<b>Tuesday July 18</b>	Poor	Bad	None	Mag storm, thunderstorm in survey area.
<b>Wednesday July 19</b>	Poor	OK in am Bad in pm	None	Thunderstorm in survey area, active diurnal in pm.
<b>Thursday July 20</b>	OK	Bad in am OK in pm	Flt 20	200.6 line km in reflights. 0003 acquisition complete.
<b>Friday July 21</b>	N/A	N/A	N/A	
<b>Saturday July 22</b>	N/A	N/A	N/A	
<b>Sunday July 23</b>	N/A	N/A	N/A	

**TOTAL FLOWN TO DATE:**

acquired to date : 5952 Line kms  
total program size: 5950 +/- Line kms  
% complete: 100 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"  
BLOCK 2**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #1 (JULY 17, 2000 – JULY 23, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday July 17</b>	N/A	N/A	N/A	
<b>Tuesday July 18</b>	N/A	N/A	N/A	
<b>Wednesday July 19</b>	N/A	N/A	N/A	
<b>Thursday July 20</b>	N/A	N/A	N/A	
<b>Friday July 21</b>	OK in am Poor in pm	OK	Flt 1 Flt 2	Flt 1 comp. box 146 line km
<b>Saturday July 22</b>	Poor in am OK in pm	Poor in am OK in pm	Flt 3	occasional active diurnal and fog in am 520 line km
<b>Sunday July 23</b>	OK	OK in am Poor in pm	Flt 4	618.5 line km

**TOTAL FLOWN TO DATE:**

acquired to date : 1284.5 Line kms  
total program size: 6285 +/- Line kms  
% complete: 20.4 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
 "KUUJJUAQ HRAM SURVEY"  
 BLOCK 2**

**AEROMAGNETIC SURVEY  
 WEEKLY REPORT #2 (JULY 24, 2000 – JULY 30, 2000)**

DATE	WEATHER	GEOMAG FIELD	FLIGHTS/ DATA ACQ.	COMMENTS
Monday July 24	OK	OK	Flt 5 Flt 6 Flt 7 Flt 8	Heading test 84 line km 176.9 line km 304.18 line km
Tuesday July 25	OK	OK	Flt 9 Flt 10 Flt 11	FOM test 510.68 line km 503.27 line km
Wednesday July 26	Poor	Poor	None	Low cloud in survey area. Periods of active diurnal.
Thursday July 27	Poor	Poor	None	Low cloud in survey area. Periods of active diurnal.
Friday July 28	N/A	N/A	None	100 hour aircraft inspection.
Saturday July 29	N/A	N/A	None	100 hour inspection.
Sunday July 30	N/A	N/A	None	100 hour inspection.

**TOTAL FLOWN TO DATE:**

acquired to date : 2863.5 Line kms  
 total program size: 6285 +/- Line kms  
 % complete: 45.5 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein



**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"  
BLOCK 2**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #3 (JULY 31, 2000 – AUGUST 6, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday July 31</b>	Poor	Poor	None	No flights due to aircraft maintenance in am, High winds and active diurnal in pm.
<b>Tuesday August 1</b>	OK	OK	Flt 12 Flt 13	541 line km comp flight
<b>Wednesday August 2</b>	OK	OK	Flt 14 Flt 15	587 line km 530.3 line km
<b>Thursday August 3</b>	OK	OK	Flt 16 Flt 17	609.2 line km 691.9 line km
<b>Friday August 4</b>	OK in am Poor in pm	OK	Flt 18	587 line km Rain in pm
<b>Saturday August 5</b>	OK	OK/active Intervals	Flt 19	304.6 line km
<b>Sunday August 6</b>	Poor	Poor	None	Low cloud an fog in area, active diurnal.

**TOTAL FLOWN TO DATE:**

acquired to date : 6714.5 Line kms  
total program size: 6285 +/- Line kms  
% complete: 96.98 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"  
BLOCK 2**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #4 (AUGUST 7, 2000 – AUGUST 13, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday August 7</b>	OK	OK	Flt 20	413 line km. Completion of acquisition.
<b>Tuesday August 8</b>	N/A	N/A	None	
<b>Wednesday August 9</b>	N/A	N/A	None	
<b>Thursday August 10</b>	N/A	N/A	None	
<b>Friday August 11</b>	N/A	N/A	None	
<b>Saturday August 12</b>	N/A	N/A	None	
<b>Sunday August 13</b>	N/A	N/A	None	

**TOTAL FLOWN TO DATE:**

acquired to date : 6821 Line kms  
total program size: 6821 +/- Line kms  
% complete: 100 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"  
BLOCK 3**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #1 (AUGUST 7, 2000 – AUGUST 13, 2000)**

DATE	WEATHER	GEOMAG FIELD	FLIGHTS/ DATA ACQ.	COMMENTS
Monday August 7	N/A	N/A	N/A	
Tuesday August 8	N/A	N/A	N/A	
Wednesday August 9	OK	OK	Flt 1	50.1 line km
Thursday August 10	OK in am Fog in pm	OK	Flt 2 Flt 3	Comp and FOM flight 97.7 line km (flight aborted due to fog)
Friday August 11	OK	Bad	None	Active diurnal all day.
Saturday August 12	OK	Bad	None	Active diurnal all day.
Sunday August 13	Poor	Bad	None	Active diurnal all day. High winds and thunderstorms in survey area.

**TOTAL FLOWN TO DATE:**

acquired to date : 147.8 Line kms  
total program size: 5619 +/- Line kms  
% complete: 2.58 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJUAQ HRAM SURVEY"  
BLOCK 3**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #2 (AUGUST 14, 2000 – AUGUST 20, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday August 14</b>	Poor	Poor	None	No flights due to poor weather and active diurnal all day.
<b>Tuesday August 15</b>	Poor	OK	Flt 3	36.2 line km. Flight cut short due to high winds and severe turbulence
<b>Wednesday August 16</b>	Poor	OK	None	No flights due to high winds and heavy turbulence.
<b>Thursday August 17</b>	OK	OK	None	No flights due to aircraft 50 hour inspection
<b>Friday August 18</b>	Poor	OK	None	No flights due to fog, low cloud and rain
<b>Saturday August 19</b>	Poor	OK	None	No flights due to fog, low cloud and rain
<b>Sunday August 20</b>	Poor in am OK in pm	OK	Flt 4	68.3line km

**TOTAL FLOWN TO DATE:**

acquired to date : 252.3 Line kms  
total program size: 6821 +/- Line kms  
% complete: 3.7 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"  
BLOCK 3**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #3 (AUGUST 21, 2000 – AUGUST 27, 2000)**

DATE	WEATHER	GEOMAG FIELD	FLIGHTS/ DATA ACQ.	COMMENTS
Monday August 21	Poor	OK	Flt 4	Flight aborted, area obscured by fog
Tuesday August 22	OK	OK	Flt 5 Flt 6(ties) Flt 7(traverse)	444.35 line km 205.68 line km
Wednesday August 23	Poor in am OK in pm	OK	Flt 8	481.8 line km
Thursday August 24	OK	OK	Flt 9 Flt 10	74.1 line km 243.4 line km
Friday August 25	OK	OK	None	No flights, pilot got food poisoning.
Saturday August 26	Poor	OK	Flt 11	Flight aborted, area obscured by fog
Sunday August 27	Poor	OK	None	No flights due to low cloud in area.

**TOTAL FLOWN TO DATE:**

acquired to date : 1701.6 Line kms  
total program size: 6821 +/- Line kms  
% complete: 30.28 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJUAQ HRAM SURVEY"  
BLOCK 3**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #4 (AUGUST 28, 2000 – SEPTEMBER 3, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday August 28</b>	OK	Bad	None	Major magnetic storm.
<b>Tuesday August 29</b>	OK	Bad	None	Major magnetic storm.
<b>Wednesday August 30</b>	OK/poor	Bad	None	Major magnetic storm.
<b>Thursday August 31</b>	Poor	OK	Aborted	Fog and rain in survey area. Flight aborted due to low visibility.
<b>Friday September 1</b>	Poor	Poor in am	None	Fog and rain in survey area.
<b>Saturday September 2</b>	Poor	Poor in am	None	Fog and rain in survey area.
<b>Sunday September 3</b>	Poor	OK	Aborted	Fog and rain in survey area. Flight aborted due to low visibility

**TOTAL FLOWN TO DATE:**

acquired to date : 1701.6 Line kms  
total program size: 6821 +/- Line kms  
% complete: 30.28 %

**C-FZHG – Piper Navajo**

**OTHER:**

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJUAQ HRAM SURVEY"  
BLOCK 3**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #5 (SEPTEMBER 4, 2000 – SEPTEMBER 10, 2000)**

DATE	WEATHER	GEOMAG FIELD	FLIGHTS/ DATA ACQ.	COMMENTS
Monday September 4	Poor	Bad	None	Fog throughout area.
Tuesday September 5	Poor	OK	None	Fog throughout area.
Wednesday September 6	Poor	OK	None	Fog throughout area.
Thursday September 7	Poor	OK	None	Fog throughout area.
Friday September 8	Poor	OK	None	Fog throughout area.
Saturday September 9	Poor	OK	None	Fog throughout area.
Sunday September 10	Bad in am OK in pm	OK	Flt 12	392 line km Thunderstorms moving through area in am

**TOTAL FLOWN TO DATE:**

acquired to date : 2093.6 Line kms  
total program size: 5619 +/- Line kms  
% complete: 37.3 %

C-FZHG – Piper Navajo

OTHER:

Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

**SPECTRA AVIATION SERVICES  
"KUUJJUAQ HRAM SURVEY"  
BLOCK 3**

**AEROMAGNETIC SURVEY  
WEEKLY REPORT #6 (SEPTEMBER 11, 2000 – SEPTEMBER 17, 2000)**

<b>DATE</b>	<b>WEATHER</b>	<b>GEOMAG FIELD</b>	<b>FLIGHTS/ DATA ACQ.</b>	<b>COMMENTS</b>
<b>Monday September11</b>	Poor in am	OK	Flt 13	457 line km
<b>Tuesday September12</b>	Poor	OK	None	Fog throughout area.
<b>Wednesday September13</b>	Poor	OK	None	Weather no good for acquisition, crew en route to Calgary
<b>Thursday September14</b>	N/A	N/A	N/A	
<b>Friday September15</b>	N/A	N/A	N/A	
<b>Saturday September16</b>	N/A	N/A	N/A	
<b>Sunday September17</b>	N/A	N/A	N/A	

**TOTAL FLOWN TO DATE:**

acquired to date : 2550.6 Line kms  
total program size: 5619 +/- Line kms  
% complete: 45.4 %

**C-FZHG – Piper Navajo**

**OTHER:**

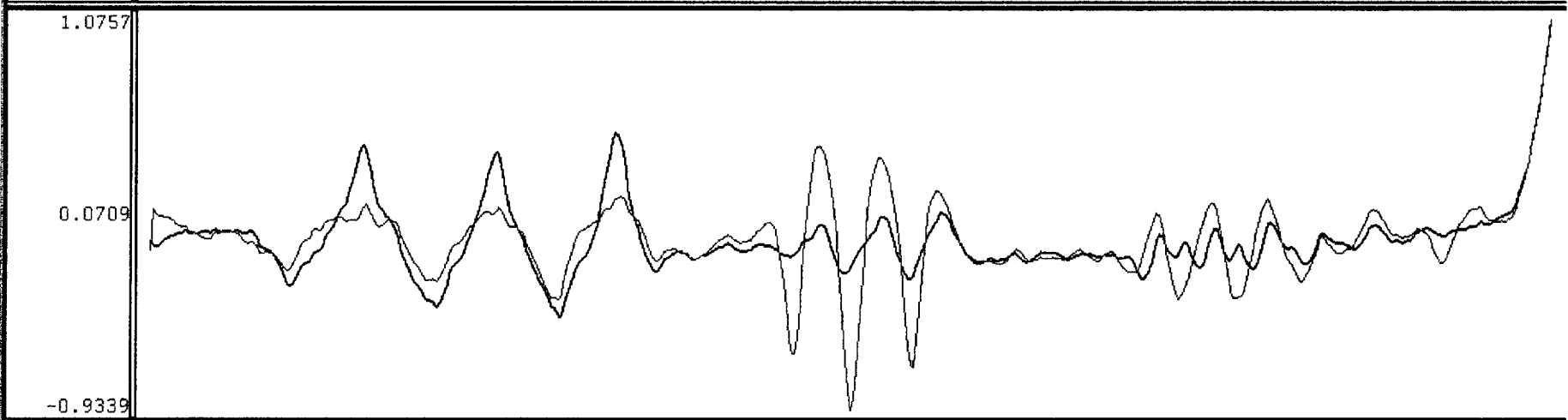
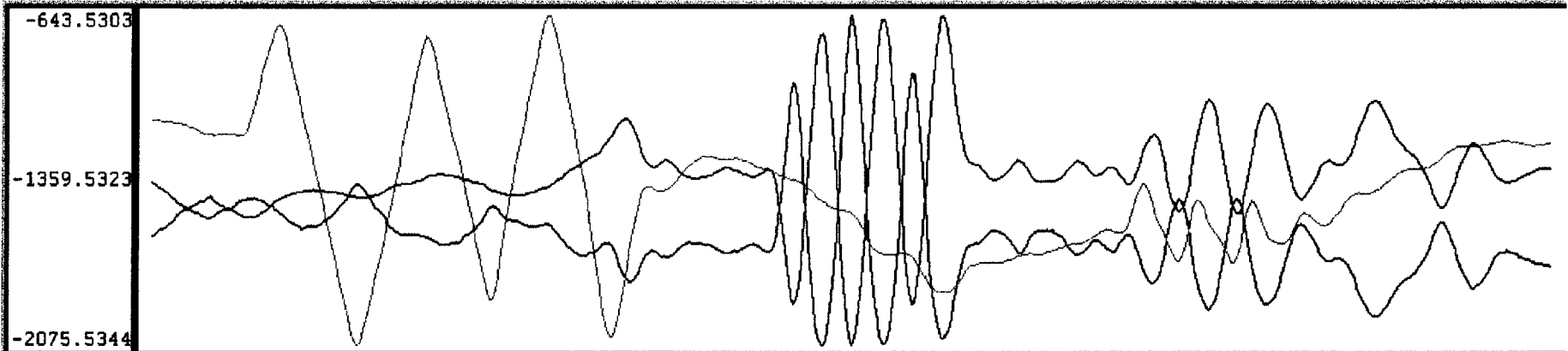
Pilot – Sam El-tawil

Equipment Operator/Field Data Processor – Jeremy Weber

Data Processor – Paul Klein

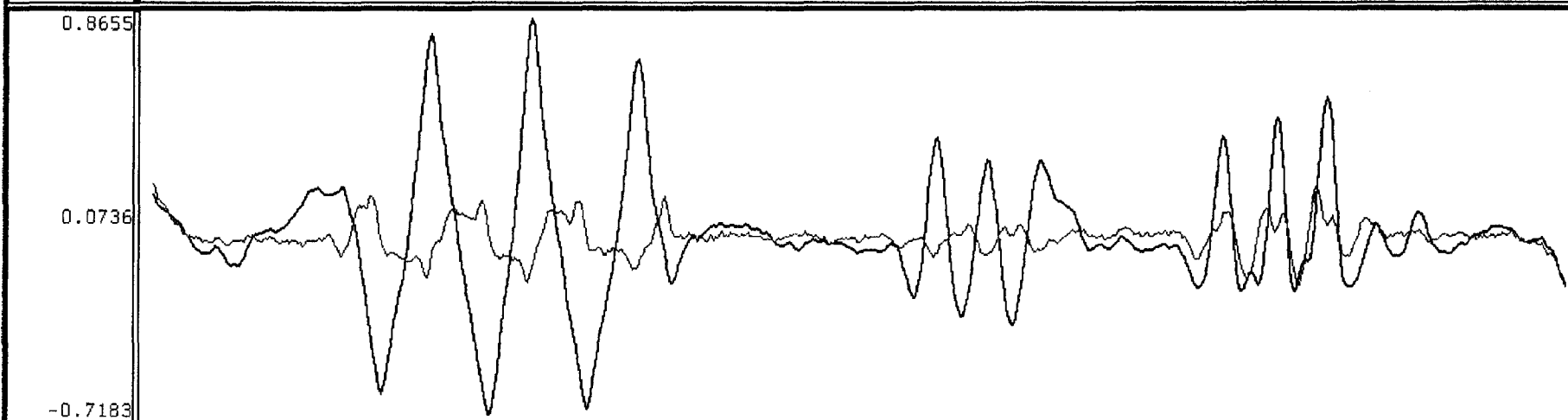
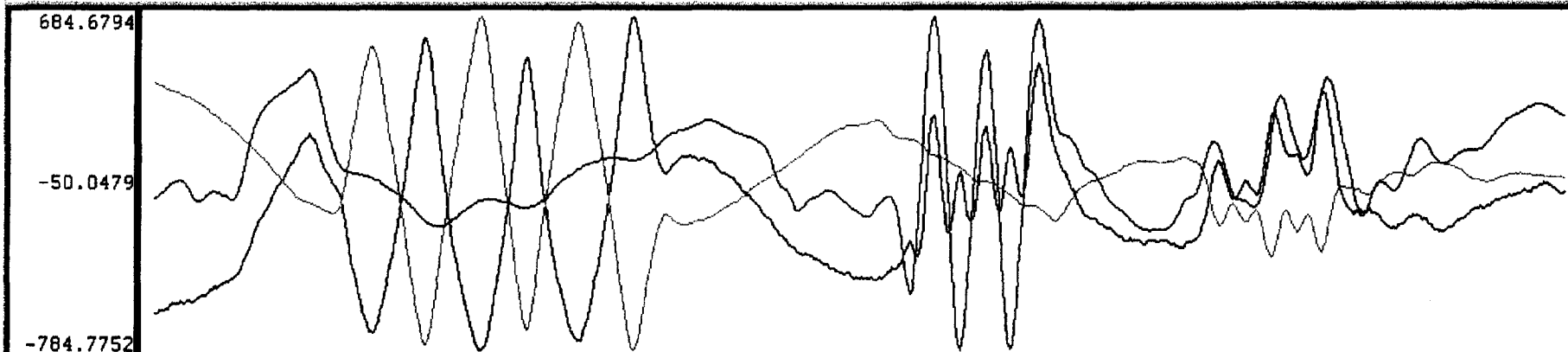


	HEAD	FID	RAD	XDEV	YDEV	ZDEV	N OUT	PMA1	MAG1	mag1hp	pma1hp
14.7	43.00	1735.7000	2455.9712	-5482.9893	-158.9936	-1421.1766	0.0000	56991.3040	56989.7600	0.0597	0.0105
14.8	43.00	1735.8000	2455.9712	-5483.2944	-123.2887	-1421.7870	0.0000	56991.4040	56989.8300	0.0378	0.0142
14.9	43.00	1735.9000	2455.9712	-5483.5996	-90.3303	-1421.1766	0.0000	56991.4970	56989.8980	0.0141	0.0105
15.0	43.00	1736.0000	2455.9712	-5484.5151	-56.7616	-1419.6509	0.0000	56991.5800	56989.9630	-0.0129	-0.0038



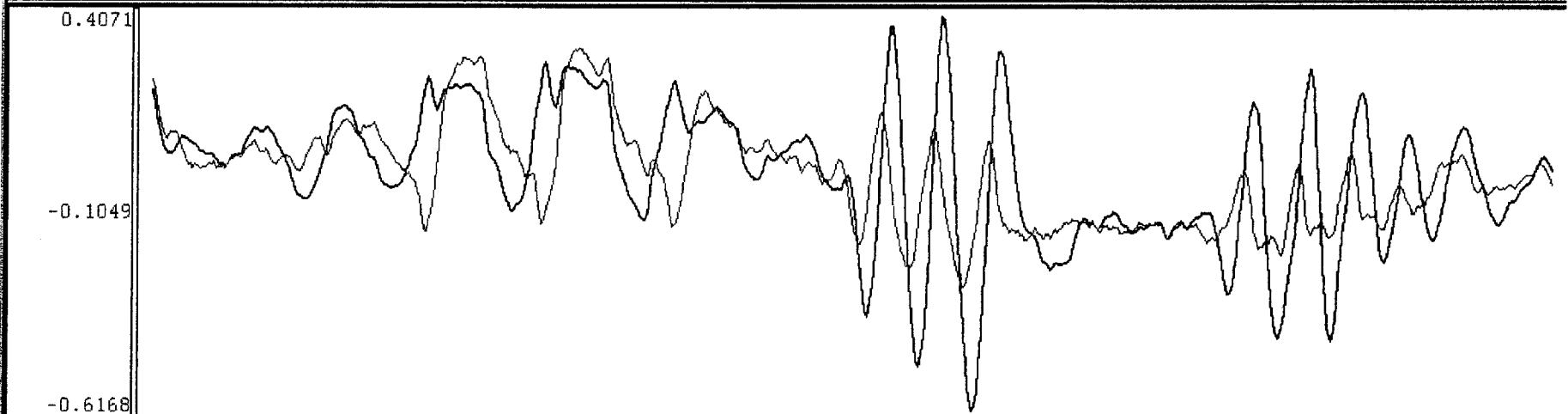
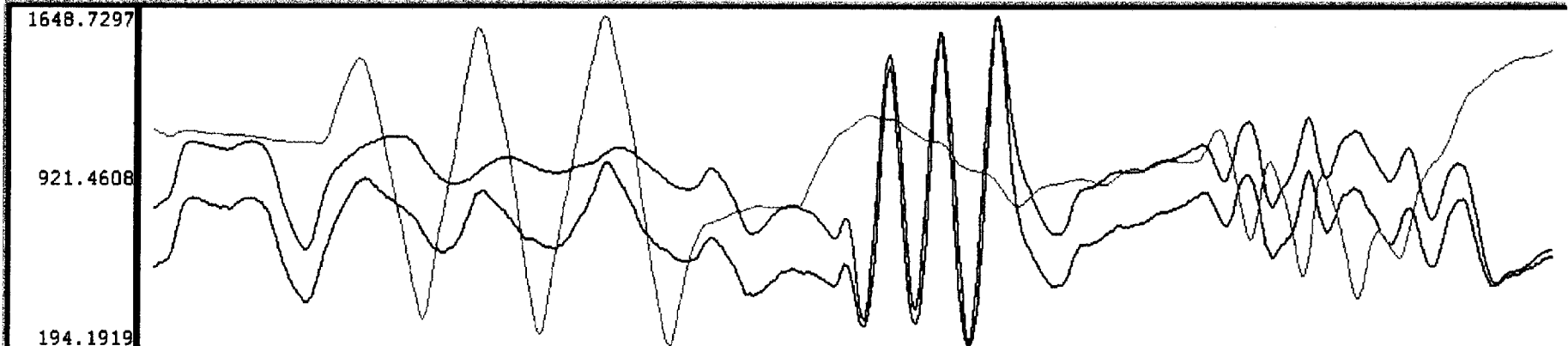
ZDEV	-0.6	28.5	57.6
(Fid)			

	HEAD	FID	RAD	XDEV	YDEV	ZDEV	N OUT	PMA1	MAG1	mag1hp	pma1hp
14.7	315.00	1670.7000	2455.9712	-5609.0244	-537.4044	-134.8851	0.0000	57045.1850	57044.1120	-0.3585	0.0711
14.8	315.00	1670.8000	2455.9712	-5612.3813	-507.4977	-130.9179	0.0000	57045.0950	57043.9550	-0.4133	0.0671
14.9	315.00	1670.9000	2455.9712	-5613.9072	-489.4927	-126.6456	0.0000	57045.0420	57043.8010	-0.4681	0.1007
15.0	315.00	1671.0000	2455.9712	-5613.9072	-485.5255	-122.9835	0.0000	57044.9780	57043.6510	-0.5221	0.1237



ZDEV	-0.6	32.5	65.5
(Fid)			

	HEAD	FID	RAD	XDEV	YDEV	ZDEV	N OUT	PMA1	MAG1	mag1hp	pma1hp
14.7	229.00	1605.7000	2455.9712	-5509.2339	705.2479	931.9892	0.0000	57173.8770	57171.9280	0.2160	0.2793
14.8	229.00	1605.8000	2455.9712	-5505.2666	735.7649	939.3132	0.0000	57173.6690	57171.7150	0.2117	0.2720
14.9	229.00	1605.9000	2455.9712	-5500.0791	758.3475	946.9425	0.0000	57173.4590	57171.4950	0.2022	0.2653
15.0	229.00	1606.0000	2455.9712	-5498.5532	768.7232	954.8770	0.0000	57173.2590	57171.2760	0.1956	0.2710



ZDEV	-0.6	32.5	65.5
(Fid)			

