Assessment Report on Geophysics

Yak, Tour & Cold Claims, Yahk Area

Fort Steele Mining Division
British Columbia

NTS Maps 82G/4 & 82F/1
49°05'N. Latitude
116°00'W. Longitude

Owner:
Hastings Management Corp.
1000-675 W. Hastings Street
Vancouver, B.C., V6B 1N2

Operator:
Abitibi & Sedex Mining Corp.
Cranbrook Project
3380 Wilks Road
P.O. Box 215
Cranbrook, B.C., V1C 4H7

Report By:
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November 4, 1996

WP7 File: Assrpt.5

Cranbrook Field Office

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1.00 INTRODUCTION

1.10 Location and Access

The Yak, Tour and Cold mineral claims collectively referred to as the Yak claim block are located northeast of the town of Yahk, B.C. See the index map (figure 1) for the location of the claim block. The claims extend from the town of Yahk approximately 12 km northeastward over the Mount Mahon area. The claims are located east of the Moyie River, north of Hawkins Creek and east of the Cold Creek drainages in the Fort Steele Mining Division on reference maps NTS 82F/1 and 82G/4 and centered near 49°05'N latitude and 116°00'W longitude.

The property is accessed from highway 95 at Yahk eastward along the Hawkins Creek improved road to the Mount Mahon, Meadow Lake and Cold Creek unimproved roads. Most of the property is crossed by active and inactive logging roads.

1.20 History

The Yak claim block has been examined by several companies in the past:

Company	Years	AR #	Work
Kennco	1966	813	soil survey
Minnova	1987	17633	mapping, CSAMT, geochem
	1988	18152	gravity survey
	1989	19957	2 DDH (ST-89-1,2)
	1990	21537	geochemical soil sampling survey
	1992	22197	3 DDH (MM-91-01,02,03)
	1992	22233	1 DDH (ST-91-03)
	1992	22692	3 DDH (MM-92-04,05,06)
Chevron	1983	12206	gravity survey
	1984	12206	geochemical soil sampling
	1984	12207	geological mapping
	1985	14240	gravity, EM-37, geochemical soil sampling
	1985	14275	1 DDH (MM-84-1)
	1988	17078	1 DDH (MM-87-01)
	1991	21959	1 DDH (MM-91-01)

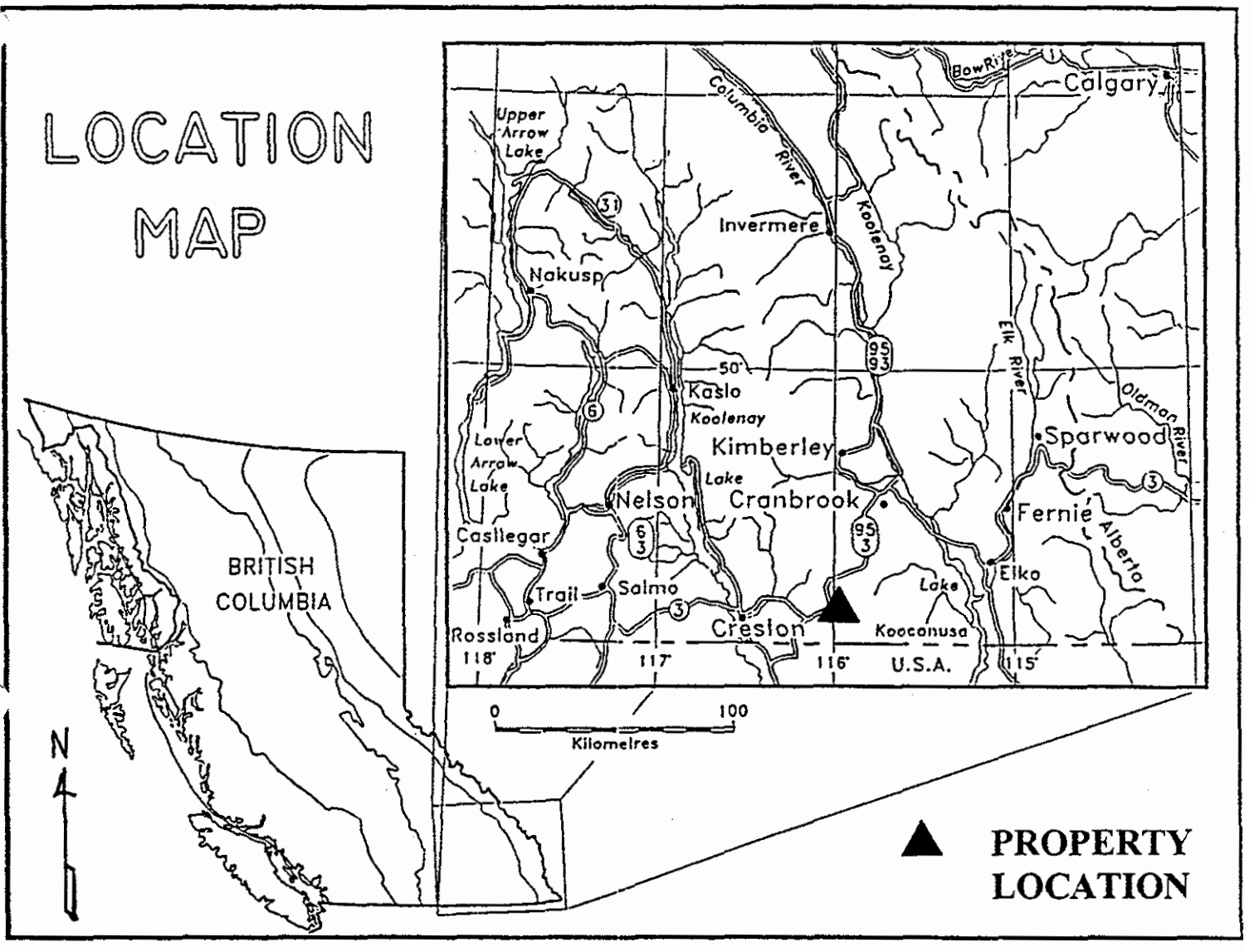


Figure 1.--Location Map.

St. Eugene	1979	7785	geology
	1980	8182	geochemical soil sampling
	1980	8217	2 DDH (YA-7 & 8)
	1980	8275	geochemical soil sampling
	1981	9373	magnetic & VLF surveys
	1981	9530	1 DDH (Y-13-81)
	1982	10284	1 DDH (Y-10-81)
Cominco	1981	9179	geochemical soil sampling
	1981	10,498	trenching and sampling
	1984	12193	UTEM geophysical survey
	1991	21787	3 DDH (C-91-01,02,03)
	1992	22609	UTEM geophysical survey
Kokanee	1990	19952	VLF and geochemical soil and stream surveys
	1990	20827	2 DDH (E-90-1&2)
	1990	20828	2 DDH (E-90-4&5)
	1990	20829	1 DDH (E-90-3)

1.30 Physiography

The property is situated in the Yahk Range and elevations range from 900 m at the Moyie River to over 1900 m at Mount Mahon. The topography of the area is one of modest relief with rounded, heavily forested mountains.

The forest cover consists of immature stands of fir, larch and spruce. Much of the property was logged over years ago and many areas have filled in with a high density of scrub and stands of alder. Traverses are difficult necessitating cut lines and GPS control for location.

1.40 Property

The Yak claim block consisting of 248 claim units and 150 Yak, Tour and Cold claims (figure 2) are a contiguous block of claims owned by Abitibi & Sedex Mining Corp., 1000-675 W. Hastings St., Vancouver, B.C. with the following subdivision:

Claim Name	Tenure No.	No. Units	Current Expiry Date
Yak	349703	9	20-Aug-98
Yak 1	339622	15	06-Sep-97
Yak 2	339643	1	06-Sep-97
Yak 3	339644	1	06-Sep-97
Yak 4	339645	1	06-Sep-97

563 904 570 240 116° 00' 00" W 576 576 589 912

MINERAL & PLACER RESERVE
% 660, 20-2-75
SUBJECT TO CONDITIONS

PROV. PARK

OUTLINE OF YAK CLAIM BLOCK

YAK
339234
36X36

YAHK
PROV. PARK

YAK 1
339622

TOUR 4
342079

TOUR 1

TOUR 340324

340324

TOUR 2
340419

TOP
209799
•952•

YAHK
BLOCK B
209760
L 4591
•721•

ALDER
209783
•753•

PINE
209784
•754•

VULCAN
340210

TOUR 3
340420

CANAM 21
212024
•1621•

CANAM 2
210673
•3470•

CANAM 21
210673
•3470•

CANAM 3
210674
•3471•

CANAM 20
212023
•1620•

CANAM 14
212031732

XANADU
338751
YAHK TIE RESERVE

CANAM 12
210949
•3946•

CANAM 5
210676
•3473•

CANAM 5 SL
210676
•3473•

CANAM 9
210703
•3500•

SL 78

SL 9

SL 5

SL 31

Hawkins Cr.

America Cr.

N

SCALE 1:50,000

1000 0 1000 2000
METERS

FIG. 2 CLAIM MAP
YAHK AREA, B.C.

Claim Name	Tenure No.	No. Units	Current Expiry Date
Yak 5	340888	1	06-Oct-97
Yak 6	340889	1	06-Oct-97
Yak 7	340890	1	06-Oct-97
Yak 8	340891	1	06-Oct-97
Yak 9	340892	1	06-Oct-97
Yak 10	340893	1	06-Oct-97
Yak 11	340894	1	06-Oct-97
Yak 12	340895	1	06-Oct-97
Yak 13	340896	1	06-Oct-97
Yak 14	340897	1	06-Oct-97
Yak 15	340898	1	06-Oct-97
Yak 16	340899	1	06-Oct-97
Yak 17	342080	1	04-Nov-97
Yak 18	342081	1	04-Nov-97
Yak 19	342082	1	04-Nov-97
Yak 20	342083	1	04-Nov-97
Yak 21	342084	1	04-Nov-97
Yak 22	342085	1	04-Nov-97
Yak 23	342086	1	04-Nov-97
Yak 24	342087	1	04-Nov-97
Yak 25	342088	1	04-Nov-97
Yak 26	342089	1	04-Nov-97
Yak 27	342090	1	04-Nov-97
Yak 28	342091	1	04-Nov-97
Yak 29	342092	1	04-Nov-97
Yak 30	342093	1	04-Nov-97
Yak 31	342094	1	04-Nov-97
Yak 32	342095	1	04-Nov-97
Yak 33	342389	1	18-Nov-97
Yak 34	342390	1	18-Nov-97
Yak 35	342391	1	18-Nov-97
Yak 36	342392	1	18-Nov-97
Yak 37	342393	1	18-Nov-97
Yak 38	342394	1	18-Nov-97
Yak 39	342125	1	31-Oct-97
Yak 40	342126	1	07-Nov-97
Yak 41	342127	1	07-Nov-97
Yak 42	342128	1	07-Nov-97
Yak 43	342129	1	07-Nov-97

Claim Name	Tenure No.	No. Units	Current Expiry Date
Tour 1	340324	20	26-Sep-97
Tour 2	340419	20	29-Sep-97
Tour 3	340420	20	29-Sep-97
Tour 4	342079	20	31-Oct-97
Cold 1	344333	1	04-Mar-98
Cold 2	344334	1	04-Mar-98
Cold 3	344335	1	04-Mar-98
Cold 4	344336	1	04-Mar-98
Cold 5	344337	1	04-Mar-98
Cold 6	344338	1	04-Mar-98
Cold 7	344339	1	04-Mar-98
Cold 8	344340	1	04-Mar-98
Cold 9	344341	1	04-Mar-98
Cold 10	344342	1	04-Mar-98
Cold 11	344343	1	04-Mar-98
Cold 12	344344	1	04-Mar-98
Cold 13	344345	1	04-Mar-98
Cold 14	344346	1	04-Mar-98
Cold 15	344347	1	04-Mar-98
Cold 16	344348	1	04-Mar-98
Cold 17	344349	1	04-Mar-98
Cold 18	344350	1	04-Mar-98
Cold 19	344351	1	06-Mar-98
Cold 20	344352	1	06-Mar-98
Cold 21	344353	1	06-Mar-98
Cold 22	344354	1	06-Mar-98
Cold 23	344355	1	06-Mar-98
Cold 24	344356	1	06-Mar-98
Cold 25	344357	1	06-Mar-98
Cold 26	344358	1	06-Mar-98
Cold 27	344359	1	06-Mar-98
Cold 28	344360	1	06-Mar-98
Cold 29	344361	1	06-Mar-98
Cold 30	344362	1	06-Mar-98
Cold 31	344363	1	06-Mar-98
Cold 32	344364	1	06-Mar-98
Cold 33	344365	1	07-Mar-98
Cold 34	344366	1	07-Mar-98
Cold 35	344367	1	07-Mar-98
Cold 36	344368	1	07-Mar-98

Claim Name	Tenure No.	No. Units	Current Expiry Date
Cold 37	344369	1	07-Mar-98
Cold 38	344370	1	07-Mar-98
Cold 39	344371	1	07-Mar-98
Cold 40	344372	1	07-Mar-98
Cold 41	344373	1	07-Mar-98
Cold 42	344374	1	07-Mar-98
Cold 43	344375	1	07-Mar-98
Cold 44	344376	1	07-Mar-98
Cold 45	344377	1	06-Mar-98
Cold 46	344378	1	06-Mar-98
Cold 47	344379	1	06-Mar-98
Cold 48	344380	1	06-Mar-98
Cold 49	344381	1	07-Mar-98
Cold 50	344382	1	07-Mar-98
Cold 51	344385	1	07-Mar-98
Cold 52	344386	1	07-Mar-98
Cold 53	344387	1	07-Mar-98
Cold 54	344388	1	07-Mar-98
Cold 55	344389	1	07-Mar-98
Cold 56	344420	1	07-Mar-98
Cold 57	344421	1	07-Mar-98
Cold 58	344422	1	07-Mar-98
Cold 59	344423	1	09-Mar-98
Cold 60	344424	1	09-Mar-98
Cold 61	344425	1	09-Mar-98
Cold 62	344426	1	09-Mar-98
Cold 63	344427	1	09-Mar-98
Cold 64	344428	1	09-Mar-98
Cold 65	344429	1	09-Mar-98
Cold 66	344430	1	09-Mar-98
Cold 67	344431	1	09-Mar-98
Cold 68	344432	1	09-Mar-98
Cold 69	344433	1	09-Mar-98
Cold 70	344434	1	09-Mar-98
Cold 71	344435	1	09-Mar-98
Cold 72	344436	1	09-Mar-98
Cold 73	344437	1	09-Mar-98
Cold 74	344438	1	09-Mar-98
Cold 75	344439	1	09-Mar-98
Cold 76	344440	1	09-Mar-98
Cold 77	344441	1	09-Mar-98

Claim Name	Tenure No.	No. Units	Current Expiry Date
Cold 78	344442	1	09-Mar-98
Cold 79	344443	1	12-Mar-98
Cold 80	344444	1	12-Mar-98
Cold 81	344445	1	12-Mar-98
Cold 82	344446	1	12-Mar-98
Cold 83	344447	1	11-Mar-98
Cold 84	344448	1	11-Mar-98
Cold 85	344449	1	11-Mar-98
Cold 86	344450	1	11-Mar-98
Cold 87	344451	1	11-Mar-98
Cold 88	344452	1	11-Mar-98
Cold 89	344453	1	11-Mar-98
Cold 90	344454	1	11-Mar-98
Cold 91	344455	1	11-Mar-98
Cold 92	344456	1	11-Mar-98
Cold 93	344457	1	12-Mar-98
Cold 94	344458	1	12-Mar-98
Cold 95	344459	1	12-Mar-98
Cold 96	344460	1	12-Mar-98
Cold 97	344461	1	12-Mar-98
Cold 98	344462	1	12-Mar-98
Cold 99	344463	1	12-Mar-98
Cold 100	344464	1	12-Mar-98
Cold 101	344465	1	12-Mar-98
Cold 102	344470	1	12-Mar-98

2.00 GEOLOGY

2.10 Regional Geology

The Proterozoic Purcell Supergroup (Belt Supergroup in the United States), a siliciclastic and carbonate sediment sequence at least 12 km thick, accumulated in a pericratonic basin between about 1500 and 1350 Ma (figure 3). It is preserved in an area 750 km long and 550 km wide, extending from southeastern British Columbia to eastern Washington, Idaho and western Montana. In British Columbia, the Purcell Supergroup is exposed in the Purcell anticlinorium, a broad, gently north-plunging structural culmination. The Yahk area is underlain largely by the Aldridge Formation, the lowermost division of the Purcell Supergroup.

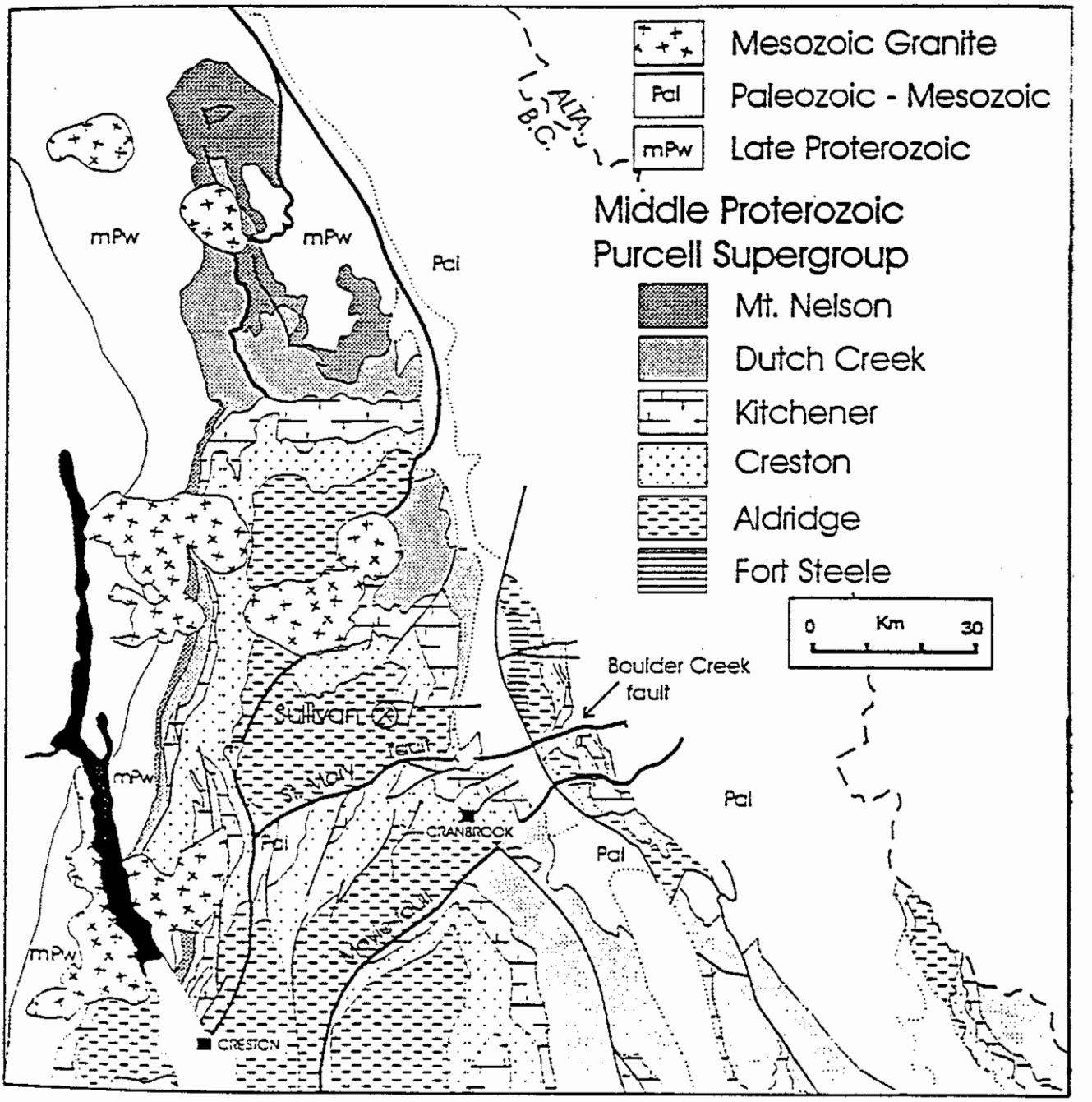


Figure 3.--Regional geology map of the Purcell Supergroup, Southeastern British Columbia.

2.20 Property Geology

Strata equivalent to the lower Aldridge Formation occur on the Yak claim block, based on stratigraphic distance below the lowest middle Aldridge marker laminite, lack of any markers in over 700 meters of stratigraphy, and presence of numerous Moyie sills. However, the outcrops are unlike the typical rusty weathering, thin-bedded siltstone and argillite of the lower Aldridge Formation farther east in the basin. They are generally thick-bedded, grey-weathering (non-rusty), quartzitic wackes, and are called the "Ramparts facies" for their type locality east of Creston as defined by Cominco.

The area remains attractive for exploration. The Lower-Middle Aldridge contact outcrops in the area. There are numerous sills that change thickness rapidly across inferred faults and exposures of albitite alteration and fragmental rocks.

3.00 AIRBORNE MAGNETIC SURVEY

3.10 Scope of Present Work

The objective of the 1996 airborne magnetic survey was to complete a magnetic survey over parts of the Yak claim block not planned to be covered by the future release Area 3. See figure 4 for the location of both the future release Area 3 and the position of the current airborne magnetic survey.

Reference:

British Columbia Ministry of Employment and Investment, 1996, Map of conductors and apparent conductivity (7200 Hz, CP) East Kootenay Geophysical Survey, St. Mary River--West Area, British Columbia; NTS 82F/9, 10, 15, 16, Open File 1996-23, scale 1:50,000.

3.20 Contractor

In August of 1996, High-Sense Geophysics Ltd, was contracted by Hastings Management Corporation to provide a detailed, precision, low-level helicopterborne magnetic survey over the Yak claim block. The survey was flown between August 24 and September 1, 1996. A total of 839.90 line km of total field magnetic data was collected over the Yak claim block.

3.30 Survey Parameters

A 9-page logistic report for the survey given in the appendix lists the details of the survey.

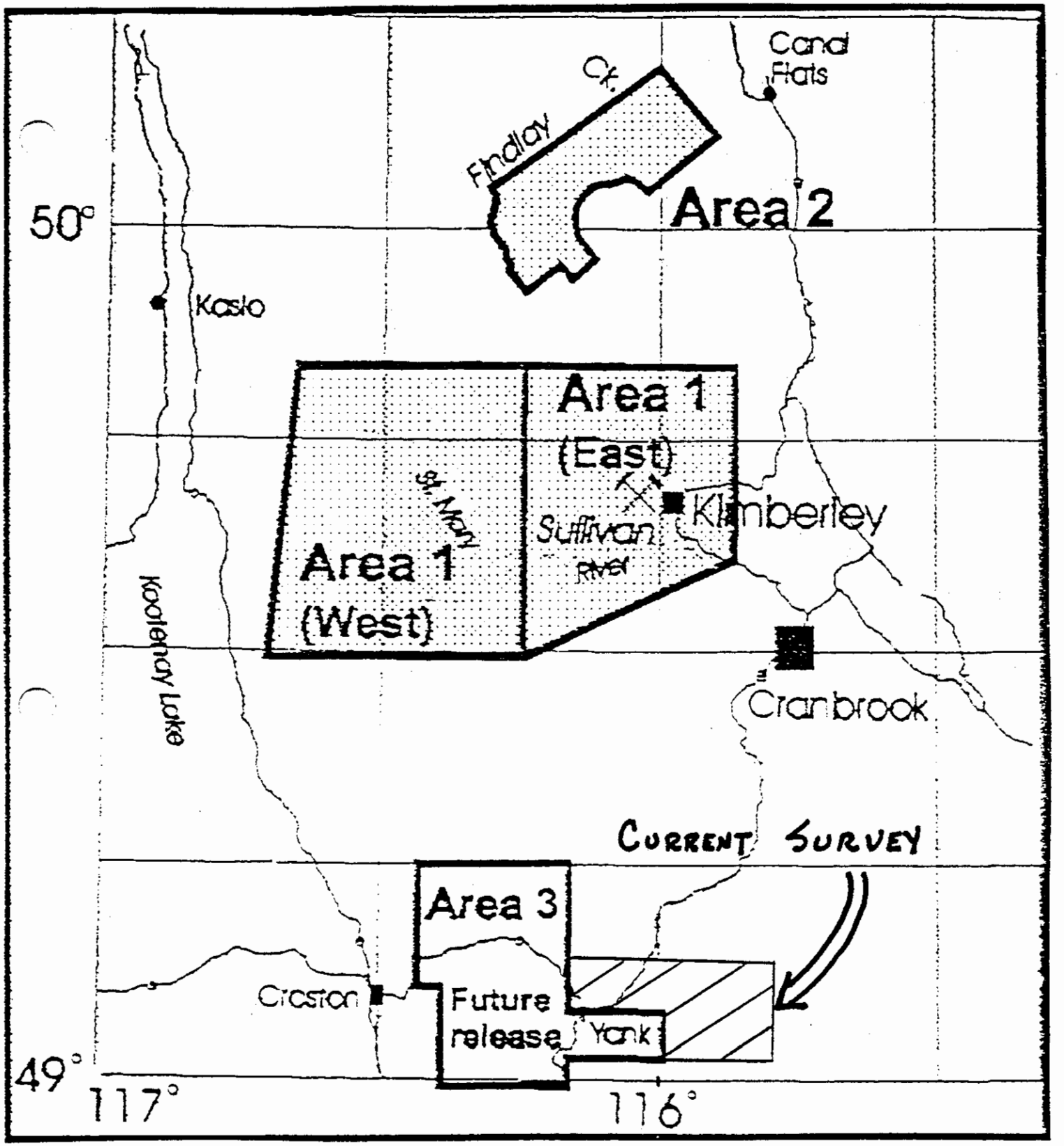


Figure 4.--Location map of Government funded airborne geophysical surveys and current survey.

3.40 Survey Perimeter Coordinates

Corner No.	Easting (m)	Northing (m)
1	582 000	5 443 000
2	582 000	5 433 000
3	573 000	5 433 000
4	573 000	5 438 000
5	561 000	5 438 000
6	561 000	5 443 000

3.50 Survey Specifications

Traverse line spacing	: 200 meters
Control line spacing	: 3 km
Nominal terrain clearance	: 45 m sensor height 65 m aircraft height
Navigation	: Global Positioning System
Traverse line direction	: East-West
Control line direction	: Perpendicular to line direction
Measurement interval	: 0.1 sec
Airspeed (nominal)	: 90 km/hr
Measurement spacing (nominal)	: 2.5 m
Airborne digital record	: radar altimeter Total Field Magnetics Time (Local and GPS) Raw GPS data
Base station record	: Ambient Total Magnetic Field Raw GPS data Time (Local and GPS)

4.00 RESULTS OF AIRBORNE MAGNETIC SURVEY

The results of the Yak airborne magnetic survey are shown on figure 5 (1:50,000 scale, in pocket), a plot of the total magnetic field with a contour interval of 2, 10, 50, 250 nT.

4.10 Anomaly A

A 5000 meter-long north-south-trending positive magnetic anomaly on the western edge of the survey extends from (5 443 000 m N., 561 000 m E.) To (5 438 000 m N., 561 000 m E.) and coincides with the Moyie Fault zone just east of the Goatfel tourmalinite occurrence on Open File Map 1995-14.

4.20 Anomaly B

A 6500 meter-long northeast-southwest-trending positive magnetic anomaly on the central part of the survey extends from (5 443 000 m N., 571 000 m E.) to (5 438 000 m N., 567 000 m E.) and coincides with the Yahk Fault along the west side of the Moyie anticline on Open File Map 1995-14.

4.30 Anomaly C

A bipolar positive/negative magnetic anomaly is centered on the central part of the survey at approximately (5 442 500 m N., 574 000 m E.). No geologic maps are available for the area but the character of the anomaly suggests an intrusive body.

4.40 Anomaly D

A 5500 meter-long north-south-trending positive magnetic anomaly occurs in the central part of the survey and extends from (5 443 000 m N., 574 500 m E.) to (5 433 000 m N., 575 000 m E.). No geologic maps are available for the area but the character of the anomaly suggests a dike-like intrusive body.

4.50 Anomaly E

A 10,000 meter-long north-south-trending positive magnetic anomaly occurs in the eastern part of the survey and extends from (5 443 000 m N., 580 000 m E.) to 5 433 000 m N., 581 000 m E.). No geologic maps are available for the area but the character of the anomaly is suggestive of Creston Formation.

5.00 CONCLUSIONS AND RECOMMENDATIONS

The 840 line-km airborne magnetic survey over the Yak claim block produced anomalies A & B associated with fault zones on the western part of the survey area and anomalies C & D related to probable (?) intrusives on the eastern part. Anomaly E is indeterminate but could be related to Creston Formation in the unmapped area.

A follow up field examination of the 5 anomalies is recommended for the 1997 field season to determine the cause of the anomalies.

6.00 STATEMENT OF COSTS

Airborne Geophysical Survey (High-Sense)	
840 ln-km @ $48.55/ln-km plus GST	$43,794
Mobilization/Demobilization (High-Sense)	1,500
Maps	750
Field Supervision (Bob Woodfill)	
5-days @ $400/day	2,000
Project Supervision (Glen Rodgers)	
6-day @ $200/day	1,200
Report Preparation (Bob Woodfill)	
1-day interpretation	400
1-day preparing report	400
Supplies/copies	50
Total	$50,094

7.00 STATEMENT OF QUALIFICATIONS

I, Robert Woodfill, Ph.D. certify that:

1. I am a Ph. D. graduate of Purdue University in structural geology and a M.S. graduate of the University of Wyoming in geophysics. I am a registered Professional Geologist in the State of Wyoming.

2. I have based this report on work done by myself during 1996 on the Yak claim block as field supervisor for the High-Sense airborne magnetic survey.

3. I do not expect to receive any share consideration as a result of writing this report.

4. I have practiced my profession continuously over the last 24 years as an exploration geologist/geophysicist working in the United States, Alaska, Canada, Mexico, Australia and Africa.

Signed: Robert Woodfill
Robert Woodfill, Ph.D.

Date: November 5, 1996

I, Glen Rodgers, certify that:

1. I am a graduate of the University of Manitoba School of Geological Engineering (1977) and am registered with the British Columbia Association of Professional Engineers and Geoscientists as a P. Eng.

2. I have based this report on work done by myself during 1996 on the Yak claims as well as overall supervision of the project.

3. I do not expect to receive any share consideration as a result of writing this report.

4. I have practiced my profession continuously over the last 20 years as an exploration geologist working in Canada, Alaska and Central America.

Signed: _____
Glen M. Rodgers, P. Eng.

Date: NOV. 5/96

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. M. RODGERS

Logistics
Report

for a

Detailed Helicopter Magnetic Survey

of

Moyie & Yahk Survey Blocks
near Cranbrook, British Columbia

carried out on behalf of

HASTINGS MANAGEMENT CORP.
by

High-Sense Geophysics Limited

Toronto, Canada
SEPTEMBER, 1996
(960808-2)

TABLE OF CONTENTS

1. INTRODUCTION

In August of 1996, High-Sense Geophysics Ltd. was contracted by Hastings Management Corporation to provide a detailed, precision, low level helicopterborne magnetic survey over two survey blocks designated as Moyie and Yahk.

The survey was flown between August 24 and September 10, 1996. A total of 2086.6 line kilometres of total field magnetic data was collected.

2. LOCATION

The survey was carried out from a base located in the town of Cranbrook, British Columbia. The Moyie and Yahk blocks are situated approximately 35 km southwest and 55km SSW, respectively, of Cranbrook. The block perimeters are listed as follows:

2.1 Survey Perimeter Coordinates

Moyie Survey Block:

Corner No.	Easting (m)	Northing (m)
1	564 000	5 472 000
2	563 000	5 470 000
3	560 000	5 470 000
4	560 000	5 458 000
5	562 000	5 458 000
6	562 000	5 455 000
7	574 000	5 455 000
8	574 000	5 472 000

Yahk Survey Block:

Corner No.	Easting (m)	Northing (m)
1	582 000	5 443 000
2	582 000	5 433 000
3	573 000	5 433 000
4	573 000	5 438 000
5	561 000	5 438 000
6	561 000	5 443 000

3. AIRCRAFT AND EQUIPMENT

3.1 Aircraft

The aircraft used was a Bell 206B helicopter, registration GCHE, owned and operated by Bighorn Helicopters.

3.2 Airborne Geophysical System

3.2.1 Magnetometer

A Scintrex H8 Optically Pumped Cesium Split Beam Sensor was mounted in the nose of the towed bird. The Larmor frequency output was processed by a High-Sense magnetometer counter that provides a resolution of 8 ppb (in a magnetic field of 50,000 nT this resolution is equivalent to 0.004 nT) ten times per second.

3.2.2 GPS Navigation

A Novatel 3751 twelve channel GPS receiver, which is an integral component of the HS-GFCS-II flight control system, was used with its antenna mounted on the towed bird to provide more precise magnetometer positioning.

3.2.3 Altimeter

A Terra TRA 3500 radar altimeter was mounted on the towed bird. This instrument operates to zero clearance and records the terrain clearance of the magnetic sensor.

3.2.4 Geophysical Flight Control System

The High-Sense GFCS-II geophysical flight control system monitored and recorded magnetometer, altimeter and GPS equipment. Input from the various sensors was monitored every 0.005 seconds for precise coordination of geophysical and positional measurements.

GPS positional coordinates and terrain clearance of the towed bird were presented to the pilot by means of LCD touch screen display.

The magnetometer response, the 4th difference, and altimeter profile were also shown on the LCD touch screen display for real time monitoring of equipment performance.

3.2.5 Digital Recording

The output of the magnetometer and altimeter as well as uncorrected GPS coordinates were recorded digitally on disk at a sample rate of ten times per second by the HS-GFCS-II system. Line number, GPS time and system time were also recorded for use during subsequent differential GPS correction.

3.3 Ground Monitoring System

3.3.1 Magnetometer

A GEM Systems Overhauser magnetometer (GSM19W) was operated as a base station to record diurnal variations of the earth's magnetic field. Readings with a resolution of 0.1 nT were recorded digitally and synchronized with GPS time for accurate correction of the airborne data.

3.3.2 GPS Monitor

A Novatel 751 ten channel receiver with a fixed antenna was also active at the base of operations. Raw satellite data was digitally recorded to enable differential correction of the corresponding airborne data.

3.3.3 Recording

The output of the magnetic and GPS monitors was recorded digitally on a dedicated PC. A visual record of the last forty minutes of activity is graphically maintained on the computer screen to provide an up to date appraisal of significant activity. At the conclusion of each production flight raw GPS and magnetic data were transferred to the main compilation computer.

3.4 Field Compilation System

A Pentium PC computer and a Cannon BubbleJet colour printer were used for field data processing and presentation. Processing software and procedures were developed by High-Sense Geophysics Limited, and include the Geopak RTICAD imaging system.

4. PERSONNEL

4.1 Field Operations

High-Sense field technician	: Yvonne Storm
Bighorn Helicopter pilot	: Neil Davidson

4.2 Project Management

Hastings Management Corp.	: Bob Woodfill
High-Sense, Toronto office	: Zbynek Dvorak

5. SURVEY PARAMETERS

Traverse Line spacing	: 200 metres
Control Line spacing	: 3 kilometres

Nominal Terrain clearance	: 45 metres sensor height 65 metres aircraft height
Navigation	: Global Positioning System
Traverse Line direction	: East - West
Control Line direction	: Perpendicular to line direction
Measurement interval	: 0.1 sec
Airspeed (nominal)	: 90 km/hr
Measurement spacing (nominal)	: 2.5 metres
Airborne Digital Record	: Radar Altimeter Total Field Magnetics Time (Local and GPS) Raw Global Positioning System (GPS) data
Base Station Record	: Ambient Total Magnetic Field Raw Global Positioning System (GPS) data Time (Local and GPS)

6. OPERATIONS AND PROCEDURES

6.1 Flight Planning

Survey block outlines were given to High-Sense by Hastings Management Corp. These coordinates were used to generate pre-calculated navigation files which were used by the airborne data acquisition system to plan flights at the designated line spacings.

6.2 Base Station

The magnetic and GPS base station was established at the spare heli-pad which was located at a Cranbrook resident's home, approximately 10 km outside of Cranbrook. A suitable site for the base station magnetic sensor, GPS antenna and data acquisition computer was selected. The GPS antenna should be located at an accurately surveyed position point, since positional errors are carried through to the differentially corrected data. Because no control point was available, the location of the GPS antenna was determined by recording several hours of GPS data and averaging the resulting antenna coordinates (the assumption being that deliberate errors introduced by military 'selective availability' satellite signal distortion will average to zero over a long period of time). The resulting positional fix, used in all subsequent differential correction, was:

49° 33' 7.5515" N	960 m a.s.l.
115° 46' 39.9499" W	(WGS 84 spheroid)

6.3 Data Compilation

Data recorded by the airborne and base station systems was transferred to the field compilation system. As each flight and/or area was completed, the following compilation operations were carried out.

6.3.1 Flight Path Correction

The GPS data was differentially corrected to remove errors introduced by 'selective availability', an intentional accuracy degradation method used by the military. The correction process uses the known fixed location of the base station to calculate the error associated with each satellite. These errors are then removed from the survey GPS data enabling a position to

be calculated with an accuracy in the order of three meters, with four or more satellites in view.

Satellite visibility and coverage was good throughout the field operations. Both GPS receivers were generally tracking a minimum of seven satellites.

The navigational correction process yields a flight path expressed in WGS 84 Latitude-Longitude coordinates. Transformation to UTM coordinates used the following projection parameters :

	Semi-major axis (a)	Semi-minor axis (b)
WGS 84	6378137.0	6356752.3142
Clarke 1866 (NAD 27 Alberta & BC)	6378206.4	6356583.8000

Local datum shift applied :

Delta X	:	7
Delta Y	:	-162
Delta Z	:	-188

UTM central meridian	=	117° W
False Easting	:	500 000
False Northing	:	0

6.3.2 Magnetic Corrections

The diurnal variations recorded by the base station were edited to remove any noted man made variations and then filtered. The filtered data was then subtracted directly from the aeromagnetic measurements to provide a first order diurnal correction.

Optically pumped magnetic sensors have an inherent heading error, typically the error is several nanoTeslas, peak-to-peak, as the sensor is rotated through 360 degrees. On reciprocal flight line directions the heading error is reasonably predictable; corresponding correction was made on the basis of aircraft heading. For this system the heading error was less than one nT.

Control lines spaced at variable intervals were flown parallel to the long axis of the survey areas, to be used in the event that base station subtraction did not provide adequate level correction. The residual differences between the control and traverse lines were used to carry out a further refinement of diurnal and heading errors.

6.3.3 Map Products and Digital Data

Following processing in the Toronto office, one copy of final maps (scale of 1:20000), logistics report and digital archive data on CD-ROM for both blocks were delivered to the Hastings Management Corp. Vancouver and Cranbrook offices. One copy of the final maps at a scale of 1:50000 was delivered to the Hastings Management Corp. Cranbrook field office. One copy of final products of only the Moyie block was sent to the Kennecott Canada Inc. Vancouver office.

The maps consisted of black and white flight path maps, total field and calculated vertical magnetic gradient colour images with contours, flight path, and reference grids all at a scale of 1:20000, and a copy of each at a scale of 1:50000. The digital data included the profile data in Geopak database format with extraction software and final Geopak format grids. The digital data also includes READ.ME files describing the contents of each database.

Respectfully submitted,

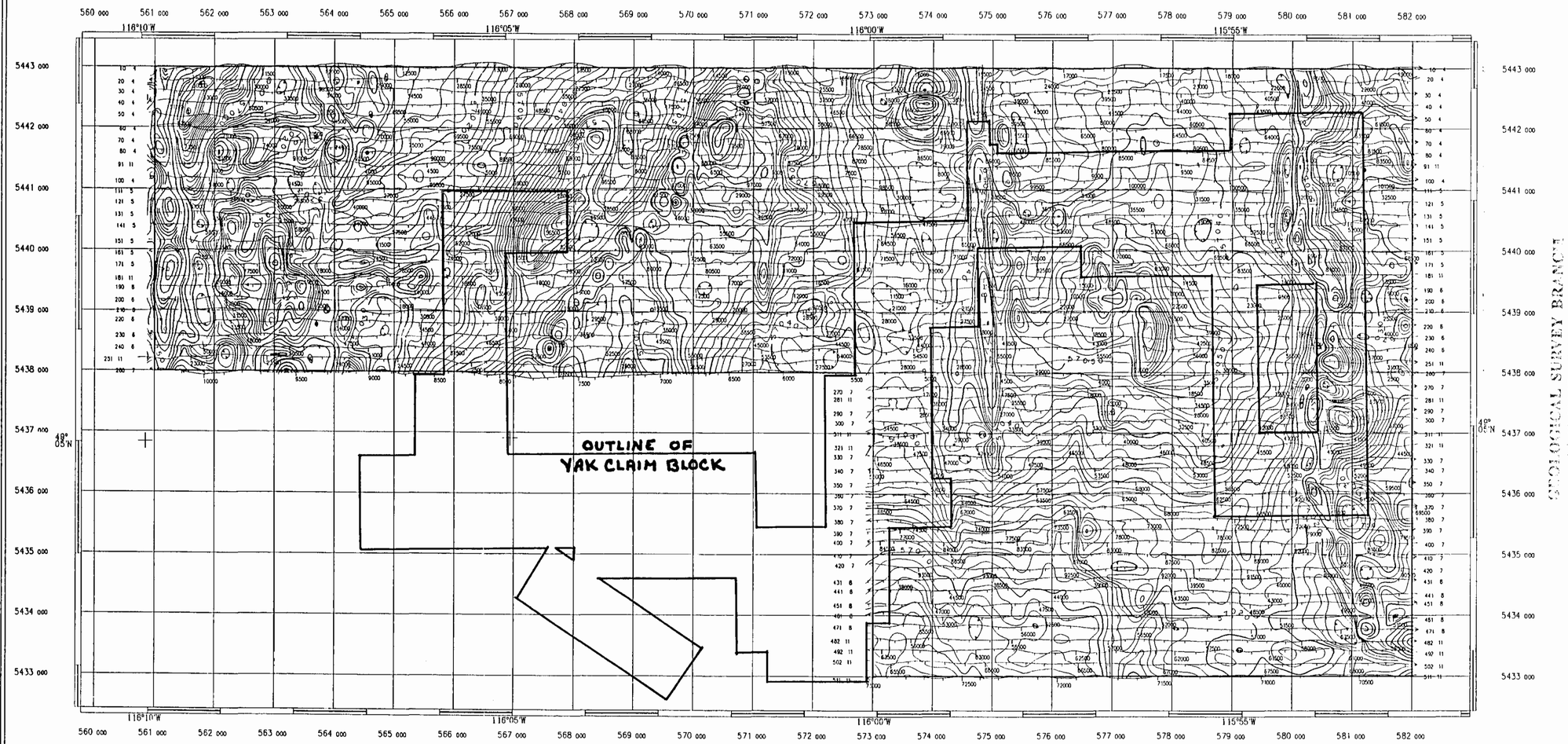
Yvonne Storm

Yvonne Storm
High-Sense Geophysics Limited
September 23, 1996

APPENDIX A: SURVEY AREA SUMMARY

Area Name	Line Kms.	
Moyie	1165.30	traverse lines
	81.40	control lines
	1246.70	total line km
Yahk	787.40	traverse lines
	52.50	control lines
	839.90	total line km
Survey Total:	2086.6 line km	

FIG. 5 AIRBORNE SURVEY



Scale 1 : 50 000

1250 0 1250 2500 3750

(metres)

SURVEY SPECIFICATIONS

Helicopter altitude:	65 metres a.g.l.
Bird altitude:	45 metres a.g.l.
Line Spacing:	200 metres

EQUIPMENT

HS-GFCS-II geophysical flight control system with the following sensors installed in the towed bird:

Magnetometer:	Scintrex H-8 cesium
Radar Altimeter:	Terra TRA 3500
GPS Navigation:	Novatel 3751 12 channel

COMPILATION

FLIGHT PATH:

GPS data recorded during the flight has been differentially corrected and transformed to correspond to the NAD 27 (Clarke 1866) UTM coordinate system.

MAGNETICS:

The magnetic data has been corrected for diurnal variation and heading error by a process of base station subtraction and control line levelling.

The grid interval is:	50 metres
Contour intervals :	2, 10, 50, 250 nT

GEOLOGICAL SURVEY BRANCH

ASSESSMENT REPORT

HASTINGS MANAGEMENT CORP.

Cranbrook, British Columbia

TOTAL FIELD MAGNETICS

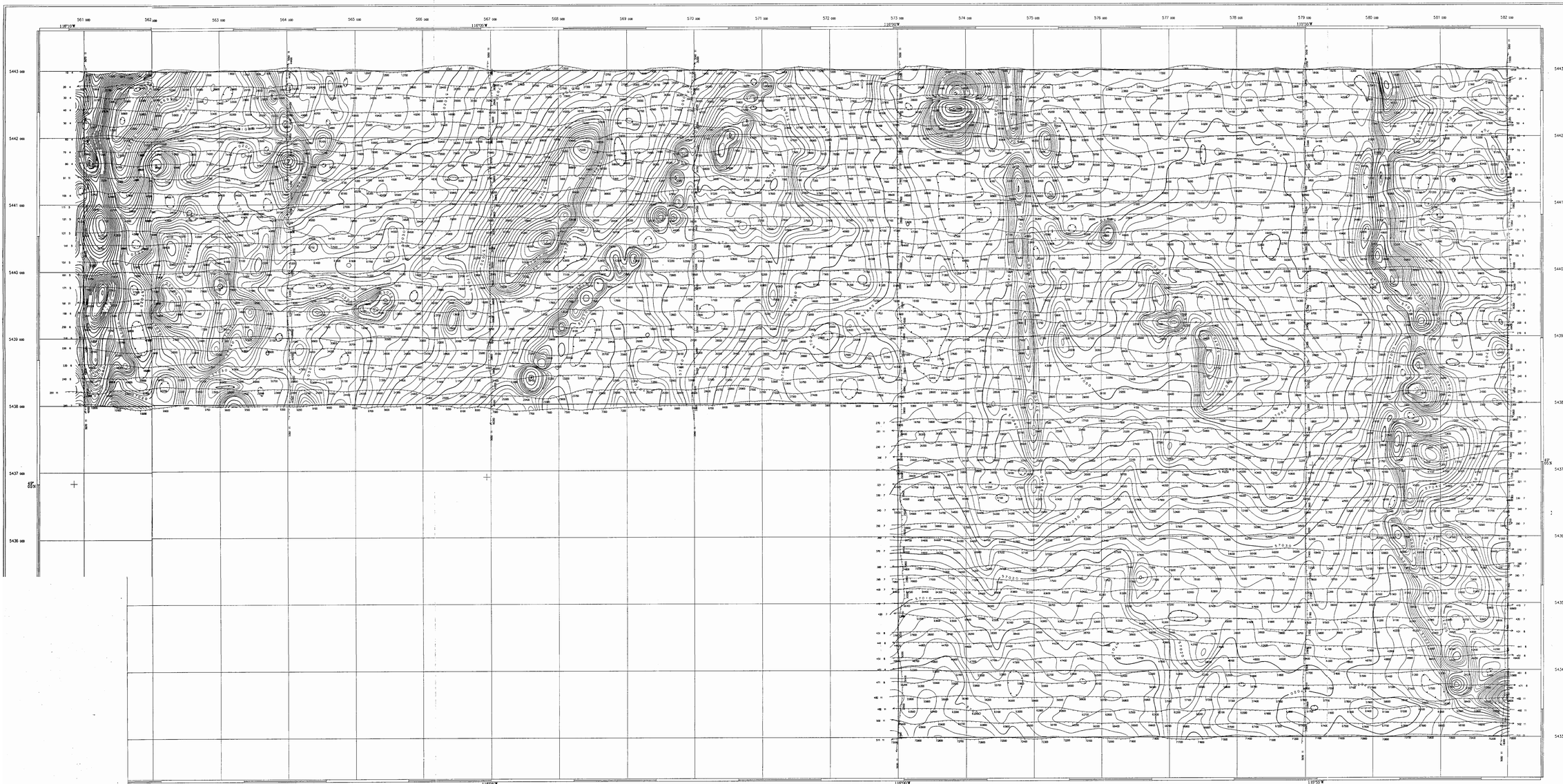
Yahk Block

MAP SCALE	1:50000	PROJECT REF #	960808-2
MAP SHEET		DATE FLOWN	Aug. - Sept. 1996
MAP PROJECTION	NAD 27 (Clarke 1866)	DATE COMPILED	Sept. 1996

SURVEY FLOWN AND COMPILED BY

High-Sense Geophysics Limited

47 Jefferson Ave.
Toronto, Canada
M6K 1Y3



Scale 1:20000

500 0 500 1000 1500

(metres)

SURVEY SPECIFICATIONS

Helicopter altitude:	65 metres a.g.l.
Bird altitude:	45 metres a.g.l.
Line Spacing:	200 metres

EQUIPMENT

HS-GFCS-II geophysical flight control system with the following sensors installed in the towed bird:

Magnetometer:	Scintrex H-8 cesium
Radar Altimeter:	Terra TRA 3500
GPS Navigation:	Novatel 3751 12 channel

COMPILATION

FLIGHT PATH:

GPS data recorded during the flight has been differentialy corrected and transformed to correspond to the NAD 27 (Clarke 1866) UTM coordinate system.

MAGNETICS:

The magnetic data has been corrected for diurnal variation and heading error by a process of base station subtraction and control line levelling.

The grid interval is:	50 metres
Contour intervals :	2, 10, 50, 250 nT

HASTINGS MANAGEMENT CORP.

Cranbrook, British Columbia

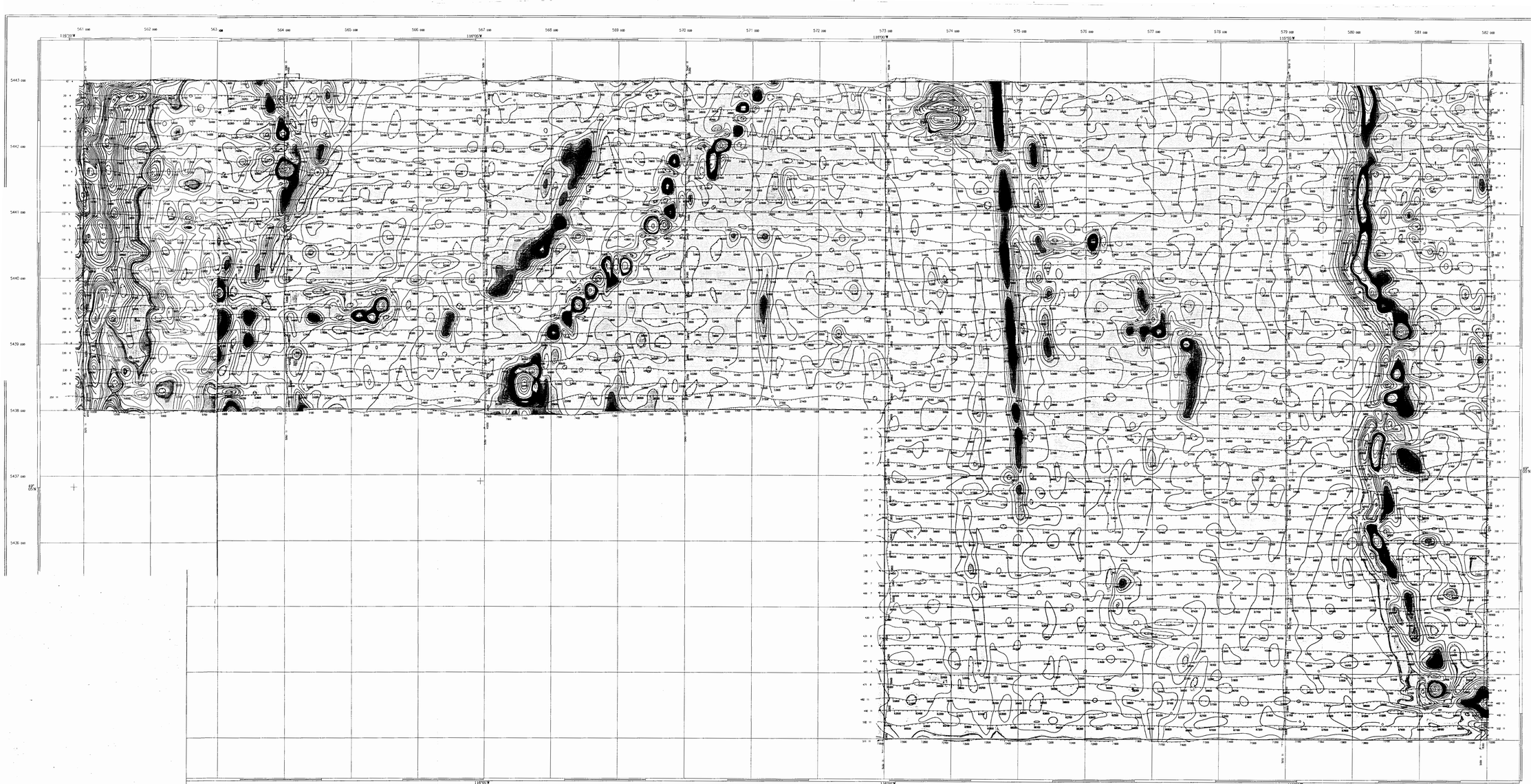
TOTAL FIELD MAGNETICS

Yahk Block

MAP SCALE	1:20000	PROJECT REF #	960808-2
MAP SHEET		DATE FLOWN	Aug.-Sept. 1996
MAP PROJECTION	NAD 27 (Clarke 1866)	DATE COMPILED	Sept. 1996

SURVEY FLOWN AND COMPILED BY: High-Sense Geophysics Limited, 47 Jefferson Ave, Toronto, Ontario M6K 1Y3

FIG. 6



Scale 1:20000

500 0 500 1000 1500

(metres)

SURVEY SPECIFICATIONS

Helicopter altitude:	65 metres ±20.
Bird altitude:	45 metres ±20.
Line Spacing:	200 metres

EQUIPMENT

MEP-GTCS-II geophysical flight control system with the following sensors installed in the towed bird:

Magnetometer:	Scintrex H-8 cesium
Radar Altimeter:	Terra TRA 3500
GPS Navigation:	

COMPILATION

FLIGHT PATH:

GPS data recorded during the flight has been differentially corrected and transformed to correspond to the NAD 27 (Clarke 1866) UTM coordinate system.

MAGNETICS:

The magnetic data has been corrected for diurnal variation and heading error by a process of base station subtraction and control line leveling.

The grid interval is:	50 metres
Contour intervals :	0.025, 0.1, 0.5, 2.5 nT

HASTINGS MANAGEMENT CORP.

Cranbrook, British Columbia

CALCULATED VERTICAL DERIVATIVE

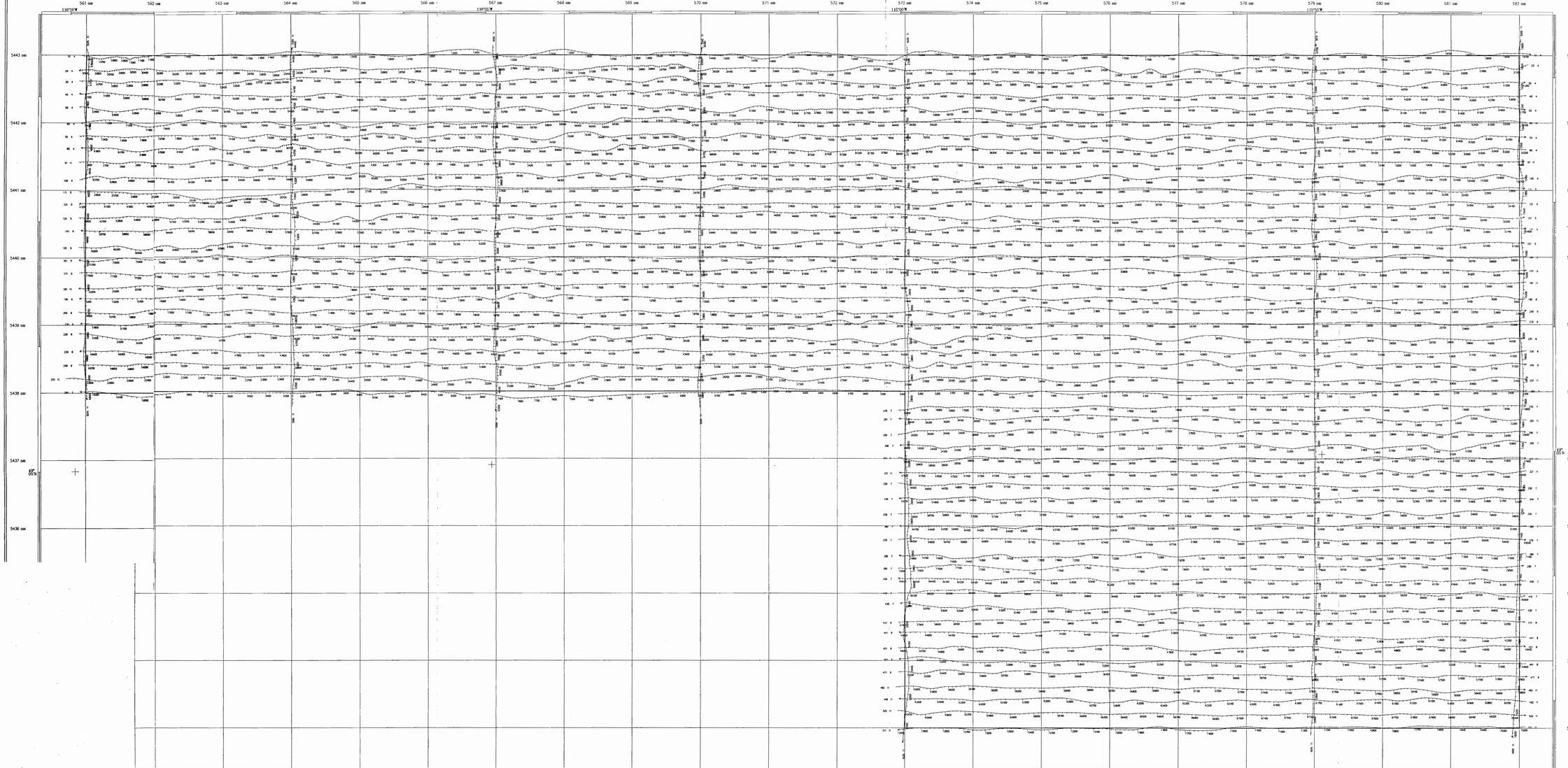
Tonk Block

MAP SCALE	1:20000	PROJECT REF #	960808-2
MAP SHEET		DATE FLOWN	Aug.-Sept. 1996
MAP PROJECTION	NAD 27 (Clarke 1866)	DATE COMPILED	Sept. 1996

SURVEY FLOWN AND COMPILED BY: High-Sense Geophysics Limited

47 Jefferson Ave. Toronto, Canada M5A 1R3

FIG. 7



Scale 1:20000

500 0 500 1000 1500

(metres)

SURVEY SPECIFICATIONS

Helicopter altitude:	65 ± 15 metres a.g.l.
Bird altitude:	45 ± 15 metres a.g.l.
Line Spacing:	200 ± 10 metres

EQUIPMENT

HS-GPCS-II geophysical flight control system with the following sensors installed in the towed bird:

Magnetometer:	Scintrex H-8 cesium
Radar Altimeter:	Terra TRA 3500
GPS Navigation:	Novatel 3751 12 channel

COMPILATION

FLIGHT PATH:

GPS data recorded during the flight was post-processed differentially corrected and transformed to conventional UTM to the NAD 27 (Clarke 1866) UTM coordinate system.

HASTINGS MANAGEMENT CORP.

Cranbrook, British Columbia

FLIGHT PATH

Yank Block

MAP SCALE	1:20000	PROJECT NO.	960808-2
MAP SHEET		DATE FLOWN	Aug - Sept 1996
MAP PROJECTION	NAD 27 (Clarke 1866)	DATE COMPILED	Sept. 1996

SURVEY FLOWN AND COMPILED BY: High-Sense Geophysics Limited, 47 Jefferson Ave., Toronto, Canada M6K 1Y3

FIG. 8